Title
Sustainable Solutions: Water Based Consolidants for the Treatment of Low-Fired Ceramics

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Sustainable Solutions: Water Based Consolidants for the Treatment of Low-Fired Ceramics

A thesis submitted in partial satisfaction of the requirements for the degree Master of Arts in Conservation of Cultural Heritage

by

Céline Wachsmuth

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ABSTRACT OF THE THESIS

Sustainable Solutions: Water Based Consolidants for the Treatment of Low-Fired Ceramics

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Master of Arts in Conservation of Cultural Heritage

University of California, Los Angeles, 2023

Professor Glenn Wharton, Chair

Abstract

This research combines practical bench conservation research with environmental and social sustainability concerns. After canvassing numerous professionals in the field, five water-based consolidants were chosen to explore a greener alternative to the predominant usage of solvent-based solutions for the treatment of friable surfaces of low-fired ceramics. Acrysol WS-24, Aquazol 200, Jade 403, Ethulose, and methylcellulose were all evaluated, each in two concentrations. Test tiles were fired and their surfaces abraded to mimic a powdery surface. Based on the experimental results of the test tiles, two consolidants, 7.5% Aquazol and .5% methylcellulose, were chosen to test on sherds from the education collection at the Museum of Indian Arts and Culture in Santa Fe, New Mexico. Conversations with Pueblo community members were also undertaken to contextualize the research and discuss the reasoning and consequences of conservation intervention.

The thesis of Céline Wachsmuth is approved.

Thiago Sevilhano Puglieri

Gregson T. Schachner

Glenn Wharton, Committee Chair

University of California, Los Angeles

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Despite not being big fans of museums, my siblings have supported me all the way and my parents have visited more museums than they ever thought they would making sure I knew they were there for me. I would like to give extra thanks to my Maman for helping translate my survey into French, as well as my cousin, Adrian for helping to translate my survey into Spanish. I am incredibly grateful to my fiancé, Will, for learning almost everything as I learned it and always being there for me, near and far. He also wrote Excel programs for me to convert my XYZ color values to L*a*b* and one following the 1996 equation for color change.

I very much appreciate the Foundation for the American Institute for Conservation for selecting me for the Take a Chance grant which supported my travel to Santa Fe, New Mexico to further contextualize my research through experimentation on samples and speaking with community members.

Most of my experimentation was done in Los Angeles and UCLA acknowledges the Gabrielino/Tongva peoples as the traditional land caretakers of Tovaangar (Los Angeles basin, So. Channel Islands). The place now called Santa Fe is recognized as Oga Po'geh (the White Shell Water Place) and is part of the land of the Northern and Southern Tewa. I would like to recognize my time on this land as a place I did part of my research.

1. Introduction

Low fired ceramics are ubiquitous in cultures and collections around the world and yet little literature exists on consolidation options for treating their often friable surfaces. While friability may be inherent to the ceramic, more often it is a result of use and aging. Using mock-ups, the performance of five water-based consolidants was compared for their use in surface consolidation of such low-fired ceramics. The goals of this research include evaluating more sustainable options for treatment not only for the benefit of the environment, but also for the health of conservators. Water-based consolidants may also benefit archaeological field work since access to solvents and hazardous materials is often limited. While controlled experiments give conservators an empirical framework for understanding aspects of the materiality of the heritage items we work with, such investigations are only one factor in the conservation decision-making process. The various cultural contexts of these ceramics should be just as much, if not more, of a guiding factor in treatment decisions. To that end, I worked with Landis Smith, Projects Conservator at the Museums of New Mexico Conservation Lab/Museums of Indian Arts and Culture, to have conversations with Pueblo community members concerning what is most important to them about their pottery as well as their thoughts on conservation intervention. Discussions with potters and community members underlined the importance of collaboration and making a treatment plan that respects the community's desires and intended use for a pot.

To learn about the currently used consolidants for low-fired ceramics, a survey was created and advertised on various conservation related communication channels in English, French, and

Spanish. Responses indicated a prevalent use of Paraloid B-72 for consolidation, a material well known for its stability and ability to be manipulated to suit a variety of treatments. Few conservators currently choose to use water-based solutions.

Five consolidants were chosen for testing: methylcellulose, Ethulose, Jade 403, Acrysol WS-24, and Aquazol 200. These were chosen based on a literature review and conversations with some archaeological conservators. Due to the COVID-19 pandemic, the testing was pivoted from the UCLA/Getty Program labs to my Los Angeles residence. Although it was not planned, the low technology set-up more closely replicated the archaeological field experience. To make the sample mock-ups, raw materials were purchased from New Mexico Clay and fired in an electric kiln at approximately 730°C. Easily accessible materials were used to roughen the ceramic sample surfaces and craft two aging chambers - one for high temperatures and one for high relative humidity - in attempts to recreate potential storage environments. Each consolidant was tested at two different concentrations and applied by brush. The samples were split into three groups: a control and one set for each of the aging chambers. They were photographed using a digital single-lens reflex (DSLR) camera along with detail shots of the surface using a USB DinoLite Microscope. A simplified tape test was performed on the surfaces and a portable FieldSpec 3 fiber optic reflectance spectroradiometer was used to take color measurements. Preliminary results suggested a low concentration solution of methylcellulose as a possible alternative to solvent-based solutions.

2. Conservation Values in Flux

The field of conservation has changed immensely since George Stout first suggested that the profession is like a three-legged stool, with the legs being scientific analysis, art historical research, and practical methodology (Stoner 2003). We have slowly incorporated more legs and arguably wear infinitely more hats in the day-to-day machinations of our professional lives. These changes have been happening over the last few decades and have shifted the focus of conservation from a scientific examination of the physical nature of a thing to include its intangible context as well. In her article on the Social and Historic Construction of Professional Values in Conservation, Mariam Clavir gives an overview of why conservation became heavily science driven, detailing how in the 1930's science had been shown to be relevant and useful in many museum applications such as the development of new pigments and understanding the deterioration of archaeological metals (Clavir 1998). Science had the answers and at the time it was "held to be more crucial than indigenous belief systems regarding these same objects" (Clavir 1998, 4). In his 2012 book, Salvador Muños-Viñas examines the different ways that an object's cultural value and condition can be interpreted and enters into the discussion of the Western European framework many of the values are based on. Muños is not the first to note that conservation is dynamic. In a publication from 2001, Elizabeth Pye states that "conservation choices depend on a range of factors, not just the condition of the object, thus there are no standard approaches" (Pye 2001, 121). Conservators look at the whole, and while we can base our original treatment plans off of experience and literature, we must acknowledge and be prepared for the fact that every object we treat is different.

These conversations are not new to the field, but their integral incorporation into daily practice has been slow. In her talk at the 44th AIC Annual Meeting General Session, Sanchita

Balachandran challenged the notion that any change has actually been made in how conservators approach their practice, saying “instead, as cultural institutions and museums are struggling to remain relevant, the conservation profession has continued to devote its focus to technical questions and solutions. Our rapid embrace of new treatments, imaging techniques and analytical methods stands in stark contrast to the lack of engagement with the social and political concerns that swirl around the objects we are called upon to preserve” (Balachandran 2016). While rich discussion around these epistemologies of truly holistic conservation practice exist, the field as a whole has been hesitant to wholeheartedly embrace these changes. Chris Taylor explores the idea that museums are systems (entities with a chain of command and procedures) and they must recognize that it is “more critical for museums to recognize these systems because museums have the power, through our work, to either perpetuate these systems or break down these systems” (Taylor 2017). Artistic director of the 2029 Chicago Architecture Biennial, Yesomi Umolu, also argues for museums to recognize the power that they have and notes that, among other things, museums must accept that they uphold systems of harm by existing as they do now before they can move forward into equitable spaces (Umolu 2020).

In 1982, Gaël de Guichen had already noted that society has both a tangible and intangible effect on material and pointed out the damaging effects climate change was imparting on cultural heritage materials, particularly on limestone sculpture (de Guichen 1982). In addition to calls to be more socially conscious and sustainable, the field has also, slowly, been acknowledging the impact of climate change on the cultural heritage sector. Mary Cassar noted a few of these negative impacts such as flooding, drought, and changes in soil moisture and chemistry that have all affected the burial environments of artifacts and has put many of them at greater risk (Cassar & Pender 2005). In northern Alaska, where permafrost used to provide a

stable, ideal environment, for preservation of un-excavated materials, the warming of the earth has caused the permafrost to melt and has put these objects and great risk of being completely lost (Hillderdale, Knecht, & Jones 2019). This same area is also prone to erosion from rising sea levels, creating challenges for archaeologists and cultural heritage stewards alike. A number of responses to climate change have sprung up, including Ki Culture and AIC's Sustainability Speciality Group which work to bring awareness to these issues and provide resources about how conservators can make changes to their practices to be more environmentally sustainable. Megan de Silva and Jane Henderson also published an article in 2011 outline ways conservators can incorporate sustainable practices into their work and in the Spring of 2020, Emerging Conservation Professionals Emma Hartman and Natalya Swanson hosted a podcast titled "Conservators Combating Climate Change" to highlight some professionals who are already enacting change in their professional lives.

3. Engagement with Pueblo Community Members

To uphold these changes in conservation approaches and considerations, I knew that I needed to find a way to not only engage with the literature and other conservation professionals but also with members of a source community. The conservation process is never performed in isolation - there is always a context to the treatments performed. Pottery from Pueblos in New Mexico and nearby areas was studied and used as the basis for the raw materials for experimentation. I engaged with members of three Pueblos in New Mexico to help deepen my understanding of the variety of impacts conservation intervention has on living communities.

3.1. Brief History of Pueblo Pottery

Pottery has a long history in Pueblo communities and is often passed down through family members and serves as a connection to their ancestors. Raw materials were carefully gathered from their surroundings and handled with care and respect during the creation of a vessel (Naranjo 1994). Traditionally, vessels were made using the coil-and-scrape method. They would then be slipped and polished (personal communication 2023)

"Designs were painted on the surface using vegetable or mineral pigments with brushes made of yucca leaves. The final step was firing, which was done in an open pit using a variety of fuels from coal to wood to animal dung." (Fletcher 2006, 123)

Some Pueblo potters today maintain traditional methods while embracing more contemporary forms, like Hubert Candelario, San Felipe Pueblo, who "works with Native clay taken from sources in or near the San Felipe reservation in New Mexico" (Fletcher, 2006) to make is 'holey' pot series, a stark deviation from traditional pottery. Other Pueblo potters maintain traditional techniques and forms, such as former Jemez Governor Joshua Madalena, who revived the Jemez black-on-white pottery tradition that once "thrived from 1300 to 1700. It vanished with the Spanish reconquest" (Madalena 2015).

In addition to some forms of pottery being entirely lost to the Spanish conquest, those forms that did survive were ultimately changed due to the onset of colonialism in the American Southwest and "the Pueblo potter was being made to fit the sensibilities of the Anglo-American tourist and anthropologist" (Naranjo 2006, 47). This came about with the expansion of the railroad and subsequent tourism that changed the Pueblo markets from barter trade to a monetary economic system.

3.2. Respectful Collaboration

One of the main goals of this research was to have the work be holistic - it should be an experiment grounded in real world applications and considerations. In addition to considering environmental sustainability among other things, this research also considers social sustainability. Social sustainability takes “a people centered approach, caring for others, considering a multitude of interconnected perspectives, and creating an equitable future for everyone” (Christidou et al 2023). Conservation treatment is never completed in a vacuum and it should follow that conservation research is not either. To accomplish this goal and with the help of conservator Landis Smith, in the fall of 2021 and spring of 2022 I had conversations with four individuals from Pueblo communities in New Mexico: former Governor Joshua Madalena, Jemez Pueblo; Dr. Tessie Naranjo, Santa Clara Pueblo; Eliza Naranjo Morse, Santa Clara Pueblo; and a potter of San Idelfonso Pueblo. The conversation with Gov. Joshua Madalena took place over Zoom and conversations with the other Pueblo community members took place in person during a visit to Santa Fe, New Mexico.

In preparation for these conversations I composed a list of questions to help steer the conversation, however the pace and actual direction was determined by the community members gracious enough to spend time talking about their thoughts on the importance of pottery to them and their communities, their thoughts on conservation in general, and thoughts on the materials used for conservation treatment. The questions around conservation generally centered on the conservation of pottery and specifically consolidating crumbly pots. In all conversations around conservation, the question of when to treat and when not to treat was always considered and was always connected to the reason for treatment. The “why” of treatment ultimately drove their thoughts on whether or not a pot should be consolidated. Usually, the community members would not recommend the treatment of a pot unless

absolutely necessary for learning purposes or if there was risk of losing information and material. They felt that treating objects is an intimate task, one that cannot be done impartially and should involve the members of the originating community from the beginning whenever possible.

3.3. Shared Knowledge

The community members I engaged with consider Pueblo pottery to be alive. Some suggested that by using chemicals and harsh solvents in conservation treatments, the conservator could be suffocating the being that is or was the pot (personal communications, 2021 & 2022). This is not information conservators would likely know without having first conversed with a Pueblo community member yet it is a crucial piece of information needed in order to decide the best course of treatment. If consent is given to treat an object, the solution chosen for treatment should be as natural as possible to honor the being of the pot. This was a conclusion all community members came to in conversations with them. In conversing with former Gov. Madalena, he shared his passionate opinions that power should be given back to the communities through actions such as members performing the actual treatments. His relationship to pottery, like many, is one that comes from family and tradition and there is power in having the knowledge and agency about it.

The conversation with Dr. Tessie Naranjo and Eliza Naranjo Morse took place at the same time. It was a privilege to hear perspectives from two generations in the same family - Tessie, an elder and Eliza, her niece. Neither is a potter by trade, but their family has many potters and they are both familiar with the art, Eliza herself is an artist who does incorporate clay in some of her work. The feelings in the conversation were a mix of sad and inspired as Tessie shared her solemn feelings about being surrounded by beings (pots) that no longer had a purpose or life as

they are in limbo sitting in storage and Eliza shared her hopefulness at the conversation taking place and the weight being given to their opinions. She shared the difficulties she has had in straddling two parts of her identity, as someone integrating contemporary sensibilities into her artwork without all of the knowledge of her ancestors and elders. This conversation in particular reinforced the importance of ceding agency to communities and making museum collections available and accessible.

These conversations were possible because of the relationship already built between the community members and Landis Smith. She has spent time with people both in and out of Pueblo communities, resulting in a level of trust and comfort essential for deep discussions. When engaging in conversations, conservators should do so with the intention to build on that initial conversation, that it should not be a one-off thing to be checked off a to-do list. Instead of just looking for a “rubber stamp of approval”, as one community member I spoke with put it, these interactions should be approached with respect and not taken lightly. It is increasingly expected as part of conservation intervention to consult with the source community, which is a positive engagement, but after centuries of hurt, having knowledge and cultural materials taken away, gatekeeping, and overall distrust, these conversations will not always be easy and will not always leave the engaged parties feeling positive. In my discussion with the Naranjo family, they stated that the emotional discussion needs to happen before there can be space for objectivity and that ultimately, we should seek to come together to share our knowledge. The second point of the American Institute for Conservation’s Code of Ethics states that “All actions of the conservation professional must be governed by an informed respect for the cultural property, its unique character and significance, and the people or person who created it.” (AIC 1994). Conservators cannot be entirely informed without prior engagement with the community whenever possible. An exceptional conservator will approach a treatment with humility and the

knowledge that each object has the potential to behave differently, even if it is made of the same material as objects treated in the past, and that humility serves well in discussions with community members. Conservators work in a system built on colonization and as well intentioned as we may be, these ties need to be acknowledged in order to move forward with people and with objects.

In addition to approaching conversations with community members with good intentions and respect, conservators should approach the objects we treat with the same. As mentioned earlier, many Pueblo people consider pots to be alive, which should change our treatment approach to consider only non-toxic materials so as not to suffocate them. Based on some of my conversations, this knowledge should not only change what materials we choose but also when we choose to interact with a pot. When we interact with a being, our mood should be in-offensive. Similar to how an individual's feelings, when strong enough, are felt by those in proximity, this is also possible with the pots and other spiritual/ceremonial objects. Moods can affect the outcome of treatment. This principle exists for human bodies, Harvard Health states that "there's a strong link between good mental health and good physical health, and vice versa." (Harvard Health) and with the knowledge that Pueblo pots are alive, we should approach them with a positive presence during their treatment. wesConservation is more than just bench work so treatment can be returned to when in a good state of mind. All of these things may make a conservator feel uncomfortable because they are just objects, why go through all these "extra" steps for something that the conservator themselves may not believe in? Because of respect for the descendant communities and adherence to an ethical and holistic conservation practice.

Most humans aim to make a good first impression - we want to look respectable and presentable. The same principle largely applies to objects. Generally, community members take pride in their material heritage, and to treat something poorly, or doing something disfiguring would be disrespectful and misrepresent the skill and respect that went into creating something, like a pot. Conservators have a responsibility to do their best to honor the practices and beliefs of the communities whose heritage they work with.

4. Condition Issues of Low Fired Ceramics

Raw clay materials are found all over the world, making ceramic vessels ubiquitous tools for everyday tasks in cultures worldwide. Pit fires and bonfires were first used to “cook” clays before the development of kilns able to sustain high temperatures. During firing, clay-shaped objects are surrounded by flammable material, which is then burned to heat the pottery. Organic material is often added to keep the fires burning for longer intervals. Kilns enable greater heat retention, making higher internal temperatures possible, as well as greater control over firing atmospheres. At higher temperatures, morphological changes such as sintering begin to take place within the clay. Sintering is the “welding together of small solid particles by applying a heat or pressure treatment below the melting point” (Hammer 2019).

While ceramics are generally considered stable materials in collections, they can deteriorate from improper storage and handling and may have sustained damage prior to entering a collection environment. Pots fired at lower temperatures are inherently weaker and more susceptible to damage and deterioration. Mechanical damage is often the most commonly found, along with deterioration related to manufacturing, impact damage, abrasion, thermal shock, soluble salts, frost, plant roots, dirt and staining, encrustations & concretions, iron

staining and mold growth (Buys & Oakley 1993). If the raw materials of the ceramic paste (clay and tempers) weren't mixed well or in proper proportions, this can cause some of the previously mentioned problems after firing. Drying before firing can also cause issues, some of which may not be noticeable until after the ceramic is used. Impact damage can occur from use life and improper handling during excavation and while in a collection. Abrasion can occur during the use of the pot, especially if it is being used for cooking (i.e.-a ladle scraping along the rim) and during the burial (i.e.-when sand or other particles repeatedly wash/blow over the surface). Thermal shock and frost can cause cracking and spalling (powdering and loss of the ceramic from the migration of salts). Soluble salts can be incredibly harmful to the pot, especially those that deliquesce (liquify) at a given relative humidity (RH) and resolidify when the RH stabilizes. Salts can cause a great deal of stress and damage and can affect a pot during its use life as well as in the burial environment-the most common problematic salts are chlorides, nitrates, and phosphates (Buys & Oakley 1993, 23). While buried, it is possible for the ceramic to soften enough that plant roots begin to push their way into and grow through the ceramic body. Dirt and staining, while not necessarily structurally damaging, can bring disfiguring aesthetic changes, especially iron stains. Encrustations and concretions may also be disfiguring without affecting the overall structure. In some cases, mold growth is possible. Other types of conservation intervention in other areas, if improperly applied or if the materials used migrated into another area of the object, may also be condition issues noted on a ceramic vessel. Extended contact with water can also cause damage to a pot, especially low fired wares because it can soften it and has the potential to cause the vessel itself to dissolve. In the treatment of a mud sculpture, conservators opted to not use water-based consolidants because of the susceptibility of the material (Drosdik et al. 2017). This does not, however, preclude water-based consolidants as an option for all low-fired wares, it is simply another factor to

consider. Sometimes, water-based consolidants are preferred for large scale treatments where the use of solvents is impractical (Down 2015).

4.1. Previous & Current Treatment Practices

Consolidation is a treatment that will hold a crumbling substrate together. A consolidant will take the place of the original binding material within the substrate (Down 2015) and will either do this by linking chemically to the particles of the substrate or by forming a mechanical supporting network throughout the substrate while being inert to it. (Buys & Oakley 1993) A consolidant is sometimes made of the same material as an adhesive, but for consolidation purposes, the concentration is significantly lowered.

Materials selected for consolidation have changed since the first attempts at this kind of treatment. In the 1950s, the British Museum routinely consolidated ceramics with polyethylene glycol (Carbowax) using vacuum impregnation (Smith S. 1998). This treatment was unsurprisingly unsuccessful; the vessels would sweat (start leeching material) at high RH and attract dirt and would sometimes disintegrate during treatment. In the 60s and 70s soluble nylon (N-methoxymethyl nylon), which is a chemically modified form of nylon with formaldehyde (Sease 1981) was used as a consolidant for powdery surfaces, as its initial working properties were desirable. This also was discontinued as “1 the film had attracted dirt and dust, badly discoloring the objects and obscuring painted decoration; 2 the film was not matte; 3 the film had exerted strong contractile forces, peeling off the surface of the object with it; 4 the film was no longer flexible; and 5 the film was insoluble. Of the desirable properties originally claimed for it, permeability to water is the only one that seems to be maintained over time” (Sease 1981).

Today, “the most common consolidants are synthetic resins applied in dilute form (e.g. 5-10% w/v Paraloid B-72 (an ethyl methacrylate-methyl acrylate co-polymer) in acetone).” (Down 2015, 188) In some cases water-based consolidants are considered as well. Certain isocyanates, silanes, siloxanes, and methyl methacrylate, while developed for stone, can have applications in ceramics as well. (Buys & Oakley 1993) poly(vinyl acetates), poly(vinyl butyral) (aka Mowital B30H), and Acrysol WS-24 have also been used to consolidate ceramics more recently.

5. Canvassing the Field

To gain a better understanding of current practices in the field of conservation, I conducted semi-structured interviews with fifteen conservation professionals. I reached out to object conservators who have publications regarding ceramic treatment as well as those who I knew have experience with treating ceramics and who were recommended to me. Individuals were asked about their own practices when treating ceramics, both high and low fired, as well as their thoughts on using water-based solutions as opposed to solvent-based ones. These conversations led to the development of a survey that was released to the conservation community at large. The survey was translated into both French and Spanish in hopes of gathering answers from a wider range of conservation professionals.

5.1. Consultation with Conservation Professionals

Consulting recognized professionals proved to be a rich and informative method of deepening my understanding of current practices in the field. Some of the most notable information I gathered from my conversations included learning from Lynn Grant, Head Conservator at the Penn Museum, that generally cellulose ethers are unlikely to leave a shine on the treated surface. methylcellulose is commonly used for a variety of treatments in the Penn labs as there

is often already a solution made up. She had previously used this for treatments on site in Copán, Honduras, noting that it had to dry relatively quickly because it had the potential to mold. She has used Primal previously on site but noted that it left a shiny surface. PVAs, while accessible and used in many places, such as in Central America, are not good options for field work because the surface stays tacky and attracts dirt. Nancy Odegaard, Conservator Emerita of the Arizona State Museum, also shared that PVA's are widely available and used in developing countries and suggested I use one for comparison in my research to make it more relevant to a wider audience. She shared that Acrysol was popular in the 90's for wall paintings conservation and was diluted to alter the working properties. Objects conservator in private practice, Tony Sigel noted his use of Acrysol as an inpainting medium on glazed ceramics and advocated for the use of Paraloid B72 in acetone and ethanol for most ceramic treatment needs such as assembly and consolidation. I had the privilege of engaging in discussion with a number of other conservation professionals who influenced my thesis in one way or another.

The most influential discussion however, was with Geneva Griswold, Objects Conservator at the Seattle Art Museum. I spoke with her as I was coming to the realization that the COVID 19 Pandemic related restrictions would mean that I could not use solvents. She shared that as she had started taking on private clients, she often searched for solvent free solutions and that sticking to water-based consolidants would be of great interest not just to her but also to other conservators whose consideration of health and safety is paramount whilst working on-site or in smaller labs.

In all consultations, I was able to learn practical information about preferences and concerns that is not always gleaned from academic papers.

5.2. Survey Development & Dissemination

The survey was designed on Google Forms and consisted of twelve main questions and four follow up questions. The main questions consisted of one asking where the respondent was trained, ten questions about a treatment they performed on a low-fired ceramic, and one asking if they would like to fill out the survey again regarding another treatment. Respondents had the option to fill out the survey for three different treatments if they wished. The survey was translated into French and Spanish, and links for the other two language options were included in the general survey description. The survey was advertised on the American Institute for Conservation's message boards (General Discussion, Archaeological Discussion Group, and Object Specialty Group), various Facebook pages (personal and public), and the thesis specific Instagram account.

5.3. Survey Results

Thirteen professionals responded to the survey. Only the English translation was replied to. Seven respondents were trained in the United States, two in Canada, one in Portugal, one in the Netherlands, and one in the United Kingdom. A total of seventeen treatments were detailed (two respondents chose to detail three treatments each). The ceramics treated were all semi-porous to porous and most of the treatments took place in a lab setting. Some of the labs were mentioned to have had fewer resources and some respondents performed treatments in the field. One performed the treatment in their home during the pandemic.

As detailed in Figure 1, the majority of treatments used Paraloid B-72 in varying concentrations, dissolved in either acetone, ethanol, or xylene or some combination. All other consolidants mentioned were only used in one instance: polyvinyl alcohol (PVA) based emulsion, Klucel (a

type of hydroxypropylcellulose) in ethanol, an ethyl silicate, Funori (a carbohydrate extract from seaweed), Paraloid B67 (an isobutyl methacrylate polymer) in stoddard solvents, methylcellulose in water, and Acrysol WS-24 (an acrylic dispersion resin). In most cases, no other consolidants were tested prior to treatment, generally due to the respondents' familiarity and previous history with using the chosen consolidant. The consolidants mentioned as having been tested but not ultimately chosen were: polyvinyl acetate (PVAc), methhycellulose, Klucel G & H, and polyvinyl butyral. Some conservators noted that they tested the type of solvent for its compatibility and behavior with the surface.

While Paraloid B72 was the favored resin due to its familiarity, wide availability, good working properties, and adaptability to fit many needs, participants also mentioned some caveats. There is the potential for the consolidant to darken the surface beyond an acceptable amount and results in exposure to less than ideal fumes. Similar to the personal conversations, the survey results suggest interest in finding other alternatives.

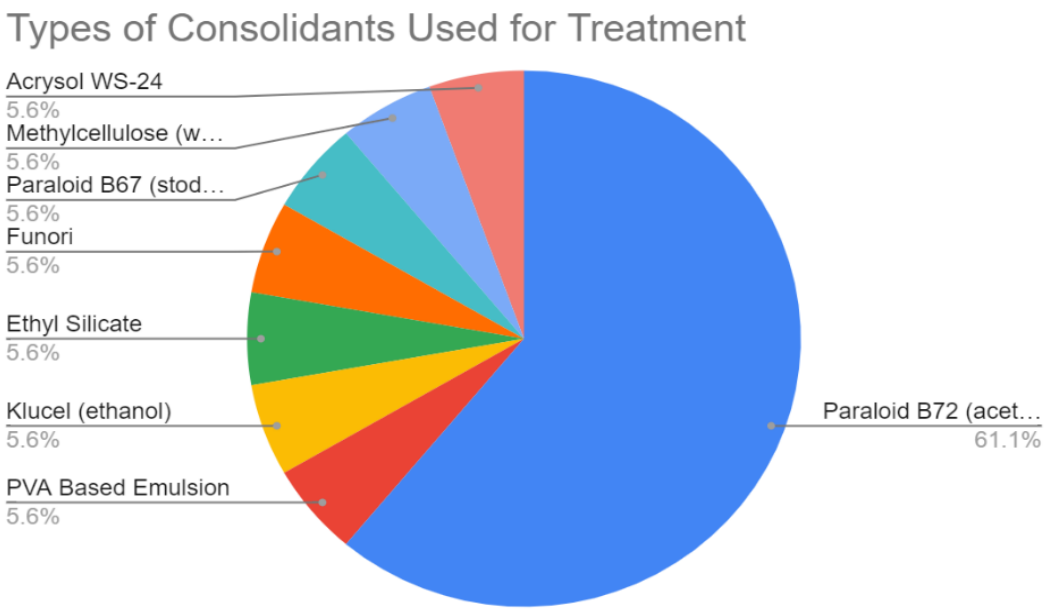


Figure 1: Pie Chart of Types of Consolidants Used for Treatment Based on Survey Results

As depicted in Figure 2, the consolidant was most often applied by brush. Pipetting was also quite common; there was one mention of using a hypodermic needle and one mention of a squeeze bottle. Respondents mentioned the control that using a brush would offer to apply the consolidant. Some responses mentioned that the consolidant was applied to the point of saturation. A solvent chamber was used in one instance to minimize the surface color change. Many respondents also stated that they would pre-wet the surface prior to treatment to mitigate the color change and increase penetration.

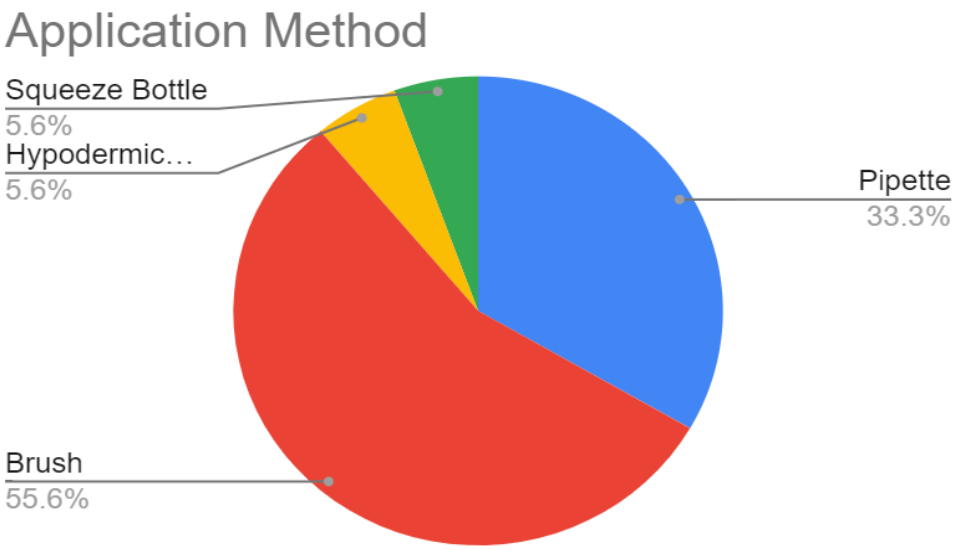


Figure 2: Pie Chart of Application Methods Used based on Survey Results

Most respondents said their treatments were due to structural concerns, however there was also a concern for surface stability associated with these issues (Figure 3). Most condition descriptions included powdery surface/spalling/flaking/delamination. Three mentions of these issues were related to salts and six were not specified. Powdery/flaking paint/slip, cracking, and broken/fragmenting clay body were also mentioned as condition issues. Two responses related to broken/fragmenting Cuneiform clay tablets.

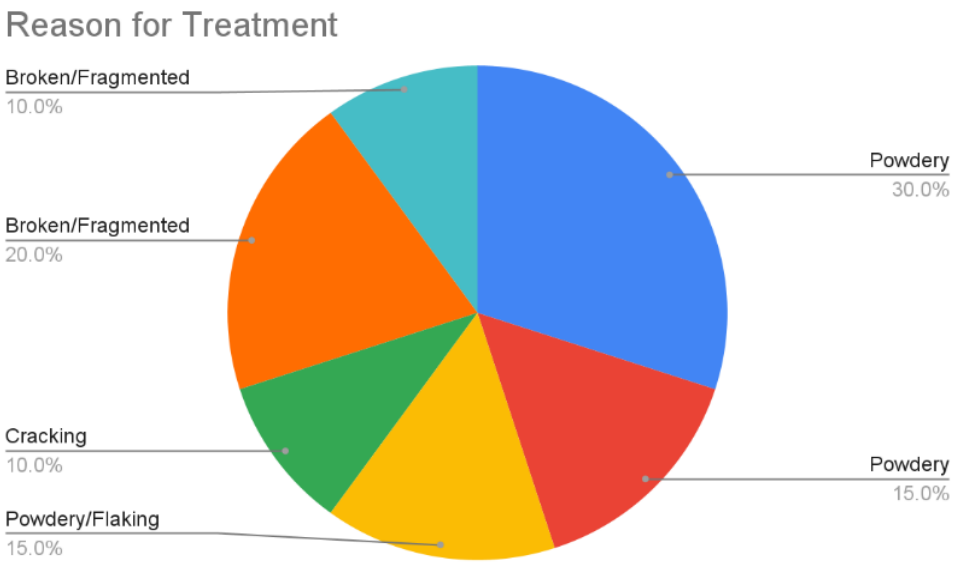


Figure 3: Pie Chart of Reasons for Treatment in Survey Results

5.4. Social Media Engagement

Social media is an increasingly important part of engagement with wide audiences and as a social experiment, I made an Instagram account specifically for detailing the experimentation progress of this research. The account is public and can be found on the Instagram application or web page by searching for the account @stuckinsideconservation. A weekly posting schedule was attempted for every Thursday in the spring of 2021, labeled on the page as #ThesisThursday. Through this page, two suggestions were made which added to the experimental protocols. One follower asked about the potential for the nail polish used to cover the number on the top of the tile to yellow during aging and thus obscuring the label which led to the addition of labeling on the side and back of the tiles. Another follower asked about how well the relative humidity chamber was sealed. This led to a closer look at the chamber testing DataLogger data which showed an increase of air exchange in the chamber. As a result, the seal of the box was reinforced using blue tape, significantly decreasing the air exchange to an acceptable level.

6. Background of Selected Consolidants for Testing

Once it has been decided that treatment is necessary, the discussion of which consolidant to choose begins. An ideal consolidant should be compatible with the substrate, chemically and physically stable over time, able to be localized, strong enough to hold, not tacky when set, easy to apply, inexpensive, and have a good shelf-life. This list was taken from the Adhesive Compendium (Down 2015, 1) where a subsequent chapter adds that change in appearance should be minimal and penetration potential/porosity should be considered and I argue that in addition to these qualities, a conservator should consider the environmental impact of the consolidant, safety of the conservator while preparing and applying the consolidant, and any cultural preferences (using non-toxic materials or natural ones) before making a final decision on the consolidant to be used. Generally, the chosen consolidant will not have all of the ideal qualities mentioned but will strike a balance between these considerations and the needs of the vessel in question.

There are different types of consolidants, namely dispersions, emulsions, and solutions. A dispersion is when fine particles are uniformly distributed throughout another medium. Emulsions are similar, and are considered a type of dispersion, where the particles are stable in a second immiscible liquid. Solutions are a homogeneous mixture of two things (in this case the adhesive and solvent carrier) in a single phase. Emulsions have the advantage of being able to carry higher molecular weight polymers and are often water-based, making them non-toxic.

Consolidants can be applied in a number of ways, and the needs of the vessel as well as the chosen consolidant will determine the application method. It can be applied through spraying, brushing, dripping by pipette, immersion, or capillary draw. The application method, amount of consolidant applied, and ambient environment, affect the penetration and efficacy of the treatment (Down 2015, 189). Drying time is a crucial consideration, as it can affect the efficacy, for example, if it dries too fast, the resin will be pulled back towards the surface of the substrate (Buys & Oakley 1993). The solution of Paraloid B-72 in acetone, as mentioned before, is one of the most commonly used consolidants today. “Solvent resins, by their very nature, penetrate better than water-based emulsions or dispersions, but require more care and higher safety measures (Down 2015, 189).” When large amounts of consolidant are needed for a more porous matrix, water-based options are considered as they can penetrate the more porous ceramic and will not immediately evaporate when applied over a large area. Also, it can be more safely handled. This paper argues that water-based consolidants can also be suitable for smaller scale treatments.

Though it will not be discussed in this paper, it should be mentioned that (re)firing ceramics is sometimes considered as a treatment option, namely for cuneiform tablets as it definitively maintains the writing, however this is a highly controversial treatment and many opt for consolidation. For example, “le changement d’aspect de la tablette, entre autres, est inacceptable pour le département des Antiquités orientales du musée du Louvre, car l’apparence, et notamment la couleur de la terre, permet parfois de reconnaître le lieu où la tablette a été faite et de l'attribuer à un groupe défini” (Liégey et al 2010, 30) (the change in appearance of the tablet, among other things, is unacceptable to the Department of Oriental Antiquities of the Louvre Museum, because the appearance, and in particular the color of the

earth, sometimes makes it possible to recognize the place where the tablet was made and assign it to a defined group).

The following sections give a brief overview of the consolidants chosen for this experimentation.

6.1. Acrysol WS-24

Acrysol WS 24 is an acrylic colloidal dispersion supplied in water (36% w/v). It has a small particle size and charged particles which keep the dispersion from settling. Consequently, this keeps the viscosity low. It has a neutral pH and an adhesive strength similar to that of Paraloid B-72. It dries clear and is readily soluble in acetone. It does not pose a health hazard with handling and use. It has been used to treat coarse earthenware and brickwork, as well as for bone, glass, and ceramic consolidation. As an acrylic, Acrysol WS-24 is resistant to weathering and aging.

6.2. Aquazol 200

Aquazol is a resin that is soluble in a wide range of solvents including water and ethanol. Chemically it is known as poly(2-ethyl-2-oxazoline) (PEOX) and it is available in different molecular weights (50, 200, and 500). 200 was chosen for this study because it is the medium molecular weight and was available. It is thermally stable and non-toxic, it doesn’t shrink, become brittle, or support mold growth, and so has good ageing properties. It is susceptible to RH changes, and the susceptibility increases with molecular weight. It has been used for the treatment of many material types including glass, paintings, unfired clay, enamel, basketry, books, and paper. It can also be used as a painting medium and mixed with other adhesives/consolidants to change their properties.

6.3. Jade 403

Jade 403 is a modified polyvinyl acetate resin emulsion. It has a neutral pH and is clear in color. It is resistant to discoloration with ageing, though this is possible, has a moderate cohesive strength and is flexible. It has generally good aging properties. If it is frozen, the adhesive properties are rendered useless. It can be mixed with other adhesives to manipulate properties. Jade has been occasionally used in metal and paper conservation. It is most often used in book conservation, upholstery & semi-tanned skins, paintings, and furniture.

6.4. Ethulose

Ethulose is a type of cellulose ether, chemically known as ethylhydroxyethylcellulose (EHEC) and has the brand name Bermocoll. It is non-toxic and can be dissolved in water and organic solvents. It has intermediate stability and is unaffected by microbial attack both when in solution and after use. It has a variety of potential uses. More testing is necessary to understand its aging properties.

6.5. Methylcellulose

Methylcellulose is another kind of cellulose ether. It has a weaker bond that other cellulose ethers. It has excellent long-term stability, it does not discolor with aging, has minimal weight loss, no loss of viscosity, and no biodeterioration once set. It remains soluble in water and organic solvents. It is often added to other solutions to change the properties, such as adding flexibility, moderating the overall strength, and increase the working time. methylcellulose has a wide range of conservation applications and has been used in painting, textile, basketry, photograph, book, and paper conservation.

7. Experimental Design

The experimentation began in the fall of 2020 and continued through the spring of 2021. In that time, the MA program took a collective leave of absence due to COVID-19 restrictions which meant that the labs and resources of both the University of California Los Angeles (UCLA) and the Getty Villa were no longer available to use, affecting some of the sample preparation and experimental execution. Experimentation included the fabrication of samples, abrading the surface, photographic documentation, the creation of aging chambers, measuring weight, taking colorimetric measurements, and performing a modified strength adhesion test.

The experimentation was done in Los Angeles, California both in the Cotsen Institute's Experimental and Archaeological Sciences Lab (EASL) and my place of residence. The research was done in my residence due to COVID 19 restrictions, however this increased the potential relevance to archaeological, private, and small conservation labs as my set-up was done with easily accessible and non-toxic materials.

7.1. Sample Preparation

Raw materials to make sample tiles were purchased from New Mexico Clays. The clay and tempering materials were sourced from this company as part of the research involving discussions with Pueblo potters as well as a case study on sherds from the education collection at the Museum of Indian Arts and Culture in Santa Fe, which will be discussed in a future section. Manzano Red Clay, a red low fire rugged earthenware cone 4 clay, a 20C and 90C Mica, and 30, 60, and 90 mesh sand, and volcanic ash from New Mexico, were purchased. Test mixtures and firings were carried out to find a suitable mixture to create the test tiles. Suitable tiles had surfaces easily abraded. Water was added on an as needed basis to create a good

working consistency. A 100 mL cup was used to measure out the raw materials and the final mixture was six cups of Manzano red clay, three cups of 90 mesh sand, ½ cup mica, and 1 cup of volcanic ash (Figure 4a). The larger mesh sand was chosen in hopes of creating a rougher surface for consolidation. More ash was added as it is a common temper in some northern Rio Grande Pueblo pottery.

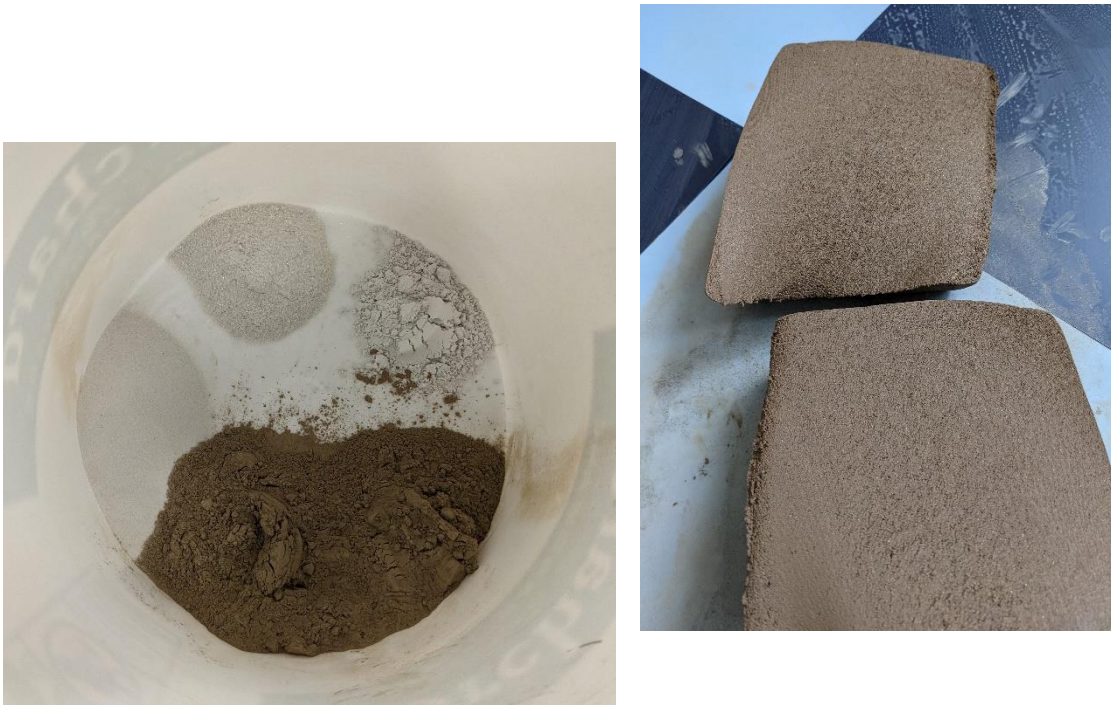


Figure 4 a & b: Image of Raw Material (a) & Clay (b)

Once a raw mixture (Figure 4b) was decided on, the clay was made and spread out onto non-stick silicone baking sheets using a rolling pin (Figure 5a). In order to help maintain consistent thickness a metal frame was placed on the silicone sheets. The frame was made from a deconstructed white board - it was wrapped with blue tape. Once rolled out, the tiles were cut with a sharp knife and removed from the silicone sheet. The tiles were approximately ½ inch thick 4x4 inch squares. They were left to dry for at least 72 hours before firing. The firing was

done with an electric kiln (the Skutt Kiln Sitter Kiln Model 614-3) in EASL. The tiles were fired at approximately 716-730 °C. This was chosen as a suitable temperature range for a “low fire”. Self-supporting pyrometric cones (Orton SSB 016, 018, & 020) were used to monitor firing temperature within the kiln. I started the firing process (Figure 5b) and it was completed by Vanessa Muros, director of the EASL. They were fired at a fast firing speed (150 °C/hour) following the firing schedule recommended in the kiln operating manual. The conditions of the kiln were not modified beyond the standard operation.

Figure 5 a & b: Rolled and Cut Out Clay Tiles (a) & Me Placing Tiles in the Kiln (b) (courtesy of Vanessa Muros)

Three sets of tiles were made (Figure 6), one set of 30 tiles for the control set to be aged in the ambient environment, one set of 30 tiles to be aged in a high relative humidity environment, and one set of 30 tiles to be aged in a high temperature environment, making a total of 90 tiles. Each consolidant type (consolidant and consolidant concentration) was tested in triplicate, so for one

consolidant in one set six tiles were needed. Each set consisted of five consolidants, tested in two concentrations each.

Figure 6: Image of Prepared Tiles

The test tiles were labeled using a fine tipped felt black ink marker. The number was written in the top left corner and covered by two layers of clear nail polish. The number was also written on the back of the tile and bottom profile. The labeling system consisted of a designation in capital letters which indicate the sample set the tile belongs to, followed by an abbreviation in lowercase letters for the consolidant, followed by a numerical representation of the consolidant concentration and repetition number. For example, the third repetition test tile for the low concentration of Aquazol in the relative humidity chamber is denoted by the label: RH aq 1.2. Please use the table below for reference (Table 1).

Table 1: Abbreviation Chart for Test Tiles

Set	Consolidant	Concentration	Repetition
Control		1 = low concentration	0 = first repetition
	ac = Acrysol WS 24		
	ag = Aquazol 200		1 = second repetition
	j = Jade 403	2 = high concentration	
	e = Ethulose		2 = third repetition
	m = Methylcellulose		
Relative Humidity	ac = Acrysol WS 24	1 = low concentration	0 = first repetition
	ag = Aquazol 200		
	j = Jade 403		1 = second repetition
	e = Ethulose	2 = high concentration	
	m = Methylcellulose		2 = third repetition
Temperature	ac = Acrysol WS 24	1 = low concentration	0 = first repetition
	ag = Aquazol 200		
	j = Jade 403		1 = second repetition
	e = Ethulose	2 = high concentration	
	m = Methylcellulose		2 = third repetition

After the tiles had been fired, it was necessary to create a surface in need of consolidation. To do this the surface of the tiles was abraded in a systematic manner using a piece of 60 grit sandpaper attached to a rectangular hand sanding block. In an attempt to create an evenly abraded surface, six tiles were placed inside a picture frame with the glass removed and back replaced with a piece of plywood (Figure 7). The construction was such that the tiles sat above the thickness of the frame. As the tiles did not fill up the entire empty space of the frame, a bumper of foam wrapped in blue tape was placed at the bottom of the tiles. This method was somewhat successful in creating an evenly abraded surface across all tiles, as the evenness of the abrasion relied on the consistency of the pressure I applied as I abraded the sample surfaces.

Figure 7: Image of Tile Abrasion Set-Up

7.2. Consolidant Preparation and Application

Each consolidant was prepared using a weight to volume ratio, with each consolidant and deionized water being weighed using a digital pocket scale. 100 mL of each consolidant solution was prepared. 5% and 7.5% solutions were made of Acrysol WS-24, Acrysol 200, and Jade 403, and .5% and 1% solutions were made of Ethulose and methylcellulose. Due to supply issues related to COVID, the consolidants were sourced from what was available in the labs at the UCLA/Getty Conservation training facilities at the Getty Villa, except for the Ethulose which was ordered from Talas, a conservation supply business. All other consolidants had also previously been ordered from Talas at different times. The consolidants were mixed without a stir plate due to COVID related issues. This was not a problem for any consolidants except for the Ethulose which was very difficult to get into solution.

The solutions were then applied with a natural-hair brush. A separate brush was used for each consolidant and concentration. The brush was loaded with consolidant before being touched to the surface, allowing the consolidant to spread. Some particles on the tile surface were moved with the application of the consolidant, as they were picked up and suspended in the solution. This was deemed as acceptable movement as the goal of treatment was to keep the particles on the object to prevent total loss. The tiles were left to set overnight before any further testing.

7.3. Photography

Overall photographs of the tile sets were taken using a Sony α200 digital single-lens reflect (DSLR) camera. A classic mini XRite Color checker and scale bar were used in each photograph. All photos were captured in RAW and post processed using Camera Raw in Photoshop. The tile sets were grouped by low and high concentration. Photos were taken before treatment (BT), post treatment (PT) and post aging (PAG).

For the purpose of this research, the before treatment stage is considered to be after the tile surfaces were abraded and before the consolidants were applied, the post treatment stage is considered to be after consolidant application, and the post aging is considered to be after the aging cycles are completed.

Detail photos of the tile surfaces were also taken using a DinoLite Microscope. Two photos were taken per tile, one in normal light and one in raking light. These photos were meant to provide a more detailed and textured view of the tile surfaces. Photos were taken BT, PT, and PAG.

7.4. Aging Chambers

In order to test how well the consolidants hold up in less than ideal, though potentially realistic, storage environments, two aging chambers were made, one with high relative humidity (RH) and one with high temperature (T). The chambers were housed in two large plastic containers. Three HOBO DataLoggers, small monitoring devices with sensors and data storage, were placed inside the chambers in the left, center, and right to monitor temperature and relative humidity. The control set, kept outside of the chambers in the ambient room conditions, was monitored with two data loggers. For this experiment, data was collected every half hour.

HOBOware software was used to extract the data points after the experiment and this was imported into Microsoft Excel for data processing. The averages of all readings when the chambers were “active” were taken using the function available in Excel. The standard deviation of all readings when the chambers were “active” was also calculated using the averages and a preloaded function in Excel. See following paragraphs for the definition of “active” periods.

For the high relative humidity chamber, saturated solutions of sodium chloride were used to create an environment with an RH of approximately 75%. Sodium chloride was used for its ease of procurement. The saturated salt solutions were placed in small plastic Ziploc boxes with a square cut out of the top. A piece of Sympatex was taped over the opening using double sided stick tape (Figure 8).

Figure 8: Image of Saturated Salt Container Set-Up

This setup is based off of a WAAC newsletter from 1991 which details this method in order to avoid salt creep and thus contamination over long periods of time (Creahan 1991). The chamber was tested and it was noted that there was a higher than optimal air exchange resulting in the ambient environment causing drastic fluctuations in the chamber environment. The seal on the box was reinforced with blue tape and this proved to be sufficient in minimizing the air exchange. Twelve supers saturated solution containers were needed to maintain the relative humidity in the chamber (Figure 9).

Figure 9: Image of Relative Humidity Chamber Interior Set-Up

For the temperature chamber, two heat lamps (typically utilized in reptile enclosures) were used. They were clipped to either end of the chamber and the cables bent in a way that they did not shine directly onto the samples (Figure 10). As the lid could not be closed on the box, a cover of tin foil was placed over the lamps in order to create a more enclosed space. During testing of the chamber, a section of the box melted.

Figure 10: Image of Temperature Chamber Interior Set-Up

The tiles were placed in their respective chambers for three “active” cycles of approximately 144 hours in the chambers followed by approximately 144 hours out of the chambers. The aging cycle thus lasted approximately 42 days from April 3, 2021 to May 17, 2021. The final cycle out of the chamber was shortened by approximately half the time. This could not be avoided due to housing issues in the space where the experimentation was conducted. It is possible that not enough time was allotted for the tiles from the RH chamber to dry out before conducting final measurements.

7.5. Weight Measurements

The tiles were weighed three times throughout the experiment, BT, PT, and PAG. A digital pocket scale, the Weigh Gram WG-220, was used. The scale measures grams up to two decimal places, which was recorded for each tile. The scale was recalibrated before each weighing session. Tiles were weighed before treatment, after treatment, and post aging. The tiles were weighed at least 48 hours post treatment and aging to allow for curing time and re-acclimation.

7.6. Fiber Optic Reflectance Spectrometry

Spectral information of the color of the tile surfaces was quantitatively collected using a FieldSpec® 3 portable spectroradiometer from Analytical Spectral Devices Inc. It is a type of fiber optic reflectance spectrometer (FORS) which is an analytical method where light is reflected off of a surface and subsequently collected. This information can be turned into a spectrum or data points within the color sphere to give information on the color of the analyzed surface. The device has a spectral range from 350 nm to 2500 nm. The data was collected using the program RS^3 and was viewed using the program ViewSpec Pro. The main data is

automatically shown in ViewSpec as a spectrum, but this function was not used for this research, instead the individual values representing the color of the sample in the color sphere were retrieved from the program and used.

Two readings were taken per sample, one in the top right and one in the bottom left of the tiles. The orientation was determined by the placement of the label located in the top left corner of the tile (Figure 11). The spectrometer probe surface was cleaned between each reading. There was some transfer of material from the tile to the probe surface when doing readings of the surface before treatment. This transfer lessened with consolidation. The readings were taken BT, PT, and PAG and were taken from the same places for each repetition.

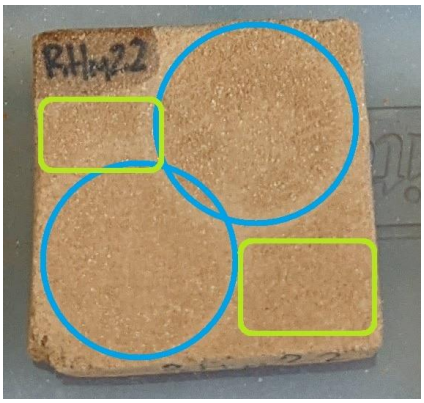


Figure 11: Image of Areas of FORS Analysis (blue circles) and Tape Placement (green rectangles)

The collected data went through a number of manipulations. The data files were opened in the program ViewSpecPro and then processed in the program through the “Colorimetry” function. The data from CIE 1964 color space with a 10° illuminant angle and D65 illuminant were used. The instrument collected this data in the XYZ color space which was developed in 1931. In order to have a set of standardized values, they were converted into L*a*b* color values which are from a color space developed in 1976 by the Commission International de l’Eclairage [CIE]. The 1976 equation of

$$L^* = 116\, f\left(\frac{Y}{Y_\mathrm{n}}\right) - 16$$
$$a^* = 500\left(f\left(\frac{X}{X_\mathrm{n}}\right) - f\left(\frac{Y}{Y_\mathrm{n}}\right)\right)$$
$$b^* = 200\left(f\left(\frac{Y}{Y_\mathrm{n}}\right) - f\left(\frac{Z}{Z_\mathrm{n}}\right)\right)$$

where, being $t = \frac{X}{X_\mathrm{n}}, \frac{Y}{Y_\mathrm{n}}$, or $\frac{Z}{Z_\mathrm{n}}$:

$$f(t) = \begin{cases} \sqrt[3]{t} & \text{if } t > \delta^3 \\ \frac{t}{3\delta^2} + \frac{4}{29} & \text{otherwise} \end{cases} \qquad \begin{aligned} X_\mathrm{n} &= 95.0489, \\ Y_\mathrm{n} &= 100, \\ Z_\mathrm{n} &= 108.8840 \end{aligned}$$
$$\delta = \frac{6}{29}$$

was used. To streamline this process, a Google Sheets function was written by software engineer, William Johnson. The two readings per tile were then averaged to give one reading. These averages were then used to calculate the color change or delta E (ΔE) from before treatment to post treatment, post treatment to post aging, and before treatment to post aging. Initially the ΔE equation from 1976 was used, as it is the simplest equation, but in discussion with Getty Conservation Institute Scientist, Vincent Laudato Beltran, the decision was made to recalculate the averages using the 2000 equation which added in corrections for the blue region of the L*a*b* color space as well as corrections in the lightness and red-green axes (personal communication 2021 & Beltran et al 2021, 21). The 2000 equation is as follows:

$$\Delta E_{00}^* = \sqrt{\left(\frac{\Delta L'}{k_L S_L}\right)^2 + \left(\frac{\Delta C'}{k_C S_C}\right)^2 + \left(\frac{\Delta H'}{k_H S_H}\right)^2 + R_T \frac{\Delta C'}{k_C S_C}\frac{\Delta H'}{k_H S_H}}$$

$$\Delta L' = L_2^* - L_1^*$$
$$\bar{L} = \frac{L_1^* + L_2^*}{2} \quad \bar{C} = \frac{C_1^* + C_2^*}{2}$$
$$a_1' = a_1^* + \frac{a_1^*}{2}\left(1 - \sqrt{\frac{\bar{C}^7}{\bar{C}^7 + 25^7}}\right) \quad a_2' = a_2^* + \frac{a_2^*}{2}\left(1 - \sqrt{\frac{\bar{C}^7}{\bar{C}^7 + 25^7}}\right)$$
$$\bar{C}' = \frac{C_1' + C_2'}{2} \text{ and } \Delta C' = C_2' - C_1' \quad \text{where } C_1' = \sqrt{a_1'^2 + b_1^{*2}} \quad C_2' = \sqrt{a_2'^2 + b_2^{*2}}$$
$$h_1' = \operatorname{atan2}(b_1^*, a_1') \mod 360^\circ, \quad h_2' = \operatorname{atan2}(b_2^*, a_2') \mod 360^\circ$$

$$\Delta h' = \begin{cases} h_2' - h_1' & |h_1' - h_2'| \le 180^\circ \\ h_2' - h_1' + 360^\circ & |h_1' - h_2'| > 180^\circ, h_2' \le h_1' \\ h_2' - h_1' - 360^\circ & |h_1' - h_2'| > 180^\circ, h_2' > h_1' \end{cases}$$

$$\Delta H' = 2\sqrt{C_1' C_2'}\sin(\Delta h'/2), \quad \bar{H}' = \begin{cases} (h_1' + h_2' + 360^\circ)/2 & |h_1' - h_2'| > 180^\circ \\ (h_1' + h_2')/2 & |h_1' - h_2'| \le 180^\circ \end{cases}$$

$$T = 1 - 0.17\cos(\bar{H}' - 30^\circ) + 0.24\cos(2\bar{H}') + 0.32\cos(3\bar{H}' + 6^\circ) - 0.20\cos(4\bar{H}' - 63^\circ)$$
$$S_L = 1 + \frac{0.015\left(\bar{L} - 50\right)^2}{\sqrt{20 + \left(\bar{L} - 50\right)^2}} \quad S_C = 1 + 0.045\bar{C}' \quad S_H = 1 + 0.015\bar{C}'T$$
$$R_T = -2\sqrt{\frac{\bar{C}'^7}{\bar{C}'^7 + 25^7}}\sin\left[60^\circ \cdot \exp\left(-\left[\frac{\bar{H}' - 275^\circ}{25^\circ}\right]^2\right)\right]$$

An Excel sheet programmed with this function was shared by Beltran to streamline the process.

7.7. Strength Adhesion Tape Test

To visualize the efficacy of the consolidant strength a simplified version of the Tape Adhesion Strength Test ASTM D3330 was used. The tile was not moved during testing, the angle of removal was not measured, nor the average force needed. Consistency was dependent entirely on me and there were likely differences in force applied and angle of removal due to human error. Clear pressure sensitive single coated tape was used and was placed on a light blue piece of cardboard paper upon removal. The paper was intended to provide visual clarity. The test was performed on PT and PAG. Representative tests were performed on three untreated test tiles to show how much material could be removed before treatment. This could not be done to the treated tiles, because it would have removed all of the material to be consolidated. To minimize contamination the tape was placed in the bottom right corner for the PT tests and just below the label for the PAG tests (Figure 11).

8. Experimental Results & Discussion

8.1. Handling & Environmental Comparisons

All of the solutions were made with deionized water and with non-toxic materials and thus were safe to handle without the use of a fume hood. The consolidants and water were combined and mixed with a glass stirring rod. They were left to set overnight. All solutions were easily dissolved/diluted except for the Ethulose. This took a couple days to go into solution and consequently was the most viscous of all the consolidants. It is likely that with a stir plate, the Ethulose would more easily go into solution. All of the consolidants were easy to prepare and easy to store. methylcellulose has the possibility of growing mold after it is in solution and needs to dry properly after being applied to a surface. It is most often kept refrigerated and this could

be an issue for site conservation in high temperature and high relative humidity environments. If it is used within a reasonable amount of time however, this will not be an issue. It is also easily remade, as are the other consolidants.

The Acrysol and Jade solutions were the most watery of all solutions and flowed easily on the surface of the test tiles. The Aquazol solutions were slightly heavier liquids but still flowed relatively well on the surface. The lower percentage methylcellulose was slightly more viscous and spread slower than the other consolidants. The higher percentage methylcellulose spread even slower, and both Ethulose solutions were quite viscous and had the potential to pool on the surface, spreading slowest of all consolidants. These solutions did not handle as well during their application. This could be problematic if the surface in need of consolidation is vertical, which could lead to drips if not carefully applied.

Being that all the consolidants are water-based, they are more accessible to smaller labs and site settings where procuring solvents may be difficult, such as sites in Ethiopia or Peru as shared by conservator Vanessa Muros (personal communications 2022). Acrysol and Jade are both sold in liquid form. This may make it difficult to transport if materials need to be packed for air travel. Also, Jade cannot freeze or it loses its working properties. Aquazol, Ethulose, and methylcellulose are sold as solids, making them easier to travel with. Aquazaol is susceptible to high relative humidity and can break down in these environments; it should be both stored and transported with a desiccant to avoid the granules sticking together.

A new tool in the field, the Lifecycle Assessment (LCA) Carbon Calculator (Sustainable Tools in Cultural Heritage (STiCH) 2022), gives the greenhouse gas (GHG) emissions of a single unit of a chosen material. Users can search the calculator for the conservation materials they plan to

use or are considering using to see the potential effect its use will have on the environment. GHG emissions are the “most commonly used measurement of environmental stability” (Tools for Informed Sustainable Choices 2022) making this relevant not just to conservators but also globally. It should be noted that using the carbon calculator developed by the STiCH team only considers one kind of environmental impact. The GHG emissions are “measured in carbon dioxide equivalents (CO2 eq) over a 100-year period” (Tools for Sustainable Choices 2022). At the time of writing, the Carbon Calculator has not yet been configured to calculate the GHG emissions for Acrysol, Aquazol, or Ethulose. It has calculated that of methycellulose and Jade. Figure 12 shows the comparison of these two consolidants alongside Paraloid B72. All the values are for 1kg of consolidant.

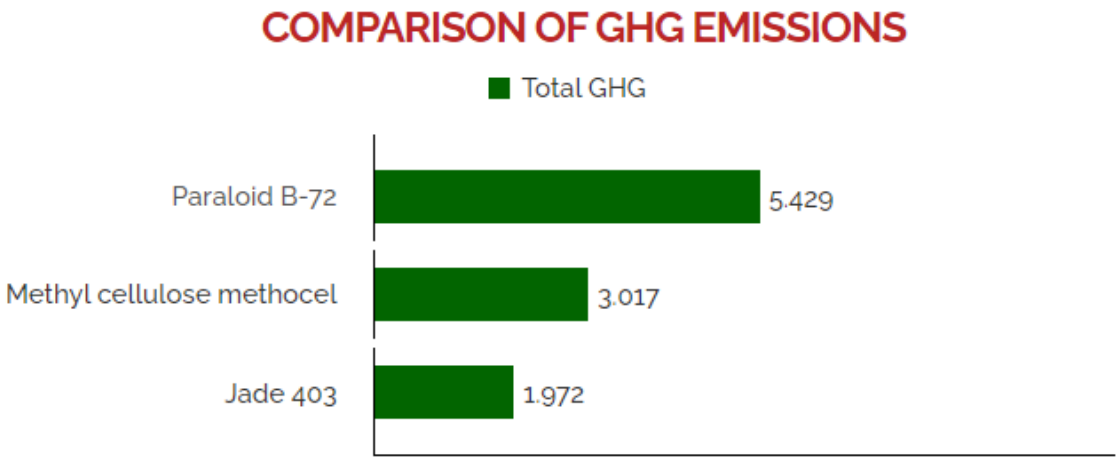


Figure 12: Comparison of GHG Emissions for Selected Consolidants from STiTCH

Based on the Carbon Calculator, the commonly used Paraloid B72 has a higher environmental impact than methylcellulose or Jade. The table below shows the comparison of the impact of acetone, ethanol, deionized water, and distilled water. Though the GHG emissions in the table are relatively low, the calculations are for 1 mL of acetone and ethanol and 1 L of the waters. This number would substantially increase with repeated use of Paraloid B72, which is commonly

used either entirely in acetone or a mixture of acetone and ethanol and would be combined with the higher GHG from the Paraloid B72 resin. Ethanol can also be used with some of the consolidants used in this research, such as Aquazol, either alone or mixed with water. It should also be noted that the kind of water used for treatment will have a different impact. This research utilized deionized water, which has 0 GHG emissions which is in direct contrast to the distilled water which has the highest GHG of all the solvents compared below in Figure 13.

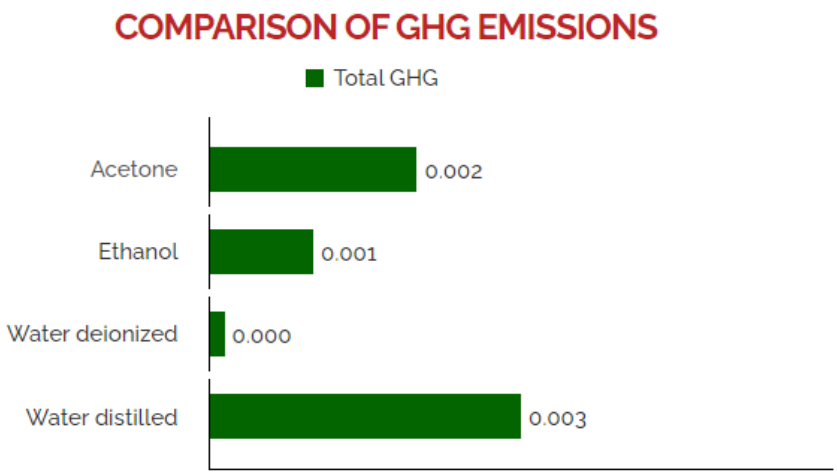


Figure 13: Comparison of GHG Emissions for Selected Solvents from STiTCH

For comparison, “a typical pair of running shoes generates 30 pounds of carbon dioxide emissions” (Chu 2013). While the overall GHG emissions for these materials is much lower than a pair of shoes, conservation is in general a wasteful field. The impact adds up quickly and conservators have a responsibility to consider the environmental impact of our material choices.

8.2. Photography Comparisons

The DSLR photos were more useful for observing changes than the DinoLite photos. The DinoLite photos were taken at higher magnification and recorded too small of an area to see changes overall, and there were no microscopic changes in the surface that could be revealed through this imaging other than the movement of particles.

8.2.1. DSLR

The DSLR photos were useful in observing overall patterns and changes in the color of the test tiles. The photos indicated that for low concentrations, the Aquazol and methylcellulose did not result in much color change, if any. The other three consolidants, Acrysol, Jade, and Ethulose, all caused a darkening of the ceramic surface after treatment and after aging. This pattern is mostly the same for the higher concentrations, however the higher concentration of methylcellulose visibly darkened the surface. Tide lines (lines that demarcate where the solvent reached before evaporating) were often visible on the tiles treated with Jade and some were visible on tiles treated with Ethulose. These patterns are consistent across the control, relative humidity aged, and temperature aged tile sets. Figures 14-16 show the overall DSLR images for the control test tiles treated with the low concentration solutions throughout the experimentation. It is possible that the color change is from the original molecular weights of the solutions, particle size, or penetration depths. Further research would be necessary to understand the cause.

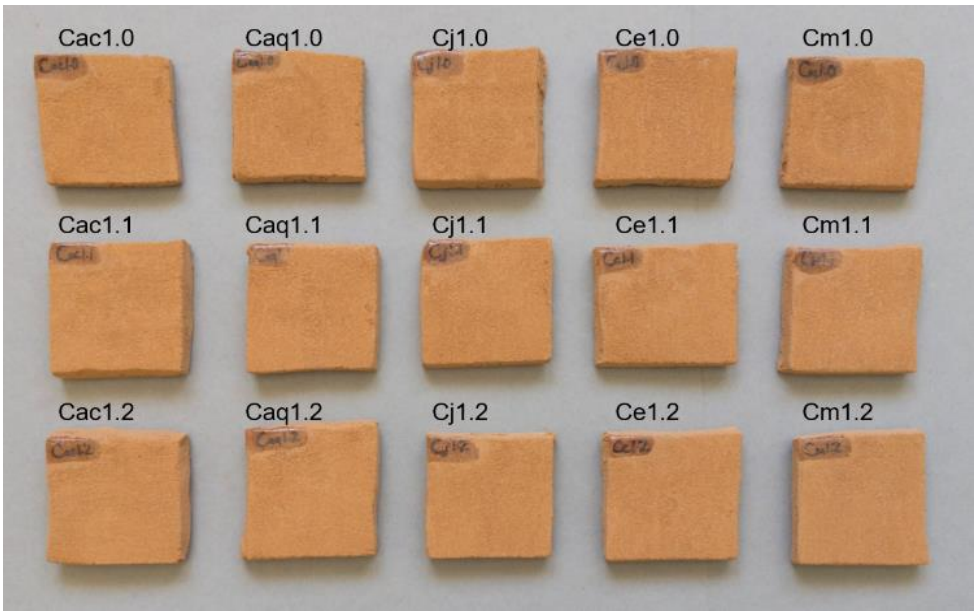


Figure 14: Image of Low Concentration Control Test Tiles Before Treatment

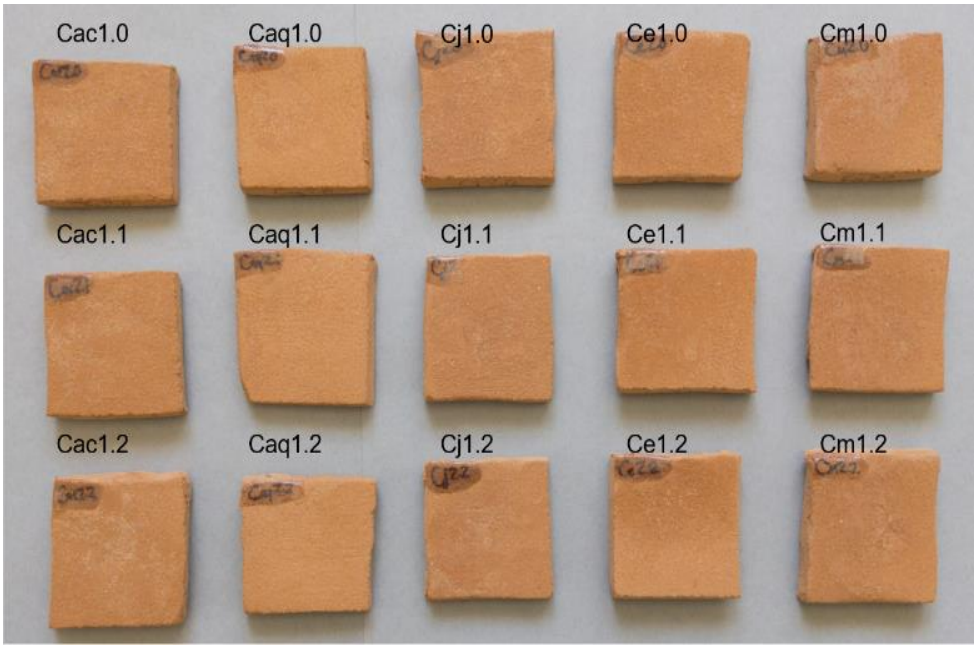


Figure 15: Image of Low Concentration Control Test Tiles Post Treatment

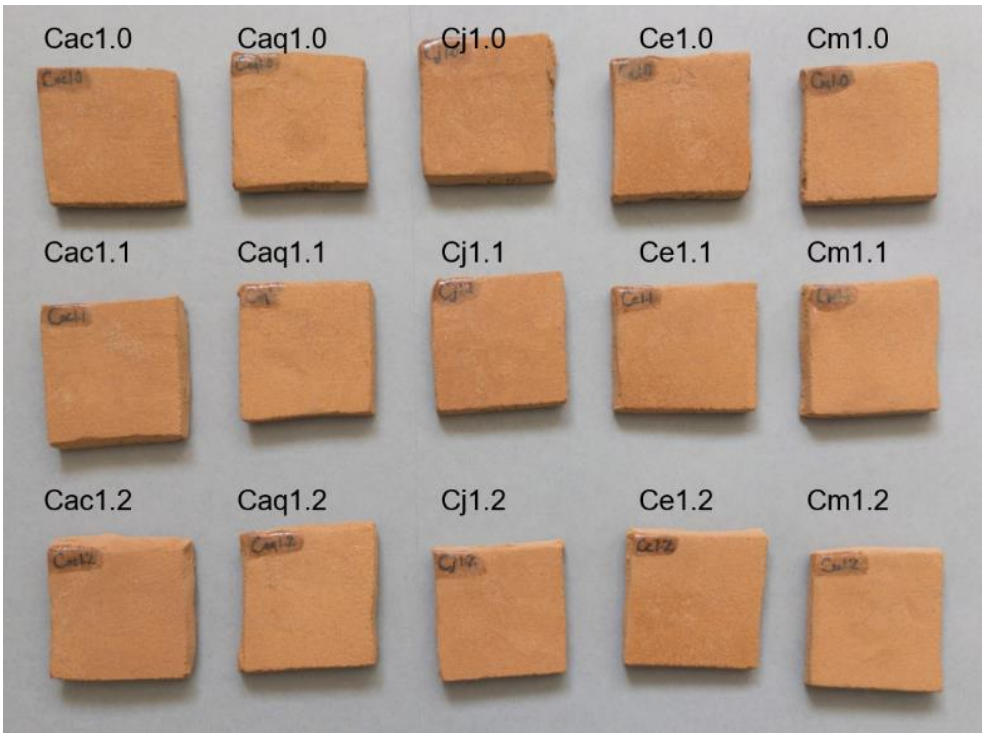
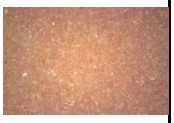


Figure 16: Image of Low Concentration Control Test Tiles Post Aging

8.2.2. DinoLite

The photos captured with the DinoLite did not assist in visual comparison of the surfaces. No change, other than color which was already noted in the overall images, was apparent when comparing the tiles across treatments and treatment stages. The normal and raking light images were considered, with the raking light images showing more information than the normal light. The images did confirm that after the consolidant was applied, the particles moved on the surface. Table 2 shows the DinoLite Images for the control set of test tiles for the tiles treated with the .5% solution of methylcellulose.

Table 2: Comparison DinoLite Photos of Control Test Tiles of Low .5% methylcellulose (n=normal light r=raking light)

Control Methylcellulose Low Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
1.0						
1.1						
1.2						

8.3. Data Logger Information

Temperature and relative humidity readings were taken every half hour on the HOBO DataLoggers. The following information derives from the “active” periods when the aging chambers were in use.

The ambient temperature and relative humidity were within normal ranges and are reflective of spring conditions in Los Angeles. The high temperatures of the Temperature aging chamber significantly lowered and stabilized the relative humidity of the chamber and the standard deviation for fluctuations in RH is relatively low. Consequently, due to the extremely high temperatures, the relative humidity was extremely low which is replicative of conditions found in New Mexico. There was a greater fluctuation in temperature, likely because the chamber was not sealed, and so would be susceptible to larger temperature fluctuations between night and

day. The seal on the Relative Humidity aging chamber likely created a microclimate that increased the overall temperature. The relative humidity in the chamber remained within the calculated range for sodium chloride microclimates, showing that this was a viable solution for creating a high RH environment; the standard deviation was also relatively low for the relative humidity percentage. The temperature in the Relative Humidity aging chamber was also fairly consistent, and while not completely immune to the larger temperature changes between night and day, it did an overall satisfactory job of buffering the exterior conditions. Table 3 gives the overall average values with standard deviation for the relative humidity and temperature inside the aging chambers.

Table 3: Average Temperature and Relative Humidity Data from DataLoggers [with Standard Deviation]

	Control	Temperature Chamber	Relative Humidity Chamber
Average Temperature (°F)	60.97 [1.61]	143.65 [6.53]	74.22 [3.12]
Average Relative Humidity (%)	49.12 [4.92]	10.67 [1.27]	72.02 [2.73]

8.4. Weight Change Information

Overall, the weight changes were negligible, making up for less than 1% of the overall weight when taking the greatest weight change and the lightest weighing test tile. The consolidant that imparted the greatest weight after application was Aquazol. This is consistent across all tile sets and consolidant concentrations, though the lower concentration of Aquazol had lower weight

change than the higher concentration. The lightest consolidant was Acrysol, again consistent across the board. The other consolidants imparted similar weight changes as each other, ranging from around 0.08 grams to 0.11 grams. Roughly, the weight impact is as follows: Aquazol > Jade > Ethulose > methylcellulose > Acrysol, also depicted in Figure 17. It is possible that this weight change is from the original molecular weights of the solutions, particle size, or penetration depths. Further research would be necessary to understand the cause.

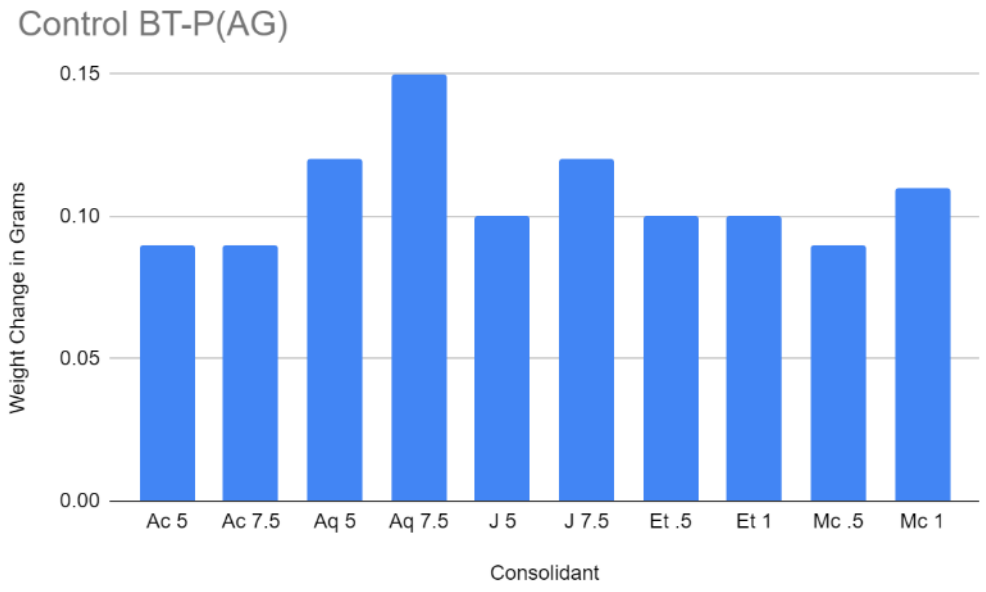


Figure 17: Bar Graph of Average Weight Change Measured in Control Test Tiles Before Treatment to Post Aging

The final recorded weight of all the Relative Humidity tiles was generally higher than the other final readings, especially for the lower concentration consolidants. This is possibly because there may not have been enough time between the final weighing and removal from the chamber to allow the tiles to return to an equilibrium with ambient conditions. Some excess water may account for the higher weights. The Control and Temperature data sets were generally closer in weight change. All of the weight change values are recorded in Table 4.

Table 4: Measured Weight Change Averages from All Tile Sets

Control BT-P(AG) (g)			RH BT-P(AG) (g)			Temperature BT-P(AG) (g)	
Ac 5	0.09		Ac 5	0.13		Ac 5	0.08
Ac 7.5	0.09		Ac 7.5	0.11		Ac 7.5	0.07
Aq 5	0.12		Aq 5	0.15		Aq 5	0.12
Aq 7.5	0.15		Aq 7.5	0.19		Aq 7.5	0.14
J 5	0.10		J 5	0.11		J 5	0.07
J 7.5	0.12		J 7.5	0.13		J 7.5	0.10
Et .5	0.10		Et .5	0.12		Et .5	0.07
Et 1	0.10		Et 1	0.12		Et 1	0.08
Mc .5	0.09		Mc .5	0.13		Mc .5	0.05
Mc 1	0.11		Mc 1	0.14		Mc 1	0.06

8.5. Colorimetry Changes

Calculated color changes are mostly consistent with the observations made from the overall DSLR photography; the Aquazol treated tiles had the least amount of color change, with a ΔE below 2 (all the values highlighted in green and bolded in Table 5). Unlike the images there was a qualitative change in the ΔE for the low percentage methylcellulose, which observably had little to no color change. After aging, the ΔE values for the low concentration methylcellulose decreased. This trend is observable in other consolidants as well and is perhaps tied to a decrease in efficacy discussed in the following section on Strength Adhesion Tape Test

Performance. The ΔE values for the tiles treated with Acrysol, Jade, and Ethulose are all comparably high.

The aging chambers had little effect on the color of the tiles. There was a change in all ΔE values, however, all of the values are under 2 which was deemed an acceptable color change. In a 2007 publication, Richardson and Saunders (2007) describe how an average viewer can discern color change with a ΔE of 2 (under standard lighting conditions) and so a ΔE2 was used as the threshold for this experiment. However, they also noted that when viewing a more dynamic piece, viewers noticed a color change at around a ΔE of 4 and so a slightly higher ΔE may be considered acceptable in some cases.

*Table 5: Delta E Values of Average L*a*b* Values for All Test Tiles*

	ΔE: BT-PT			ΔE: PT-PAG			ΔE: BT-PAG		
	Control	Temperature	Relative Humidity	Control	Temperature	Relative Humidity	Control	Temperature	Relative Humidity
5% Acrysol	4.64	3.12	2.08	**1.37**	**1.51**	**0.56**	3.52	**1.75**	**1.89**
7.5% Acrysol	2.87	5.2	4.22	**0.54**	**0.8**	**0.42**	3.39	4.41	3.95
5% Aquazol 200	2.12	**1.3**	**0.26**	**0.99**	**0.4**	**0.38**	**1.97**	**1.62**	**0.43**
7.5% Aquazol 200	**1.35**	**1.97**	**1.2**	**0.6**	**0.58**	**0.24**	**0.83**	**1.49**	**1.3**
5% Jade 403	5.6	3.78	2.83	**0.82**	**0.67**	**0.47**	4.89	3.43	3.17
7.5% Jade 403	4.77	5.64	4.2	**0.3**	**0.92**	**0.16**	4.54	5.54	4.11
.5% Ethulose	4.36	3.21	2.1	**0.53**	**1.35**	**0.93**	4.8	2.03	**1.43**
1% Ethulose	5.31	6.89	5.11	**0.54**	**0.77**	**0.22**	4.89	6.89	5.21
.5% Methylcellulose	2.69	2.36	**1.12**	**0.48**	**1.02**	**0.77**	3.14	**1.54**	**0.99**
1% Methylcellulose	5.22	4.32	5.05	**0.27**	**1.07**	**0.31**	5.05	5.25	5.15

8.6. Strength Adhesion Tape Test Performance

The simplified strength adhesion tape test provided an objective way to visualize the efficacy of the consolidants. Figure 18 below shows a representative tape test for three untreated tiles.

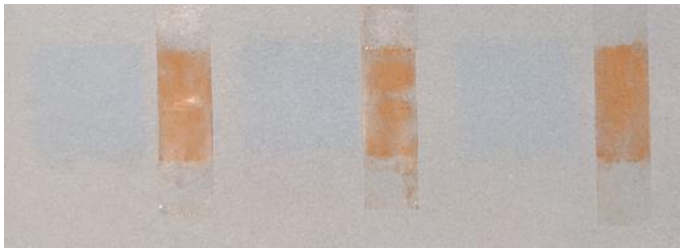


Figure 18: Image of Strength Adhesion Tape Test of Representative Untreated Test Tiles

The tests post treatment (Figure 19a) show that the best performing consolidants were Jade, Ethulose and methylcellulose. Some material was lifted from the surface of the tiles treated with Acrysol and with Aquazol. The tests Post Aging (Figure 19b) period show that there was a slight decline in performance in all of the consolidants except the higher concentrations of Jade, Ethulose, and methylcellulose. These appeared to perform the same as before aging. The observed patterns are consistent in the tile sets for the Relative Humidity and Temperature chambers. This suggests that a greater exposure to extreme conditions affected the performance of the consolidants.

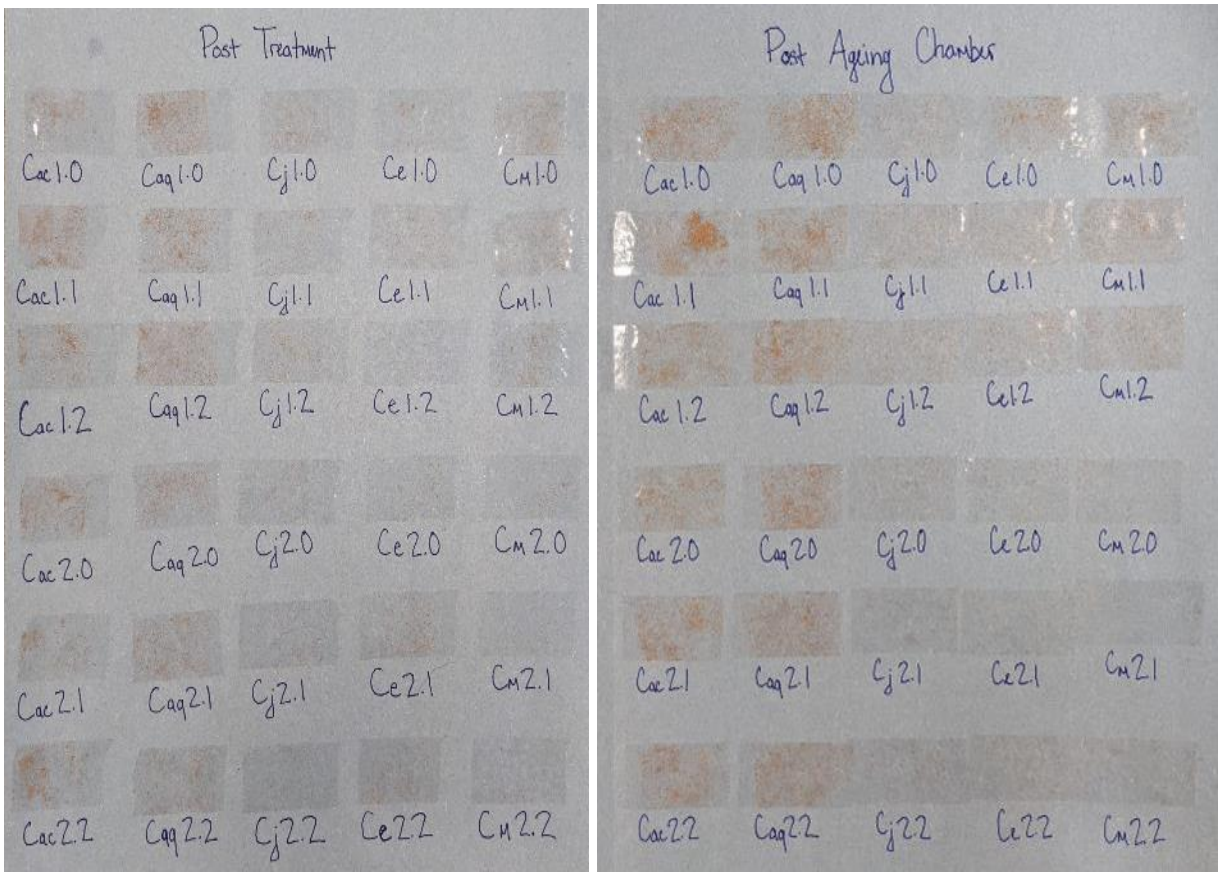


Figure 19 a & b: Images of Strength Adhesion Tape Test Results of Control Test Tiles Post Treatment (a) & Post Aging (b)

9. Testing at the Museum of Indian Arts & Culture

During the spring of 2021, I traveled to Santa Fe, New Mexico, thanks to the support awarded by the Foundation for the American Institute of Conservation's "Take a Chance Grant". There, sherds from the education collection of the Museum of Indian Arts and Culture (MIAC) were surveyed and selected for further testing. The sherds were selected to provide a range of surface types that looked like they might be in need of consolidation. Based on initial results from experimentation on the test tiles, a 7.5 % solution of Aquazol 200 and a .5% solution of methylcellulose were both tested on the sherds.

9.1. Experimental Setup

Upon arriving at MIAC, a number of sherds were available for testing and after consideration of each, including their original preparation and use and current condition, eight sherd types were selected for testing (Table 6).

Table 6: Descriptions and Images of Education Collection Test Sherds Before Treatment

Test #	Description	Image of Sherd
Test #1	Cookware, interior surface, dark black	
Test #2	Cookware, exterior surface, dirt and charcoal	
Test #3	Cookware, exterior surface, dirt	
Test #4	Cookware, exterior surface, little dirt on dark black	
Test #5	Glaze paint (lead based) on white slip, interior surface	

Test #6	Acoma, interior surface, grey	
Test #7	Acoma, exterior surface, mineral paint (main) on white slip	
Test #8	Acoma, exterior surface, white slip	

The sherds were photographed before and after treatment using a Google Pixel 4a, both RAW and jpeg images were collected and a color checker card was used for the RAW images. A color measurement of the areas to be consolidated was taken before and after treatment. Only one color measurement per consolidation area was taken during this testing due to space constraints on the sherds. A modified strength adhesion tape test, similar to the original experimentation, was also performed on each of the sherds before and after treatment. The tape was placed on a blank piece of white printer paper. The same application method was used as the original experimentation - one layer of consolidant applied by brush.

9.2. Results & Discussion

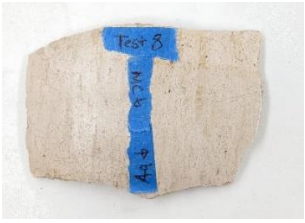
The results of the experimentation on the sherds of the education collection showed that methylcellulose behaved consistently while Aquazol's behavior was much more unpredictable. The Aquazol resulted in the most color change before and after treatment, with a ΔE above two for six of the tests (Table 7). Methylcellulose on the other hand only resulted in a color change above two for two tests. The two tests showing a color change for methylcellulose also produced a significant color change for Aquazol, on sherd tests 3 and 5 (Table 8). The sherd used for test 3 is from the exterior of a cookware pot, and this could be an interaction between any number of things including but not limited to what was previously cooked in the vessel, as the color change on other cookware pots was not as drastic (tests 1, 2, and 4). Test 5 was on a sherd with a lead-based glaze paint on a slip surface and the color changes could have been from an interaction with the paint or slip or underlying ceramic body. Overall the average color change for the methylcellulose was significantly less than for Aquazol.

Table 7: Delta E Values for Education Collection Sherds Before and After Treatment

ΔE: BT-PT			
Test 1 Aq	3.54	Test 5 Aq	4.99
Test 1 MC	1.39	Test 5 MC	7.48
Test 2 Aq	1.60	Test 6 Aq	2.29
Test 2 MC	0.51	Test 6 MC	0.99
Test 3 Aq	10.35	Test 7 Aq	6.41
Test 3 MC	2.75	Test 7 MC	1.60
Test 4 Aq	5.77	Test 8 Aq	0.86
Test 4 MC	1.45	Test 8 MC	0.42

Table 8: Comparison Images of Education Collection Test Sherds Before and After Treatment

Test #	Image of Sherd BT	Image of Sherd PT
Test #1		
Test #2		
Test #3		
Test #4		
Test #5		

Test #6		
Test #7		
Test #8		

In addition to the colorimetry testing, modified tape tests were performed. As the previous tests in Figure 20 show, a few of the sherds were possible candidates for consolidation. Tests 4, 5, and 7 would possibly benefit from consolidation. The after treatment tests in Figure 21 show that the consolidation did have an effect, especially on test sherds five and seven. The methylcellulose was not as effective on sherd four as the Aquazol.

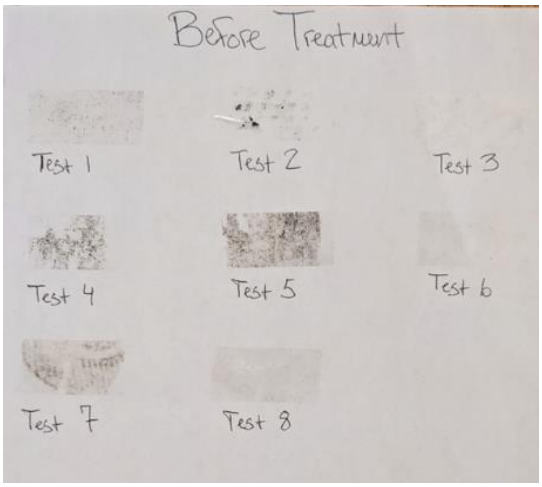


Figure 20: Images of Strength Adhesion Tape Test Results of Education Collection Test Sherds Before Treatment

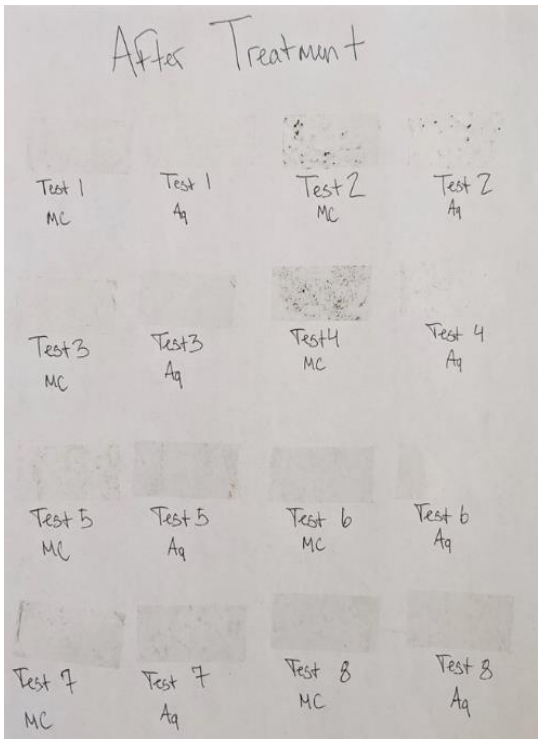


Figure 21: Images of Strength Adhesion Tape Test Results of Education Collection Test Sherds After Treatment

These tests showed the surprising color change behavior of Aquazol on the cooking pots - while there was some color change on the other sherds, the ΔEs were much lower and harder to see. The methylcellulose behaved similar to the controlled experiments and performed even better in terms of color change. It was difficult to comment on the overall efficacy of the consolidants as

most sherds were not in need of consolidation. In test four, methylcellulose did not perform as well as Aquazol, which is similar to how it behaved in the control tests - well, but not as well as Aquazol.

10. Conclusions

It is my hope that this research encourages conservators to consider the many implications of their treatment decisions, including the physical and intangible impact on the object in question and the impact on the affiliated community, environment, and their own physical well-being. In the exhibit driven schedule of museum work it is not always possible to do all of these things, but I believe it is possible to start working these into practice whenever the opportunity arises or on a smaller scale and eventually they will become commonplace considerations. Based on the summary of the Philosophy and Ethics Held in Trust (HIT) Working Group, many in the field share this desire to create a more people centered approach to conservation, “among heritage professionals and the public, there is a strong call for a more just and inclusive conservation practice that is collaborative, open, diverse, sustainable, and ethically relevant.” (Smith et al. 2023, 1).

This research question started as a simple “do water-based consolidants work as possible alternatives to solvent-based ones?” and developed into a more comprehensive look at this straightforward treatment question. To answer to that basic question, yes, water-based consolidants are possible alternatives to solvent-based ones. It is possible to find more sustainable alternatives to some of our “go to” solutions in an effort to combat climate change through our profession. The HIT groups found that “Of the HIT initiative’s nine pillars of study,

the findings and goals of the Climate Crisis and Environmental Impact Working Group demand the most urgent attention and action" (Berdecía-Hernández et al 2023, 1).

This research showed that a 0.5% solution of methylcellulose provided a suitable amount of adhesion for powdery ceramic surfaces and behaved consistently across ceramic types. It also resulted in very little measurable color change that was not always easily discernible through visual observation. Both the 5% and 7.5% solutions of Aquazol 200 resulted in the least color change on the original test tiles and also provided sufficient consolidation. However when tested on the education collection sherds at MIAC, the Aquazol more often than not led to a substantial color change which was easily visually observed. This research was presented at the 2022 AIC Conference during the joint Objects and Archaeological Discussion Group Session and questions and comments from colleagues suggested that Aquazol is generally not favorable in high humidity conditions because it degrades over time and often needs to be reapplied. Acrysol WS-24, Jade 403, and Ethulose all performed very well in terms of consolidation properties, however all of them significantly discolored the test tiles.

In conversations with Pueblo community members, I shared the results of my experiments with them to discuss their opinions on conservation intervention and while they answered my questions, they were all most interested in why treatment was being performed in the first place. This question is a pivotal one. We often rush to suggest treatment, and many times, treatment is the best way to safeguard the physical object for the future. But what is that future? And what about the desires of members of affiliated communities? It is a Western European view to preserve and it does not consider the original context and intentions for an object, let alone that object's significance to contemporary communities. Choosing restraint in treatment is difficult but necessary. It will not always be the case that no treatment is preferable but starting with

caution will lead to consideration of more perspectives. Oftentimes, conservators are reversing past conservation efforts that have failed or are damaging the object. We all hope that our work will not be questioned as we sometimes do with past treatments, but (we hope) previous conservators did the best they could with the time, knowledge, and resources they had available. Showing restraint and considering the views of community members as well as the bigger and long-term picture will inadvertently help with this.

10.1. Areas for Further Study

While this study considered a number of factors, the test tiles created only replicated a small subset of potential treatment conditions. Future research considering the effect of a water-based consolidant on a ceramic with water soluble salts and subsequent desalination (or no desalination) would be relevant. Additionally, the relative strength of these consolidants in addressing more structural issues, such as flaking & delamination and crumbling structure would be beneficial. There are a number of application methods that could affect the overall performance and color change, such as immersion, which were not tested. Other consolidants could also be considered, such as Funori and aqueous silicates. The latter was suggested through personal communication with a conservator specializing in stone. These consolidants were all tested in water, but some can be used in conjunction with ethanol and other solvents, which could change their behavior. The effect of how these consolidants may interfere with future analytical testing was not explored. Porosity is an important factor when treating ceramics and was not evaluated or taken into consideration for this experimentation and it should be included in further studies. The penetration depth of the consolidants was also not examined as it is extremely difficult to accurately measure penetration depth of consolidants in ceramics. A way to measure penetration depth would have wide reaching applications to a variety of other treatment research questions. The most interesting follow up question that came out of this

research is what the degradation patterns of Aquazol are and at what point Aquazol degrades and is an unsuitable option for treatment. Reassessing and comparing the ageing properties of the other consolidants would be an additional avenue for further study.

11. Appendices

11.1. Questions for Pueblo Community Members

The questions below only served as starting points for conversation. Not all questions were asked during the conversations. The conversation was driven by the community members involved and evolved in real time. Conversations generally lasted an hour/hour and a half. I introduced myself and my research first before asking questions.

- What do you think is important for me to know about Pueblo pottery? About how I should approach conservation of Pueblo pottery?
- What is your relationship to pottery?
- What is your ideal engagement for your community with pottery? What do you hope for the future of pottery?
- What are your views on conservation intervention? When is it appropriate? Are there certain materials we should use? Should avoid?
    - Discussion about powdery surfaces and when they warrant intervention.
- Thank you for your time today. Can I follow up with you?

11.2. Survey Questions & Links (English, French, & Spanish)

Link to google forms for layout (English) https://docs.google.com/forms/d/1_e57JkK6SBdSRCJD-e170ADIMtQcjv8S2AwhvZMNLCs/edit?usp=sharing

SHORTENED LINKS

English: https://forms.gle/zjYeCVCBu9LXDxmQ9
French: https://forms.gle/hJikmQhyZWvrp7ba8
Spanish: https://forms.gle/jv2QghSePz57GNzYA

ENGLISH

SURVEY TITLES

MA Thesis: Consolidants for Low-Fired Ceramic Treatments (English)

Second Treatment *OPTIONAL*
Third Treatment *OPTIONAL*
Updates & Contact

OPENING TEXT

PLEASE READ BEFORE CONTINUING
Thank you for participating in this survey. Please only fill out this survey if you have completed a **consolidation** treatment on a **low-fired ceramic**. There are three sections on this form. Please fill out one section per treatment described. You are *not* required to fill out all three sections. One section should take approximately ten to fifteen (10-15) minutes to complete.

My name is Céline Wachsmuth. I am a Master's student in the UCLA/Getty Conservation Program. For my thesis research, I am evaluating water based consolidants for their use in treating low-fired ceramics. My goals are to evaluate green alternatives to solvent based consolidation treatments and compile practical knowledge from conservators on their practices. During my background research, I realized there is little published on the practices of conservators for consolidating low-fired ceramics and so I devised this survey to gain an understanding of practices in the field. I am curious to see if any patterns arise based on region. Consolidation may not be appropriate for a number of reasons, including it being an irreversible process and the cultural context of the object. Another aspect of my research is investigating cultural concerns regarding consolidation. Though it is not part of the survey, I am consulting with Pueblo potters to understand their views on conservation and will integrate these important discussions in my analysis.

To complete this survey in French visit INSERT LINK DIRECTLY, to complete in Spanish visit LINK.
If you have any questions, comments, or concerns, please reach out to me at wachsmuthc@g.ucla.edu.

FRENCH

SURVEY TITLES

Mémoire de maîtrise: Consolidants pour les traitements des céramiques à basse cuisson (français)
Deuxième traitement * OPTIONNEL *
Troisième traitement * OPTIONNEL *
Mises à jour et contact

OPENING TEXT

* VEUILLEZ LIRE AVANT DE CONTINUER *

Merci pour votre participation à cette enquête. Veuillez remplir ce questionnaire seulement si vous avez effectué un traitement de consolidation sur une céramique cuite à basse température. Il y a trois sections sur ce formulaire. Veuillez remplir une section par traitement décrit. Vous n'êtes pas obligés de toutes les remplir. Une section devrait durer environ dix à quinze (10-15) minutes.

Je m'appelle Céline Wachsmuth. Je suis étudiante en master de restauration dans le cursus universitaire UCLA / Getty. Pour ma thèse, j'évalue des consolidants aqueux pour leur utilisation dans le traitement des céramiques cuites à basse température. Mes objectifs sont d'évaluer des alternatives écologiques aux traitements de consolidation à base de solvants et de compiler les connaissances des restaurateurs sur leurs pratiques. Lors de mes recherches préalables, je me suis rendue compte qu'il y avait peu de publications sur les pratiques des restaurateurs pour consolider les céramiques cuites à basse température et j'ai donc conçu cette enquête pour savoir ce que font les restaurateurs. Je suis curieuse de savoir si des méthodes particulières sont utilisées en fonction des régions. La consolidation peut être inappropriée pour un certain nombre de raisons: irréversibilité, contexte culturel de l'objet, etc… Un autre aspect de mes recherches consiste à étudier les préoccupations culturelles concernant la consolidation. Bien que cela ne fasse pas partie de l'enquête, je consulte les potiers de Pueblos pour comprendre leur point de vue sur la restauration et intégrer ces discussions importantes dans mon analyse.

Pour compléter ce sondage en anglais, visitez INSÉRER LE LIEN DIRECTEMENT, pour compléter en espagnol, visitez le LIEN
Si vous avez des questions, des commentaires ou des préoccupations, veuillez me contacter à wachsmuthc@g.ucla.edu.

SPANISH

SURVEY TITLES

Tesis de maestría: Consolidantes utilizados como parte de la restauración/conservación de la cerámica de baja temperatura (español)
Segundo tratamiento * OPCIONAL *
Tercer tratamiento * OPCIONAL *
Actualizaciones y contacto

OPENING TEXT

* POR FAVOR LEA ANTES DE CONTINUAR *
Gracias por su participación en esta encuesta. Solo complete esta encuesta si ha completado un intervención que incluyó la consolidación de una cerámica de baja temperatura. Este formulario tiene tres partes. Complete una parte por cada ejemplo como descrito. No es necesario que complete las tres partes. Cada parte debe tomar aproximadamente diez a quince (10-15) minutos en completarse.

Me llamo Céline Wachsmuth. Soy una estudiante de maestría en el Programa de Conservación de UCLA / Getty. Para la investigación de mi tesis, estoy evaluando consolidantes a base de agua para su uso en las intervenciones de restauración para

la cerámica de baja temperatura. Mis objetivos son evaluar alternativas ecológicas en la intervención de consolidación a base de solventes y recopilar conocimientos prácticos de restauradores/conservadores sobre sus prácticas. Durante mi investigación de antecedentes, me di cuenta de que hay poco publicado sobre las prácticas de restauradores para consolidar la cerámica de baja temperatura, por lo que ideé esta encuesta para comprender las prácticas utilizadas en el campo de restauración. Tengo curiosidad de ver si surgen algunos patrones regionales. Hay varios casos donde la consolidación no es apropiada, incluyendo el hecho que sea un proceso irreversible y el contexto cultural del objeto. Otro aspecto de mis búsquedas es investigar las preocupaciones culturales sobre la consolidación. Aunque no es parte de la encuesta, estoy consultando con ceramistas de Pueblo para entender sus puntos de vista en lo que se trata de la restauración y voy a integrar estas importantes discusiones en mi análisis.

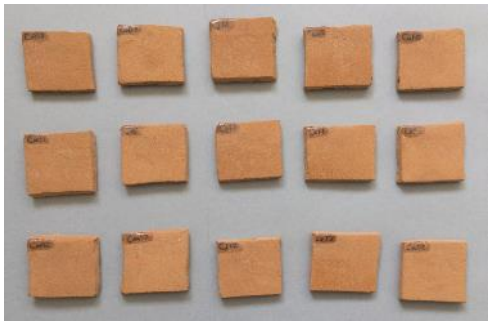
Para completar esta encuesta en inglés, visite INSERT LINK DIRECTLY, para completar en francés, visite LINK.
Si tiene alguna pregunta, comentario o inquietud, comuníquese conmigo a wachsmuthc@g.ucla.edu.

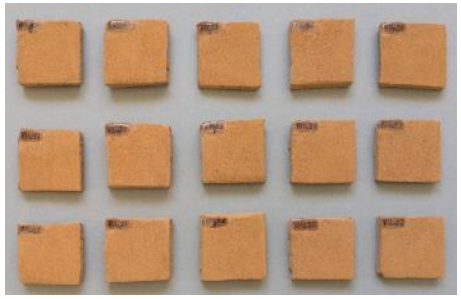
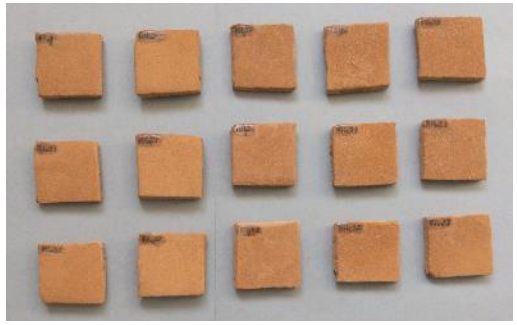
#	QUESTION (English)	QUESTION (French)	QUESTION (Spanish)
1	What region of the world were you trained (ie-USA, Canada, Mexico, South America, Europe, Egypt, other?)	Dans quelle région du monde avez-vous été formé (États-Unis, Canada, Mexique, Guatemala, France, Égypte, autre?)	¿En qué país recibió capacitación (es decir, EE. UU., Canadá, México, Guatemala, Francia, Egipto, otro?)
2	Material description of object being treated, including vessel type, color, estimated porosity (porous, semi porous, etc.) etc.	Description matérielle de l'objet traité, y compris typologie, couleur, estimation de la porosité (poreuse, semi-poreuse, etc.), etc.	Descripción del tipo de objeto recibiendo intervención , incluyendo la forma de la vasija, color de la pasta, porosidad estimada (porosa, semiporosa, etc.), etc.
3	Contextual description of object being treated (including location of original, cultural affiliation, any history you deem relevant)	Description contextuelle de l'objet traité (y compris localisation / provenance de l'original, l'appartenance culturelle, tous détails que vous jugez pertinent)	Descripción contextual del objeto recibiendo intervención (incluyendo la ubicación de la afiliación cultural original, y cualquier historia que considere relevante)
4	Did you engage in any consultation with stakeholder communities before performing the treatment?	Avez-vous consulté les communautés intéressées avant d'effectuer le traitement?	¿Realizó alguna consulta con las comunidades interesadas antes de realizar la intervención?

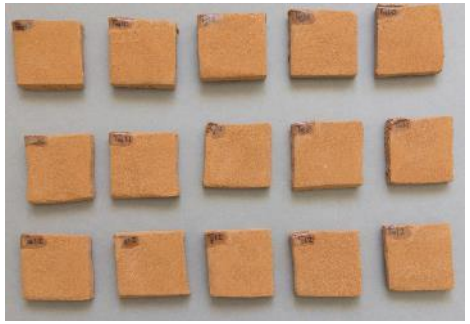
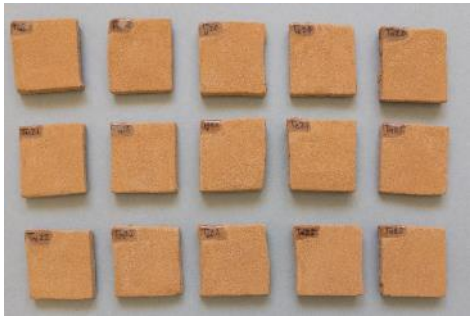
5	Condition assessment/reason for treatment (spalling, powdery surface, lifting material, erosion, use, etc.)	État de conservation / raison du traitement (écaillage, surface poudreuse, matériel de levage, érosion, utilisation, etc.)	Evaluación del estado / motivo por la intervención (desprendimientos lenticulares, superficie pulverulenta, delaminación de la superficie, erosión, uso, etc.)
6	Was this a surface treatment or a structural treatment?	S'agit-il d'un traitement de surface ou d'un traitement structurel?	¿Fue una intervención de la superficie o de la estructura?
7	Was the treatment performed in a lab or on site? Please elaborate on the conditions if you would like.	Le traitement a-t-il été effectué dans un laboratoire / atelier ou sur place? Veuillez préciser les conditions si vous le souhaitez.	¿La intervención fue hecha en un laboratorio o en campo? Por favor, explique las condiciones si lo desea.
8	What consolidant was chosen for treatment and why? (example: standard treatment protocol, previous experience, does not darken surface, good working properties)	Quel consolidant a été choisi pour le traitement et pourquoi? (exemple: protocole de traitement standard, expérience antérieure, pas de saturation de la surface, facilité d'utilisation)	¿Qué consolidante fue elegido para la intervención y por qué? (ejemplo: protocolo de intervención estándar, experiencia previa, no afecta el aspecto, buenas propiedades de trabajo)
9	Did you test any other consolidants before final treatment? If so, which ones?	Avez-vous testé d'autres consolidants avant le traitement final? Si oui, lesquels?	¿Probó otros consolidantes antes de la intervención final? ¿De ser así, cuáles?
10	What application method was used? (brush, pipette, spray, mister, other)	Quelle méthode d'application a été utilisée? (pinceau, pipette, spray, brumisateur, autre)	¿Qué método de aplicación se utilizó? (con pincel, por inyección, con spray, con un nebulizador, otro)
11	General comments and observations on treatment. Would you use this treatment again (yes/no & why)? Would you change anything? Why/why not?	Commentaires généraux et observations sur le traitement. Souhaitez-vous utiliser à nouveau ce traitement (oui / non et pourquoi)? Souhaitez-vous changer quelque chose? Pourquoi/pourquoi pas?	Comentarios y observaciones generales sobre la intervención. ¿Volvería a utilizar esta metodología (sí / no y por qué)? ¿Cambiarías algo? ¿Por qué / por qué no?

12	Would you like to be updated with the collective results of the survey?	Souhaitez-vous être mis à jour avec les résultats de l'enquête?	¿Le gustaría ser contactado con los resultados colectivos de la encuesta?
13	Can I contact you if I have further questions?	Puis-je vous contacter si j'ai d'autres questions?	¿Puedo comunicarme con usted si tengo más preguntas?
14	May I use parts of your responses in my thesis text? You will be contacted with what I wish to include for editing and final approval before I submit.	Puis-je utiliser des parties de vos réponses dans le texte de ma thèse? Vous serez contacté avec ce que je souhaite inclure pour l'édition et l'approbation finale avant de soumettre.	¿Puedo usar partes de sus respuestas en el texto de mi tesis? Será contactado con lo que deseo incluir para su edición y aprobación final antes de enviarlo.
15	If you answered yes to any of the above three questions, please include your email below.	Si vous avez répondu oui à l'une des trois questions ci-dessus, veuillez inclure votre mail ci-dessous.	Si respondió afirmativamente a cualquiera de las tres preguntas anteriores, incluya su correo electrónico a continuación.

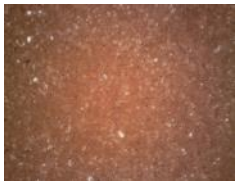
11.3. Photography: Overall

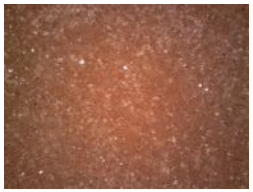
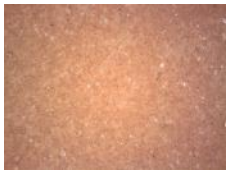
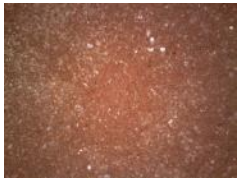
Control			
	BT	PT	PAG
Low %			
High %			

Relative Humidity			
	BT	PT	PAG
Low %			
High %			

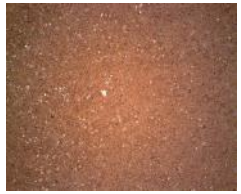
Temperature			
	BT	PT	PAG
Low %			
High %			

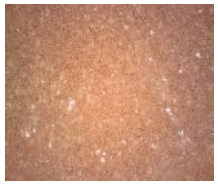
11.4. Photography: DinoLite

Control 5% Acrysol Low Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
1.0						
1.1						
1.2						

Control 7.5% Acrysol High Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
2.0						
2.1						
2.2						

Control 5% Aquazol Low Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
1.0						
1.1						
1.2						

Control 7.5% Aquazol High Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
2.0						
2.1						
2.2						

Control 5% Jade Low Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
1.0						
1.1						
1.2						

Control 7.5% Jade High Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
2.0						
2.1						
2.2						

Control .5% Ethulose Low Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
1.0						
1.1						
1.2						

Control 1% Ethulose High Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
2.0						
2.1						
2.2						

Control .5% methylcellulose Low Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
1.0						
1.1						
1.2						

Control 1% methylcellulose High Concentration						
	BTn	BTr	PTn	PTr	PAGn	PAGr
2.0						
2.1						
2.2						

11.5. DataLogger Data

Control DataLogger 1		Control DataLogger 2		Temp DataLogger Left		Temp DataLogger Middle		Temp DataLogger Right		RH DataLogger Left		RH DataLogger Middle		RH DataLogger Right	
T, °F	RH, %	T, °F	RH, %	T, °F	RH, %	T, °F	RH, %	T, °F	RH, %	T, °F	RH, %	T, °F	RH, %	T, °F	RH, %
72.83	50.44	74.04	46.88	111.47	16.90	121.83	15.00	100.11	28.37	73.22	51.51	73.39	50.20	73.47	49.06
72.83	50.05	73.22	47.40	120.84	13.87	136.64	15.00	113.39	19.99	72.27	57.42	72.35	54.58	73.00	52.41
72.83	51.26	73.44	48.31	124.26	12.25	144.11	15.00	119.67	16.42	72.32	59.15	72.35	56.87	73.43	53.60
72.83	50.75	73.40	47.73	125.54	11.65	147.80	15.00	123.10	14.69	72.36	60.38	72.48	58.30	73.73	54.56
72.83	50.53	73.27	47.65	126.38	11.04	150.61	15.00	125.19	13.47	72.32	61.32	72.48	59.41	73.95	55.39
72.83	50.32	72.96	47.68	126.97	10.51	152.06	15.00	126.55	12.63	72.14	62.37	72.35	60.35	73.99	56.24
72.83	50.01	72.53	47.31	127.36	10.16	153.54	15.00	127.53	12.01	71.93	63.74	72.18	61.31	73.90	57.00
72.83	49.88	72.27	47.06	127.30	10.35	154.29	15.00	128.00	11.76	71.71	64.56	72.01	62.20	73.77	57.77
72.83	50.05	71.93	47.27	127.50	10.00	154.67	15.00	128.26	11.46	71.54	65.27	71.83	62.91	73.65	58.37
72.83	49.84	71.63	47.27	127.43	9.75	155.05	15.00	128.53	11.08	71.33	65.91	71.62	63.56	73.52	58.95
72.83	49.98	71.33	47.18	127.23	9.76	155.05	15.00	128.60	10.93	71.02	66.50	71.40	64.17	73.30	59.48
72.83	49.98	70.98	47.24	126.71	9.78	155.05	15.00	128.40	10.78	70.77	67.04	71.15	64.72	73.08	59.98
72.83	49.90	70.64	47.05	126.90	9.36	155.05	15.00	128.46	10.48	70.55	67.53	70.93	65.27	72.83	60.48
72.83	49.21	70.29	46.12	126.38	9.26	155.05	15.00	128.20	10.24	70.29	67.98	70.63	65.75	72.61	60.89
72.83	48.30	69.95	45.11	126.06	9.03	154.67	15.00	128.06	10.09	69.99	68.39	70.37	66.17	72.31	61.32
72.83	48.18	69.56	45.19	126.64	8.78	154.67	15.00	128.00	9.86	69.69	68.74	70.12	66.59	72.05	61.69
72.83	46.89	69.22	43.38	131.21	7.82	156.98	15.00	129.40	9.51	69.39	69.13	69.81	66.95	71.79	62.06
72.83	47.73	69.56	44.70	131.76	7.53	157.77	15.00	129.88	9.21	69.13	69.42	69.60	67.20	71.62	62.23

72.83	47.37	69.31	44.43	131.69	7.39	157.38	15.00	129.88	9.09	68.92	69.70	69.39	67.47	71.49	62.40
72.83	47.16	69.05	44.37	131.76	7.32	157.77	15.00	129.81	8.98	68.66	69.96	69.13	67.71	71.23	62.59
72.83	47.18	68.75	44.39	131.27	7.35	157.38	15.00	129.61	8.98	68.41	70.11	68.87	67.98	71.02	62.81
72.83	47.41	68.49	44.64	131.41	7.26	157.38	15.00	129.74	8.90	68.19	70.38	68.66	68.23	70.80	63.03
72.83	47.42	68.28	44.63	131.62	7.20	157.38	15.00	129.54	8.90	67.98	70.59	68.44	68.47	70.63	63.20
72.83	47.54	68.06	44.78	130.93	7.32	156.98	15.00	129.27	8.89	67.81	70.87	68.27	68.69	70.46	63.39
72.83	47.91	67.93	45.24	130.93	7.39	156.98	15.00	128.93	9.00	67.64	71.08	68.10	68.94	70.29	63.56
72.83	48.28	67.89	45.54	131.34	7.30	157.38	15.00	129.07	8.97	67.55	71.28	67.97	69.16	70.20	63.73
72.83	48.44	67.89	45.56	127.43	8.29	155.43	15.00	128.40	9.11	67.46	71.36	67.93	69.30	70.16	63.84
72.83	48.51	68.06	45.58	126.97	8.31	154.29	15.00	127.80	9.17	67.59	71.34	68.01	69.43	70.20	63.97
72.83	48.32	68.23	45.24	127.17	8.34	154.67	15.00	127.73	9.17	67.59	71.46	68.01	69.57	70.16	64.12
72.83	48.30	68.41	45.15	127.50	8.30	155.05	15.00	128.06	9.18	67.68	71.55	68.06	69.72	70.24	64.24
72.83	48.28	68.75	45.08	127.83	8.20	155.43	15.00	128.33	9.18	67.76	71.59	68.14	69.82	70.37	64.29
72.83	48.12	69.09	44.72	128.42	8.26	155.43	15.00	128.60	9.19	67.93	71.64	68.31	69.93	70.54	64.33
72.83	48.14	69.52	44.68	128.69	8.27	155.82	15.00	128.73	9.19	68.11	71.69	68.48	70.00	70.76	64.38
72.83	48.00	69.87	44.52	129.30	8.22	156.20	15.00	129.13	9.20	68.36	71.74	68.74	70.09	70.97	64.37
72.83	47.94	70.29	44.36	129.63	8.17	156.59	15.00	129.40	9.20	68.62	71.77	68.96	70.17	71.23	64.43
72.83	47.52	70.68	43.80	130.11	8.10	156.98	15.00	129.67	9.13	68.88	71.80	69.26	70.26	71.58	64.43
72.83	47.32	71.07	43.64	130.38	8.07	156.98	15.00	130.01	9.14	69.13	71.80	69.51	70.34	71.83	64.45
72.83	47.06	71.50	43.40	130.65	8.16	157.38	15.00	130.28	9.14	69.44	71.80	69.81	70.38	72.18	64.49
72.83	47.03	71.97	43.43	130.86	8.14	157.77	15.00	130.63	9.15	69.78	71.81	70.12	70.47	72.48	64.51
72.83	47.02	72.40	43.30	131.41	8.11	158.57	15.00	131.04	9.23	70.12	71.78	70.46	70.53	72.83	64.52
72.83	47.21	72.83	43.57	131.76	8.29	158.57	15.00	131.38	9.31	70.47	71.79	70.80	70.54	73.21	64.55

72.83	47.56	73.40	43.83	132.53	8.73	158.98	15.00	131.59	9.85	70.85	71.74	71.15	70.57	73.56	64.59
72.83	49.82	73.87	46.66	133.30	8.68	159.79	15.00	132.15	9.79	71.28	71.61	71.58	70.62	73.99	64.63
72.83	50.08	75.21	45.93	134.09	8.42	160.20	15.00	132.85	9.57	72.06	71.28	72.22	70.57	74.68	64.57
72.83	49.00	76.04	44.73	134.16	8.59	160.61	15.00	133.27	9.62	72.62	71.25	72.87	70.52	75.29	64.51
72.83	48.85	75.73	45.31	136.78	7.88	161.87	15.00	134.13	9.44	72.75	71.56	73.08	70.66	75.55	64.59
72.83	48.44	75.60	45.03	136.78	7.95	162.72	15.00	134.70	9.45	73.14	71.40	73.43	70.60	75.77	64.76
72.83	48.71	75.39	45.48	136.86	7.86	163.14	15.00	134.92	9.22	73.27	71.50	73.52	70.73	75.77	65.07
72.83	48.56	75.30	45.11	136.63	7.58	163.14	15.00	135.14	8.92	73.40	71.51	73.65	70.80	75.81	65.31
72.83	48.04	75.12	44.56	136.41	7.53	163.14	15.00	135.14	8.84	73.52	71.58	73.73	70.87	75.85	65.53
72.83	47.58	74.91	44.02	136.41	7.54	163.14	15.00	135.21	8.85	73.52	71.67	73.77	70.99	75.81	65.77
72.83	47.31	74.69	44.42	136.49	7.58	163.14	15.00	135.21	8.85	73.52	71.79	73.73	71.11	75.77	65.97
72.83	47.39	74.48	44.54	139.58	6.78	164.01	15.00	136.97	8.65	73.48	71.90	73.69	71.22	75.68	66.21
72.83	47.45	74.43	44.36	143.21	6.26	167.59	15.00	139.62	8.15	73.40	71.98	73.60	71.33	75.20	66.70
72.83	47.53	74.17	44.56	143.53	6.14	168.51	15.00	140.24	8.01	73.18	72.08	73.34	71.54	74.55	67.63
72.83	47.80	73.96	45.01	144.26	6.08	168.98	15.00	140.55	8.01	73.01	72.18	73.13	71.72	74.16	68.12
72.83	48.53	73.96	45.57	145.76	5.69	169.92	15.00	140.94	7.86	72.83	71.98	72.96	71.76	73.90	68.43
72.83	48.02	73.70	45.19	145.67	5.60	169.92	15.00	140.94	7.71	72.62	72.16	72.78	71.74	73.73	68.53
72.83	47.87	73.40	45.21	145.84	5.48	170.40	15.00	141.02	7.63	72.40	72.35	72.57	71.81	73.52	68.66
72.83	47.88	73.05	45.27	146.43	5.39	170.88	15.00	141.26	7.56	72.19	72.35	72.39	71.91	73.26	68.84
72.83	48.15	72.75	45.56	146.43	5.43	170.88	15.00	141.34	7.48	71.97	72.48	72.18	71.97	73.04	68.96
72.83	48.33	72.44	45.78	146.43	5.45	171.37	15.00	141.49	7.44	71.76	72.57	71.92	72.06	72.78	69.12
72.83	48.43	72.19	45.95	146.34	5.41	171.37	15.00	141.49	7.41	71.50	72.60	71.70	72.16	72.52	69.27
72.83	48.79	71.88	46.40	145.09	5.47	170.40	15.00	140.79	7.47	71.28	72.75	71.49	72.22	72.31	69.36

72.83	48.90	71.63	46.37	144.51	5.46	170.40	15.00	140.16	7.46	71.07	72.88	71.23	72.28	72.09	69.49
72.83	48.69	71.33	46.21	147.19	5.08	171.37	15.00	141.10	7.32	70.81	73.02	71.02	72.40	71.83	69.61
72.83	48.71	71.07	46.14	147.97	4.88	172.35	15.00	141.57	7.17	70.59	73.32	70.76	72.55	71.70	69.57
72.83	48.72	70.81	46.19	148.14	4.78	173.34	15.00	142.13	7.03	70.29	73.43	70.50	72.67	71.49	69.61
72.83	48.83	70.59	46.28	148.66	4.73	173.84	15.00	142.45	6.95	70.04	73.58	70.24	72.73	71.27	69.64
72.83	48.84	70.34	46.29	148.57	4.58	173.34	15.00	142.37	6.87	69.74	73.69	69.94	72.84	71.02	69.71
72.83	48.79	70.12	46.23	150.34	4.39	175.38	15.00	143.17	6.73	69.48	73.78	69.73	72.94	70.76	69.74
72.83	48.94	69.95	46.34	151.69	4.15	176.42	15.00	143.50	6.74	69.31	73.82	69.51	72.97	70.59	69.72
72.83	49.40	69.82	46.80	152.70	4.15	177.48	15.00	144.15	6.67	69.22	73.78	69.39	72.96	70.54	69.60
72.83	49.87	69.82	47.23	152.60	4.13	176.95	15.00	144.06	6.74	69.09	73.68	69.30	72.95	70.46	69.53
72.83	50.09	69.82	47.47	151.60	4.33	176.95	15.00	143.98	6.74	69.05	73.62	69.21	73.00	70.42	69.47
72.83	50.54	70.04	47.76	151.60	4.81	176.42	15.00	143.66	7.13	69.01	73.53	69.17	72.96	70.37	69.43
72.83	52.95	70.51	49.87	139.81	6.63	168.51	15.00	138.48	7.74	69.26	73.06	69.30	72.98	70.54	69.45
72.83	51.65	70.77	48.56	138.05	7.08	167.13	15.00	136.75	8.18	69.52	73.15	69.69	72.79	71.49	68.57
72.83	52.59	71.11	49.49	134.81	7.81	162.29	15.00	134.56	8.76	69.78	73.17	69.99	72.70	71.92	68.14
72.83	52.14	71.58	49.32	133.73	8.18	161.03	15.00	133.27	8.96	69.87	73.15	70.12	72.69	72.05	68.09
72.83	52.03	71.88	48.95	133.73	8.20	160.20	15.00	132.85	9.11	69.99	73.17	70.20	72.75	72.18	68.14
72.83	51.81	72.23	48.51	133.30	8.08	159.79	15.00	132.50	9.10	70.12	73.21	70.33	72.80	72.31	68.12
72.83	51.13	72.44	47.80	133.37	8.07	159.38	15.00	132.29	9.18	70.29	73.23	70.50	72.82	72.48	68.11
72.83	50.74	72.79	47.27	133.59	8.09	159.38	15.00	132.36	9.18	70.42	73.21	70.63	72.80	72.65	68.09
72.83	50.29	73.09	46.70	133.73	8.06	159.79	15.00	132.43	9.14	70.59	73.20	70.80	72.82	72.83	68.05
72.83	49.80	73.35	46.25	133.73	7.93	159.38	15.00	132.36	9.10	70.77	73.16	71.02	72.84	73.04	68.04
72.83	49.18	73.57	45.29	134.30	7.80	159.79	15.00	132.50	9.03	70.98	73.16	71.19	72.86	73.21	68.03

72.83	48.69	73.61	44.81	134.45	7.65	160.20	15.00	132.71	8.88	71.15	73.18	71.36	72.88	73.39	68.02
72.83	48.09	73.74	44.71	134.81	7.65	160.61	15.00	133.06	8.88	71.33	73.14	71.58	72.87	73.56	68.01
72.83	48.11	74.39	44.32	134.66	7.65	160.61	15.00	133.13	8.85	71.54	73.10	71.75	72.86	73.77	68.00
72.83	47.85	74.65	44.19	134.74	7.51	161.03	15.00	133.35	8.77	71.76	73.07	71.96	72.86	73.99	67.99
72.83	47.43	75.34	43.41	135.10	7.55	161.45	15.00	133.84	8.67	72.01	73.01	72.18	72.85	74.21	67.98
72.83	47.32	75.26	43.78	135.32	7.59	161.87	15.00	134.20	8.67	72.19	73.00	72.39	72.84	74.42	67.94
72.83	47.15	75.52	43.67	135.10	7.62	161.45	15.00	134.13	8.67	72.40	72.93	72.61	72.84	74.64	67.90
72.83	46.75	75.00	43.46	135.39	7.86	161.87	15.00	134.27	8.91	72.49	73.00	72.70	72.85	74.77	67.95
72.83	48.04	74.65	45.02	134.95	7.94	161.87	15.00	134.06	8.98	72.62	73.10	72.83	72.95	74.86	68.04
72.83	48.37	74.30	45.60	135.68	7.88	161.87	15.00	134.13	9.06	72.66	73.22	72.87	73.01	74.90	68.11
72.83	49.03	74.26	46.31	135.90	7.92	162.29	15.00	134.34	8.98	72.66	73.25	72.87	73.10	74.86	68.22
72.83	49.12	74.09	46.43	135.46	7.91	162.29	15.00	134.27	8.98	72.66	73.25	72.87	73.16	74.86	68.37
72.83	49.33	73.74	46.82	134.81	8.00	161.87	15.00	133.84	9.05	72.62	73.42	72.83	73.27	74.81	68.46
72.83	49.56	73.44	47.16	134.74	7.97	161.45	15.00	133.56	9.05	72.49	73.61	72.74	73.35	74.68	68.56
72.83	49.67	73.09	47.30	139.65	7.09	162.72	15.00	134.85	8.84	72.32	73.74	72.57	73.39	74.51	68.70
72.83	49.88	73.14	47.17	143.37	6.60	166.22	15.00	137.95	8.43	72.23	73.79	72.44	73.52	73.95	69.17
72.83	50.94	72.88	48.63	143.94	6.35	166.67	15.00	138.55	8.13	72.14	73.81	72.31	73.62	73.47	69.93
72.83	50.69	72.36	48.33	143.77	6.33	167.13	15.00	138.86	8.06	71.88	73.93	72.09	73.71	73.13	70.34
72.83	51.02	72.19	48.58	143.45	6.26	167.13	15.00	138.78	7.98	71.71	73.96	71.83	73.80	72.78	70.59
72.83	50.99	71.63	48.71	143.45	6.24	167.13	15.00	138.70	7.90	71.41	74.05	71.58	73.86	72.44	70.85
72.83	51.09	71.28	48.88	143.37	6.18	167.13	15.00	138.63	7.82	71.15	74.08	71.27	73.92	72.14	71.03
72.83	51.26	70.98	48.99	143.29	6.20	167.59	15.00	138.63	7.90	70.89	74.11	71.06	73.95	71.88	71.21
72.83	51.67	70.68	49.57	142.96	6.29	167.13	15.00	138.55	7.98	70.64	74.17	70.80	73.98	71.58	71.32

72.83	52.34	70.51	50.26	142.64	6.39	166.67	15.00	138.40	7.90	70.42	74.23	70.59	74.02	71.32	71.47
72.83	52.67	70.25	50.47	142.32	6.42	166.67	15.00	138.25	7.97	70.17	74.26	70.33	74.08	71.02	71.56
72.83	52.83	69.99	50.68	142.08	6.31	166.67	15.00	138.10	7.97	69.91	74.35	70.07	74.10	70.76	71.65
72.83	53.16	69.74	51.21	141.61	6.46	165.77	15.00	137.65	7.96	69.65	74.41	69.81	74.16	70.50	71.77
72.83	53.48	69.44	51.41	141.45	6.50	165.77	15.00	137.35	8.03	69.39	74.44	69.56	74.19	70.24	71.83
72.83	53.61	69.18	51.42	141.37	6.30	165.77	15.00	137.35	7.96	69.18	74.50	69.34	74.23	70.03	71.89
72.83	53.72	68.92	51.45	141.53	6.33	165.77	15.00	137.35	7.88	68.92	74.53	69.09	74.26	69.77	71.95
72.83	53.70	68.66	51.56	139.50	6.62	163.14	15.00	136.38	7.94	68.66	74.56	68.83	74.29	69.51	72.01
72.83	53.32	69.13	50.66	139.96	6.45	163.14	15.00	136.46	7.94	68.49	74.48	68.66	74.27	69.39	72.00
72.83	53.16	68.96	50.57	139.65	6.45	163.14	15.00	136.53	7.94	68.32	74.52	68.53	74.25	69.26	71.95
72.83	53.15	68.88	50.57	139.27	6.41	163.14	15.00	136.38	7.94	68.23	74.39	68.40	74.21	69.17	71.92
72.83	53.09	68.96	50.37	140.20	6.31	164.01	15.00	136.68	7.95	68.23	74.28	68.40	74.12	69.21	71.80
72.83	53.22	69.05	50.55	141.13	6.53	164.89	15.00	136.83	8.10	68.28	74.20	68.44	74.04	69.26	71.69
72.83	55.17	69.56	52.31	140.82	6.43	163.58	15.00	137.12	7.95	68.49	74.02	68.57	74.06	69.47	71.57
72.83	53.20	69.78	50.16	140.43	6.57	163.58	15.00	136.83	8.03	68.62	74.09	68.74	74.05	69.56	71.52
72.83	52.92	70.17	49.83	140.04	6.74	163.14	15.00	136.75	8.10	68.71	74.04	68.79	74.08	69.60	71.58
72.83	52.60	70.68	49.27	139.65	6.84	163.58	15.00	136.75	8.18	68.88	73.95	68.87	74.06	69.73	71.60
72.83	52.32	71.33	48.81	139.50	6.97	164.01	15.00	136.97	8.11	69.09	73.82	69.09	74.03	70.12	71.40
72.83	52.07	71.50	48.75	139.96	6.91	164.89	15.00	137.35	8.11	69.31	73.76	69.34	73.94	70.63	70.90
72.83	51.93	71.80	48.55	140.20	6.90	164.89	15.00	137.65	8.12	69.52	73.73	69.56	73.90	70.93	70.64
72.83	51.67	72.10	48.31	140.35	7.01	165.33	15.00	137.87	8.12	69.78	73.67	69.81	73.87	71.27	70.47
72.83	51.67	72.49	48.31	140.59	7.01	165.33	15.00	138.17	8.20	70.08	73.64	70.07	73.84	71.58	70.29
72.83	51.66	72.88	48.33	141.37	6.90	166.22	15.00	138.70	8.13	70.34	73.52	70.37	73.76	71.88	70.18

72.83	51.50	73.31	48.01	141.84	6.92	166.67	15.00	139.24	8.07	70.64	73.47	70.67	73.74	72.22	70.04
72.83	51.46	73.65	48.02	142.24	6.87	167.13	15.00	139.55	8.07	70.94	73.39	70.97	73.71	72.57	69.92
72.83	51.24	74.04	47.87	142.32	6.98	167.13	15.00	139.78	8.15	71.28	73.34	71.27	73.63	72.87	69.84
72.83	51.27	74.52	47.79	142.40	7.11	167.13	15.00	139.78	8.23	71.63	73.23	71.62	73.61	73.26	69.73
72.83	51.36	75.00	47.75	142.64	7.13	167.59	15.00	140.16	8.24	72.01	73.12	71.96	73.56	73.60	69.67
72.83	51.33	75.56	47.66	142.72	7.17	167.59	15.00	140.40	8.28	72.36	73.04	72.35	73.48	73.99	69.59
72.83	51.05	76.04	47.27	143.29	7.16	168.05	15.00	140.87	8.25	72.79	72.89	72.74	73.44	74.38	69.52
72.83	50.76	76.26	47.05	144.18	6.89	168.98	15.00	141.26	8.10	73.18	72.90	73.13	73.36	74.77	69.44
72.83	50.64	76.26	47.16	144.10	6.98	168.98	15.00	141.42	8.03	73.44	72.87	73.43	73.33	75.07	69.41
72.83	50.00	75.82	46.71	144.43	7.09	168.51	15.00	141.34	8.33	73.52	72.99	73.52	73.34	75.16	69.45
72.83	51.88	75.52	49.42	145.34	6.82	168.98	15.00	141.65	8.18	73.57	73.14	73.60	73.47	75.20	69.57
72.83	51.92	75.34	49.15	145.25	6.85	169.45	15.00	141.65	8.11	73.57	73.35	73.60	73.59	75.16	69.68
72.83	51.91	75.08	49.07	145.01	6.83	168.98	15.00	141.57	8.11	73.52	73.49	73.60	73.67	75.12	69.83
72.83	51.92	74.82	49.18	145.01	6.71	169.45	15.00	141.73	8.03	73.44	73.63	73.52	73.78	74.99	69.96
72.83	52.28	75.39	50.46	144.68	6.74	168.98	15.00	141.26	8.10	73.35	73.79	73.43	73.86	74.90	70.10
72.83	52.38	75.56	47.88	144.51	6.68	168.51	15.00	140.94	8.09	73.27	73.81	73.39	73.94	74.81	70.21
72.83	51.76	74.22	49.46	144.26	6.75	168.51	15.00	141.02	8.10	73.18	73.86	73.30	73.96	74.73	70.29
72.83	52.05	74.00	49.56	143.69	6.80	168.05	15.00	141.10	8.02	73.09	73.94	73.17	74.01	74.60	70.34
72.83	51.53	74.13	48.80	144.02	6.63	169.45	15.00	141.42	7.95	73.09	73.82	73.17	74.01	74.47	70.41
72.83	51.70	73.83	49.02	144.76	6.44	170.88	15.00	142.45	7.65	73.01	73.84	73.08	74.00	74.30	70.54
72.83	51.94	73.35	49.25	144.84	6.26	171.37	15.00	142.61	7.58	72.79	74.02	72.91	74.07	73.99	70.75
72.83	52.00	72.92	49.18	144.35	6.26	171.37	15.00	142.61	7.50	72.53	74.05	72.65	74.12	73.73	70.90
72.83	51.94	72.57	49.06	145.67	6.04	171.37	15.00	142.77	7.43	72.27	74.23	72.39	74.18	73.43	71.02

72.83	51.46	72.70	48.58	145.76	5.96	171.37	15.00	142.77	7.35	71.97	73.88	72.18	73.96	73.26	71.06
72.83	51.35	72.44	48.60	145.34	6.02	170.88	15.00	142.45	7.34	71.76	73.94	72.01	73.91	73.13	70.93
72.83	51.46	72.19	48.75	145.17	6.03	170.88	15.00	142.21	7.42	71.58	74.01	71.79	73.86	72.96	70.88
72.83	51.88	71.93	49.22	144.76	6.14	170.40	15.00	141.89	7.41	71.33	74.13	71.58	73.89	72.70	70.88
72.83	52.24	71.67	49.56	144.26	6.15	169.92	15.00	141.57	7.41	71.11	74.19	71.36	73.93	72.52	70.89
72.83	52.34	71.41	49.71	144.26	6.13	169.45	15.00	141.10	7.48	70.89	74.40	71.19	73.97	72.31	70.93
72.83	52.51	71.11	49.87	144.02	6.09	169.45	15.00	140.87	7.47	70.64	74.31	70.93	73.97	72.14	70.94
72.83	52.67	70.77	50.02	143.86	6.03	169.45	15.00	140.71	7.47	70.38	74.43	70.72	74.00	71.88	70.94
72.83	52.65	70.55	50.01	144.02	5.98	169.45	15.00	140.63	7.47	70.17	74.46	70.46	74.00	71.66	70.95
72.83	52.82	70.29	50.20	143.94	5.98	169.45	15.00	140.55	7.39	69.95	74.53	70.24	74.04	71.45	70.99
72.83	52.96	70.08	50.34	143.21	6.12	168.98	15.00	140.32	7.46	69.74	74.50	70.07	74.05	71.27	70.97
72.83	53.04	69.87	50.70	142.48	6.12	168.98	15.00	140.16	7.38	69.56	74.63	69.90	74.06	71.10	70.92
72.83	53.09	69.91	50.25	142.32	6.09	168.98	15.00	140.16	7.38	69.61	74.55	69.81	74.19	71.02	71.09
72.83	52.69	69.91	49.69	138.97	6.84	166.67	15.00	138.17	7.66	69.56	74.54	69.77	74.22	70.93	71.14
72.83	52.30	70.38	49.19	136.27	7.56	164.01	15.00	135.50	8.23	69.65	74.46	69.86	74.20	71.49	70.70
72.83	52.46	70.77	49.46	135.75	7.70	163.14	15.00	134.56	8.45	69.91	74.38	70.20	74.06	72.31	69.66
72.83	52.21	71.20	49.07	135.10	7.94	162.29	15.00	134.06	8.67	70.08	74.48	70.42	73.97	72.65	69.22
72.83	52.02	71.63	48.89	135.02	8.04	162.29	15.00	133.77	8.78	70.25	74.47	70.63	73.93	72.96	68.96
72.83	51.74	72.10	48.60	135.32	7.96	162.29	15.00	133.84	8.74	70.47	74.50	70.85	73.93	73.21	68.74
72.83	51.17	72.40	48.01	135.61	7.86	162.29	15.00	134.06	8.67	70.68	74.46	71.10	73.90	73.56	68.51
72.83	50.47	72.75	47.28	135.53	7.81	162.29	15.00	133.84	8.67	70.94	74.43	71.32	73.83	73.82	68.36
72.83	49.98	73.01	46.77	135.46	7.86	161.87	15.00	133.77	8.74	71.15	74.43	71.58	73.83	74.08	68.24
72.83	49.69	73.40	46.46	136.27	7.80	162.72	15.00	134.20	8.75	71.41	74.40	71.79	73.77	74.34	68.11

72.83	49.62	73.78	46.54	136.78	7.73	163.14	15.00	134.56	8.76	71.63	74.33	72.05	73.77	74.60	68.02
72.83	49.18	74.26	45.88	137.01	7.75	163.14	15.00	134.92	8.69	71.88	74.30	72.31	73.74	74.90	67.96
72.83	48.68	74.87	45.54	137.60	7.70	164.01	15.00	135.36	8.69	72.23	74.22	72.61	73.68	75.20	67.84
72.83	48.30	75.34	45.21	137.98	7.59	164.01	15.00	135.58	8.62	72.53	74.17	72.91	73.66	75.55	67.75
72.83	47.82	75.65	44.80	137.98	7.66	164.01	15.00	135.80	8.62	72.83	74.12	73.26	73.61	75.90	67.67
72.83	47.95	75.82	45.05	138.43	7.63	164.45	15.00	135.94	8.70	73.09	74.09	73.52	73.58	76.16	67.60
72.83	48.04	76.08	45.04	138.66	7.77	164.89	15.00	136.23	8.71	73.35	74.08	73.77	73.58	76.42	67.60
72.83	47.96	76.43	45.00	138.89	7.66	164.89	15.00	136.46	8.71	73.65	74.06	74.03	73.57	76.68	67.54
72.83	47.55	76.95	44.36	139.73	7.44	166.67	15.00	137.27	8.50	73.96	73.98	74.34	73.55	77.03	67.51
72.83	46.87	77.52	43.61	139.19	7.24	165.77	15.00	137.42	8.27	74.26	73.89	74.64	73.49	77.34	67.42
72.83	46.23	77.48	42.71	138.89	7.32	165.33	15.00	136.97	8.34	74.52	73.89	74.90	73.43	77.60	67.39
72.83	46.48	76.69	43.38	138.51	7.83	165.33	15.00	136.90	8.64	74.60	73.99	75.03	73.48	77.68	67.42
72.83	48.10	76.52	45.40	137.68	7.88	164.45	15.00	136.38	8.71	74.69	74.14	75.12	73.57	77.77	67.49
72.83	48.45	76.47	45.38	137.23	8.02	164.01	15.00	135.94	8.78	74.78	74.27	75.20	73.64	77.82	67.65
72.83	48.57	76.30	45.41	137.30	8.06	164.45	15.00	135.94	8.86	74.82	74.36	75.25	73.71	77.82	67.77
72.83	48.81	76.08	45.82	137.01	8.12	164.01	15.00	135.72	8.93	74.82	74.48	75.29	73.80	77.86	67.86
72.83	49.24	75.91	46.43	137.23	8.09	164.01	15.00	135.65	8.93	74.82	74.57	75.29	73.86	77.82	67.98
72.83	49.35	75.65	46.69	137.23	8.06	164.01	15.00	135.58	8.93	74.78	74.65	75.25	73.94	77.77	68.06
72.83	49.49	75.30	46.76	139.89	7.43	166.22	15.00	137.20	8.69	74.74	74.73	75.20	73.99	77.68	68.18
72.83	49.82	75.17	46.96	142.16	6.89	168.05	15.00	139.24	8.14	74.60	74.60	74.99	74.09	76.81	69.02
72.83	49.08	74.87	46.42	142.88	6.65	168.98	15.00	139.47	8.07	74.48	74.38	74.73	74.20	76.11	69.96
72.83	49.14	74.35	46.40	143.13	6.33	169.45	15.00	140.71	7.66	74.13	74.58	74.38	74.25	75.59	70.50
72.83	49.53	73.61	46.87	142.08	6.49	168.98	15.00	139.85	7.69	73.78	74.71	74.08	74.40	75.16	70.87

72.83	49.84	73.14	47.07	140.98	6.66	168.51	15.00	139.32	7.68	73.22	74.88	73.52	74.54	74.47	71.27
72.83	50.21	72.62	47.43	140.43	6.69	168.05	15.00	138.93	7.75	72.70	74.97	73.00	74.63	73.77	71.58
72.83	50.53	72.23	47.69	139.89	6.72	167.59	15.00	138.32	7.74	72.19	75.03	72.48	74.69	73.21	71.76
72.83	50.68	71.84	47.62	139.65	6.63	167.59	15.00	138.17	7.66	71.71	75.18	71.96	74.69	72.61	71.99
72.83	50.78	71.50	47.66	139.50	6.52	167.13	15.00	137.87	7.66	71.24	75.25	71.53	74.70	72.18	71.94
72.83	51.03	71.15	47.86	138.81	6.67	166.67	15.00	137.50	7.69	70.81	75.28	71.10	74.71	71.70	72.13
72.83	51.26	70.64	48.28	138.51	6.72	166.22	15.00	137.20	7.72	70.47	75.28	70.72	74.73	71.32	72.23
72.83	51.51	70.29	48.54	138.13	6.75	166.22	15.00	136.83	7.72	70.04	75.29	70.33	74.74	70.93	72.28
72.83	51.77	69.99	48.76	137.83	6.78	165.77	15.00	136.60	7.79	69.69	75.30	69.99	74.73	70.54	72.38
72.83	52.09	69.78	49.02	137.45	6.93	165.33	15.00	136.16	7.86	69.35	75.32	69.60	74.72	70.20	72.40
72.83	52.66	69.44	49.74	137.08	6.99	164.89	15.00	135.87	7.93	69.05	75.26	69.30	74.74	69.86	72.48
72.83	53.05	69.22	50.06	136.56	7.12	164.45	15.00	135.58	8.01	68.75	75.26	69.00	74.77	69.60	72.46
72.83	53.47	69.01	50.44	136.86	7.22	164.45	15.00	135.50	8.08	68.49	75.23	68.70	74.76	69.30	72.51
72.83	53.96	68.92	51.04	137.68	7.32	164.89	15.00	135.43	8.31	68.32	75.04	68.53	74.80	69.17	72.50
72.83	55.11	69.01	52.34	129.03	9.17	158.57	15.00	132.08	8.94	68.36	74.87	68.48	74.83	69.21	72.42
72.83	54.95	69.61	52.09	127.63	9.59	156.59	15.00	130.28	9.37	68.66	74.64	68.79	74.69	70.24	71.45
72.83	54.83	70.08	51.81	127.43	9.81	155.43	15.00	129.34	9.66	68.75	74.62	68.91	74.61	70.54	70.95
72.83	54.59	70.55	51.35	127.50	9.79	155.43	15.00	129.20	9.73	68.92	74.59	69.09	74.60	70.80	70.71
72.83	54.15	70.89	51.27	127.30	10.00	155.43	15.00	129.07	9.88	69.05	74.54	69.21	74.53	71.02	70.50
72.83	54.21	71.24	51.54	128.22	9.91	155.82	15.00	129.34	9.92	69.22	74.50	69.43	74.53	71.27	70.32
72.83	53.86	71.58	50.75	128.56	9.85	155.43	15.00	129.40	9.96	69.44	74.47	69.64	74.49	71.53	70.17
72.83	53.61	72.01	50.53	128.82	9.63	155.82	15.00	129.40	9.89	69.65	74.43	69.86	74.46	71.79	70.05
72.83	52.84	72.19	49.64	129.57	9.37	155.82	15.00	129.47	9.89	69.87	74.37	70.07	74.42	72.05	69.93

72.83	52.36	72.44	49.12	129.84	9.30	155.82	15.00	129.61	9.81	70.08	74.31	70.29	74.39	72.31	69.84
72.83	51.75	72.70	48.45	129.84	9.21	156.20	15.00	129.74	9.66	70.29	74.30	70.54	74.36	72.57	69.72
72.83	50.73	72.96	47.28	129.90	8.89	156.59	15.00	130.08	9.37	70.55	74.24	70.76	74.30	72.78	69.65
72.83	49.10	73.22	45.66	130.11	8.74	156.59	15.00	130.28	9.29	70.77	74.15	70.97	74.26	73.04	69.56
72.83	48.67	73.40	45.36	131.07	8.65	157.38	15.00	130.63	9.30	70.98	74.12	71.19	74.20	73.26	69.49
72.83	48.91	73.74	45.75	131.41	8.69	157.38	15.00	130.97	9.31	71.24	74.06	71.45	74.17	73.52	69.43
72.83	48.65	74.04	45.41	131.76	8.67	157.77	15.00	131.38	9.31	71.54	74.00	71.75	74.14	73.82	69.37
72.83	48.74	74.30	45.61	131.97	8.65	158.17	15.00	131.59	9.24	71.80	73.92	72.01	74.08	74.08	69.28
72.83	48.63	74.69	45.49	132.18	8.74	158.57	15.00	131.94	9.32	72.06	73.86	72.26	74.02	74.34	69.24
72.83	48.57	75.26	45.55	132.74	8.75	158.98	15.00	132.29	9.41	72.36	73.74	72.52	73.99	74.64	69.16
72.83	48.67	76.34	45.37	133.09	8.73	159.38	15.00	132.78	9.34	72.75	73.55	72.91	73.89	74.99	69.07
72.83	48.15	76.95	45.00	133.37	8.67	159.79	15.00	133.13	9.19	73.14	73.48	73.30	73.82	75.38	68.96
72.83	47.90	77.04	44.72	133.66	8.56	160.20	15.00	133.42	9.12	73.44	73.42	73.65	73.80	75.77	68.91
72.83	48.01	76.60	44.78	133.52	9.07	160.20	15.00	133.49	9.58	73.65	73.48	73.86	73.76	75.99	68.87
72.83	50.10	76.47	47.19	133.52	9.00	160.61	15.00	133.91	9.36	73.87	73.47	74.08	73.75	76.16	68.92
72.83	49.84	76.34	46.72	133.37	8.74	160.20	15.00	134.06	9.21	74.09	73.61	74.25	73.80	76.33	68.94
72.83	49.36	76.30	46.14	133.16	8.84	160.20	15.00	133.99	9.13	74.30	73.57	74.47	73.86	76.55	69.02
72.83	48.62	76.08	45.56	132.81	8.71	159.79	15.00	133.63	9.05	74.43	73.59	74.60	73.90	76.64	69.12
72.83	48.34	75.78	45.71	133.73	8.67	159.79	15.00	133.49	9.12	74.39	73.70	74.60	73.96	76.59	69.23
72.83	48.51	75.60	45.79	141.53	7.02	165.77	15.00	138.32	8.36	74.35	73.87	74.55	73.98	76.42	69.34
72.83	48.89	75.39	46.26	143.21	6.48	167.13	15.00	139.93	7.85	74.30	73.95	74.42	74.17	75.72	70.31
72.83	47.74	74.82	44.87	142.40	6.47	167.13	15.00	140.09	7.54	74.13	73.85	74.25	74.24	75.38	70.74
72.83	48.12	73.87	45.47	140.66	6.65	166.67	15.00	139.32	7.53	73.61	74.32	73.82	74.40	74.73	71.09

72.83	48.66	73.22	45.79	140.35	6.69	166.22	15.00	139.09	7.52	72.88	74.67	73.04	74.55	73.69	71.81
72.83	49.07	72.66	46.10	140.35	6.62	165.77	15.00	138.78	7.52	72.27	74.78	72.48	74.63	72.96	72.20
72.83	49.48	72.27	46.60	140.74	6.66	165.77	15.00	138.70	7.67	71.88	74.82	72.09	74.64	72.61	72.34
72.83	50.34	71.88	47.57	140.51	6.76	166.22	15.00	138.63	7.75	71.54	74.82	71.70	74.72	72.31	72.40
72.83	51.26	71.58	48.60	141.69	6.57	166.67	15.00	138.93	7.75	71.20	74.89	71.36	74.74	71.96	72.42
72.83	51.27	72.01	48.38	141.92	6.47	166.67	15.00	139.01	7.75	71.07	74.30	71.19	74.55	72.01	72.28
72.83	51.36	71.76	48.68	142.16	6.37	166.67	15.00	139.09	7.68	70.85	74.31	71.02	74.44	71.96	71.95
72.83	51.46	71.41	48.85	142.08	6.29	166.22	15.00	138.86	7.60	70.55	74.39	70.76	74.41	71.75	71.90
72.83	51.47	71.07	48.86	141.69	6.29	166.22	15.00	138.63	7.59	70.25	74.56	70.50	74.47	71.45	71.87
72.83	51.60	70.77	48.95	141.84	6.13	166.22	15.00	138.48	7.44	69.95	74.58	70.20	74.50	71.15	71.89
72.83	51.04	70.38	48.39	141.69	6.02	166.22	15.00	138.25	7.35	69.61	74.57	69.90	74.49	70.89	71.89
72.83	50.79	70.04	48.16	141.13	5.93	165.77	15.00	137.87	7.35	69.31	74.63	69.56	74.45	70.63	71.81
72.83	50.77	69.69	48.12	140.74	6.03	164.89	15.00	137.42	7.34	69.01	74.74	69.26	74.51	70.37	71.75
72.83	51.06	69.35	48.40	140.51	5.97	164.89	15.00	137.20	7.38	68.71	74.76	69.00	74.51	70.07	71.72
72.83	51.01	69.22	48.28	140.35	5.97	164.89	15.00	137.05	7.34	68.49	74.65	68.79	74.46	69.90	71.61
72.83	51.03	69.01	48.30	139.96	6.09	164.89	15.00	136.90	7.41	68.28	74.63	68.57	74.43	69.69	71.53
72.83	51.37	68.92	48.66	139.89	6.30	164.45	15.00	136.75	7.64	68.19	74.50	68.44	74.36	69.64	71.38
72.83	52.33	68.96	49.70	140.27	6.44	164.89	15.00	136.68	7.75	68.19	74.53	68.44	74.33	69.69	71.24
72.83	53.24	69.05	50.79	141.29	6.39	166.22	15.00	137.05	7.80	68.15	74.56	68.44	74.27	69.73	71.10
72.83	53.73	69.35	51.04	135.46	7.65	162.29	15.00	134.70	8.30	68.28	74.49	68.53	74.25	69.90	70.88
72.83	54.26	69.82	51.53	133.44	8.13	159.79	15.00	132.29	8.79	68.66	74.47	68.87	74.26	70.93	70.14
72.83	53.91	70.08	51.26	132.74	8.48	158.98	15.00	131.25	9.16	68.92	74.59	69.26	74.19	71.66	69.21
72.83	53.87	70.55	51.04	132.46	8.53	158.57	15.00	131.18	9.23	69.13	74.64	69.47	74.15	71.96	68.92

72.83	53.65	70.89	50.86	132.25	8.68	158.17	15.00	130.97	9.31	69.31	74.66	69.69	74.18	72.26	68.71
72.83	53.27	71.33	50.23	132.67	8.69	158.57	15.00	131.18	9.39	69.52	74.65	69.90	74.17	72.48	68.58
72.83	53.21	71.71	50.23	132.67	8.80	158.17	15.00	131.25	9.46	69.74	74.65	70.16	74.14	72.74	68.49
72.83	53.18	72.14	50.23	132.74	8.84	158.17	15.00	131.25	9.54	70.04	74.62	70.42	74.14	73.00	68.40
72.83	52.86	72.49	49.85	132.88	8.77	158.17	15.00	131.25	9.54	70.29	74.59	70.67	74.11	73.26	68.30
72.83	52.52	72.88	49.40	133.37	8.73	158.57	15.00	131.59	9.55	70.55	74.56	70.93	74.11	73.56	68.27
72.83	52.13	73.22	49.05	133.66	8.84	158.98	15.00	131.94	9.55	70.81	74.50	71.23	74.09	73.86	68.21
72.83	52.23	73.65	49.25	134.02	8.91	159.38	15.00	132.22	9.63	71.11	74.45	71.53	74.06	74.16	68.15
72.83	52.35	74.04	49.39	134.30	8.87	159.38	15.00	132.50	9.64	71.45	74.40	71.83	74.04	74.51	68.10
72.83	52.35	74.48	49.36	134.74	8.77	160.20	15.00	132.85	9.57	71.76	74.35	72.14	74.01	74.81	68.07
72.83	52.10	74.91	48.96	135.10	8.60	160.61	15.00	133.27	9.42	72.10	74.30	72.48	73.99	75.12	68.01
72.83	51.29	75.43	47.79	135.68	8.59	161.03	15.00	133.70	9.36	72.44	74.19	72.83	73.94	75.46	67.93
72.83	50.08	76.38	46.58	135.83	8.47	161.45	15.00	134.13	9.21	72.88	74.03	73.21	73.89	75.90	67.88
72.83	49.39	77.08	45.88	136.41	8.50	161.87	15.00	134.42	9.29	73.31	73.82	73.65	73.80	76.33	67.74
72.83	49.16	77.21	46.14	136.86	8.24	162.29	15.00	134.70	9.07	73.70	73.74	74.03	73.69	76.73	67.66
72.83	49.15	76.43	45.85	136.78	8.17	161.87	15.00	134.63	9.07	73.91	73.82	74.30	73.66	76.94	67.65
72.83	49.12	76.08	46.17	136.63	8.52	161.87	15.00	134.49	9.29	74.04	73.90	74.42	73.68	77.03	67.75
72.83	50.22	75.91	47.57	136.71	8.48	161.87	15.00	134.56	9.29	74.17	74.00	74.51	73.74	77.12	67.85
72.83	53.35	70.94	51.10	136.49	8.53	161.87	15.00	134.34	9.29	74.30	73.98	74.64	73.79	77.20	67.98
72.83	53.19	70.89	50.84	108.48	18.73	112.69	18.86	94.09	32.61	74.35	74.10	74.68	73.88	77.25	68.13
72.83	53.06	70.89	50.64	122.26	12.63	131.77	15.00	111.50	20.07	69.87	60.49	69.73	62.27	69.99	62.53
72.83	52.93	70.81	50.47	126.77	10.77	139.97	15.00	119.13	15.67	69.74	61.72	69.64	62.59	69.94	62.32
72.83	52.82	70.72	50.29	129.36	9.73	145.43	15.00	123.54	13.46	69.69	62.93	69.60	63.37	69.99	62.62

72.83	52.82	70.89	50.30	131.34	9.11	148.49	15.00	126.35	12.25	69.65	64.04	69.60	64.12	69.99	63.11
72.83	52.26	70.77	50.05	132.67	8.79	151.33	15.00	128.40	11.46	69.56	64.99	69.56	64.81	69.99	63.65
72.83	52.05	70.51	49.82	133.59	8.52	152.43	15.00	129.88	10.81	69.56	65.38	69.51	65.40	69.99	64.19
72.83	51.94	70.25	49.69	134.09	8.22	153.16	15.00	130.83	10.37	69.44	66.26	69.47	66.11	69.94	64.81
72.83	51.83	69.99	49.53	134.30	8.08	153.91	15.00	131.31	10.00	69.31	66.96	69.39	66.70	69.86	65.43
72.83	51.71	69.74	49.42	132.95	8.22	153.91	15.00	131.52	9.85	69.13	67.54	69.26	67.28	69.73	66.08
72.83	51.69	69.48	49.43	133.37	8.06	153.91	15.00	131.66	9.62	68.96	68.05	69.09	67.80	69.56	66.48
72.83	51.77	69.26	49.52	133.30	8.03	154.29	15.00	131.87	9.51	68.79	68.54	68.91	68.22	69.43	66.85
72.83	51.78	68.96	49.52	134.23	7.88	154.67	15.00	131.94	9.40	68.62	68.87	68.74	68.59	69.26	67.19
72.83	51.89	68.75	49.64	133.66	7.86	154.67	15.00	132.29	9.18	68.41	69.26	68.57	68.93	69.09	67.47
72.83	52.12	68.54	49.93	133.30	7.88	154.67	15.00	132.36	9.10	68.19	69.59	68.36	69.23	68.87	67.81
72.83	52.25	68.23	50.05	133.80	7.79	155.43	15.00	132.36	9.10	68.02	69.84	68.19	69.53	68.70	68.11
72.83	52.55	68.11	50.38	133.73	7.98	155.82	15.00	132.43	9.10	67.81	70.14	67.97	69.77	68.48	68.33
72.83	52.79	67.93	50.56	133.44	7.91	155.05	15.00	132.15	9.10	67.59	70.41	67.76	70.02	68.31	68.61
72.83	53.95	68.11	52.01	133.37	7.84	155.43	15.00	132.15	9.02	67.42	70.54	67.59	70.26	68.14	68.85
72.83	53.75	68.36	51.59	133.02	7.85	155.05	15.00	132.01	8.94	67.29	70.73	67.46	70.45	68.01	69.05
72.83	53.21	68.58	50.94	133.23	7.92	155.05	15.00	131.87	8.94	67.29	70.67	67.41	70.65	68.01	69.22
72.83	52.64	68.83	50.29	124.64	10.51	152.06	15.00	130.49	9.22	67.46	70.86	67.63	70.68	68.40	68.94
72.83	51.85	69.13	49.45	123.51	10.81	150.97	15.00	129.81	9.36	67.64	70.91	67.84	70.73	68.70	68.85
72.83	51.43	69.44	48.94	123.82	10.78	151.33	15.00	129.94	9.36	67.81	70.99	68.06	70.81	68.96	68.79
72.83	51.49	69.87	48.94	123.69	10.95	149.90	15.00	129.13	9.65	68.02	71.04	68.27	70.89	69.26	68.76
72.83	51.02	70.34	48.38	124.07	10.83	149.90	15.00	128.93	9.65	68.19	71.17	68.48	70.97	69.51	68.79
72.83	51.45	70.77	48.93	124.26	10.80	149.90	15.00	128.80	9.72	68.41	71.31	68.70	71.11	69.77	68.78

72.83	51.31	71.33	48.69	124.71	10.67	149.90	15.00	128.93	9.72	68.66	71.40	68.96	71.19	70.07	68.81
72.83	50.55	71.76	47.82	122.94	11.40	147.80	15.00	128.00	9.94	68.96	71.52	69.26	71.28	70.37	68.81
72.83	49.70	72.19	46.94	123.00	11.43	147.46	15.00	127.80	10.08	69.26	71.55	69.56	71.37	70.72	68.82
72.83	48.58	72.62	45.99	123.19	11.45	147.46	15.00	127.86	10.08	69.56	71.61	69.86	71.46	71.06	68.85
72.83	48.33	73.01	45.53	123.76	11.28	147.80	15.00	128.00	10.16	69.91	71.67	70.20	71.53	71.40	68.89
72.83	47.72	73.44	44.93	124.07	11.28	147.80	15.00	128.26	10.09	70.25	71.68	70.54	71.59	71.75	68.89
72.83	46.08	73.83	43.30	124.58	11.05	148.15	15.00	128.53	10.02	70.59	71.72	70.89	71.63	72.09	68.90
72.83	45.79	74.26	42.98	124.58	11.13	148.84	15.00	128.86	10.03	70.94	71.72	71.23	71.70	72.48	68.94
72.83	45.44	74.82	42.45	125.22	11.09	149.19	15.00	129.20	10.11	71.28	71.70	71.62	71.74	72.83	68.97
72.83	44.65	75.65	41.67	125.48	11.00	149.54	15.00	129.67	9.97	71.63	71.68	71.96	71.77	73.21	68.98
72.83	41.84	76.78	38.72	125.99	10.89	149.90	15.00	130.01	9.90	72.01	71.69	72.31	71.81	73.60	68.99
72.83	39.91	77.87	36.66	126.12	10.91	149.90	15.00	130.08	9.90	72.49	71.62	72.74	71.83	74.03	69.01
72.83	38.80	79.09	35.74	126.32	11.02	149.90	15.00	130.28	9.90	73.05	71.51	73.30	71.80	74.60	68.97
72.83	38.62	79.93	35.69	127.50	10.61	150.61	15.00	130.76	9.91	73.74	71.31	73.99	71.72	75.25	68.86
72.83	38.29	79.71	36.12	128.56	10.55	151.69	15.00	131.31	9.85	74.43	71.21	74.68	71.65	75.99	68.75
72.83	38.89	79.27	36.53	129.43	10.37	152.43	15.00	131.94	9.78	75.12	71.07	75.38	71.54	76.68	68.64
72.83	39.40	79.01	36.98	130.45	10.19	152.79	15.00	132.57	9.79	75.69	71.01	75.99	71.49	77.29	68.56
72.83	41.48	79.05	39.22	129.70	10.34	153.16	15.00	132.85	9.72	75.99	70.99	76.33	71.47	77.64	68.53
72.83	42.07	79.01	40.25	129.09	10.40	152.43	15.00	132.85	9.65	76.26	71.22	76.55	71.52	77.86	68.61
72.83	42.40	78.92	40.52	128.09	10.44	152.43	15.00	132.78	9.41	76.56	71.40	76.85	71.70	78.12	68.73
72.83	42.03	78.83	39.88	127.63	10.81	152.06	15.00	132.78	9.49	76.86	71.58	77.20	71.79	78.43	68.85
72.83	43.95	78.96	41.62	127.17	10.62	151.69	15.00	132.64	9.41	77.13	71.76	77.42	71.90	78.65	68.99
72.83	42.51	78.79	40.12	126.58	10.89	151.33	15.00	132.36	9.41	77.26	71.95	77.55	72.01	78.78	69.12

72.83	41.60	78.39	39.41	125.80	11.13	150.61	15.00	132.01	9.48	77.34	71.78	77.68	72.02	78.87	69.19
72.83	42.21	78.13	39.97	125.80	10.85	150.61	15.00	131.94	9.48	77.43	71.88	77.73	72.05	78.95	69.23
72.83	42.20	77.61	39.81	125.41	10.91	150.25	15.00	131.52	9.35	77.43	71.67	77.77	71.97	78.95	69.23
72.83	42.23	77.39	39.93	131.76	8.60	152.43	15.00	132.01	9.17	77.43	71.88	77.68	72.14	78.69	69.59
72.83	42.40	77.08	40.20	133.73	8.01	154.67	15.00	133.27	8.89	77.13	71.55	77.42	72.02	78.25	69.85
72.83	42.42	76.78	40.19	133.87	7.89	155.05	15.00	133.56	8.74	76.86	71.70	77.16	72.11	77.90	70.14
72.83	42.37	76.52	40.12	134.45	7.82	155.05	15.00	133.70	8.82	76.65	70.79	76.85	71.93	77.55	70.20
72.83	42.25	76.17	39.97	134.37	7.81	155.43	15.00	133.70	8.74	76.47	69.67	76.64	71.08	77.34	69.64
72.83	42.69	75.91	40.46	134.74	7.79	155.05	15.00	133.56	8.74	76.26	70.75	76.42	71.39	77.03	69.93
72.83	42.73	75.56	40.47	135.10	7.90	155.43	15.00	133.63	8.66	75.99	71.10	76.16	71.65	76.77	70.17
72.83	42.71	75.21	40.43	134.74	7.73	155.43	15.00	133.35	8.66	75.78	70.82	75.94	71.60	76.46	70.20
72.83	42.63	74.91	40.31	134.59	7.66	155.05	15.00	133.13	8.58	75.47	70.99	75.68	71.60	76.20	70.24
72.83	42.64	74.56	40.31	134.30	7.74	155.05	15.00	132.85	8.57	75.17	70.99	75.38	71.66	75.90	70.32
72.83	42.95	74.30	40.67	133.94	7.71	153.91	15.00	132.43	8.57	74.87	71.40	75.07	71.84	75.59	70.44
72.83	43.12	74.00	40.87	133.37	7.73	153.54	15.00	131.94	8.63	74.60	70.81	74.77	71.63	75.25	70.35
72.83	42.69	73.78	40.46	133.52	7.63	153.54	15.00	131.87	8.56	74.35	70.16	74.51	71.28	75.03	70.09
72.83	42.68	73.61	40.40	132.46	7.82	152.79	15.00	131.31	8.62	74.13	70.05	74.30	71.13	74.77	70.00
72.83	42.48	73.48	40.15	132.32	7.78	152.43	15.00	131.04	8.62	73.87	70.23	74.03	71.11	74.51	69.97
72.83	43.09	73.52	40.79	131.62	7.88	152.43	15.00	130.76	8.69	73.65	69.23	73.77	70.67	74.25	69.62
72.83	45.63	73.87	43.48	131.14	8.07	152.06	15.00	130.35	8.91	73.52	68.69	73.60	70.18	74.08	69.31
72.83	44.32	74.09	41.97	131.83	7.92	152.79	15.00	130.35	8.91	73.40	68.52	73.52	70.05	73.99	69.21
72.83	44.40	74.39	41.85	131.76	7.93	152.43	15.00	130.22	8.99	73.52	69.22	73.56	70.41	74.21	69.35
72.83	44.62	74.82	42.14	131.69	7.98	152.43	15.00	130.22	9.06	73.70	70.33	73.86	70.71	74.73	69.08

72.83	44.49	75.30	41.83	132.11	8.07	152.43	15.00	130.22	9.14	73.83	70.97	74.03	71.11	75.03	69.05
72.83	43.69	75.78	41.38	132.46	7.96	152.79	15.00	130.63	9.07	73.96	71.37	74.21	71.36	75.29	69.04
72.83	43.06	76.04	40.87	132.39	8.01	153.16	15.00	130.90	9.15	74.13	71.56	74.42	71.53	75.59	69.01
72.83	41.95	76.38	39.85	133.09	7.88	153.54	15.00	131.45	9.01	74.39	71.56	74.68	71.53	75.90	68.87
72.83	41.31	76.65	39.46	133.59	7.87	153.91	15.00	131.80	8.94	74.65	71.44	74.94	71.47	76.20	68.75
72.83	40.69	77.04	38.73	133.94	7.72	154.29	15.00	132.08	8.87	74.95	71.32	75.25	71.38	76.55	68.60
72.83	39.78	77.43	37.97	128.69	9.36	151.69	15.00	131.87	8.94	75.30	71.15	75.59	71.30	76.90	68.46
72.83	41.05	77.87	38.79	127.69	9.71	150.61	15.00	131.18	9.08	75.65	70.95	75.94	71.19	77.29	68.32
72.83	41.04	78.31	38.67	127.69	9.72	150.25	15.00	131.04	9.23	76.04	70.99	76.29	71.16	77.64	68.23
72.83	41.16	78.57	38.98	127.69	10.07	150.61	15.00	131.04	9.46	76.38	70.91	76.68	71.12	78.03	68.18
72.83	41.18	78.96	38.96	128.09	10.20	151.33	15.00	131.45	9.62	76.78	70.86	77.16	71.17	78.47	68.19
72.83	40.98	79.49	39.31	128.49	10.21	151.33	15.00	131.87	9.55	77.21	70.79	77.51	71.08	78.87	68.11
72.83	40.32	80.50	38.70	128.62	10.36	151.69	15.00	132.22	9.63	77.61	70.77	77.90	71.06	79.26	68.06
72.83	39.24	82.23	37.25	128.96	10.56	152.06	15.00	132.57	9.72	78.09	70.10	78.34	70.84	79.66	67.86
72.83	38.01	83.70	35.89	129.70	10.26	152.79	15.00	133.06	9.65	78.61	69.74	78.87	70.57	80.23	67.64
72.83	37.44	84.29	35.43	130.11	10.43	153.16	15.00	133.56	9.74	79.23	70.01	79.44	70.72	80.80	67.70
72.83	37.39	83.70	35.45	131.27	10.26	153.54	15.00	133.99	9.74	79.89	70.31	80.10	70.81	81.47	67.73
72.83	37.92	82.85	36.06	132.53	10.06	154.67	15.00	134.63	9.68	80.46	69.89	80.67	70.78	82.04	67.67
72.83	38.33	82.54	36.44	133.37	9.76	154.67	15.00	135.14	9.57	80.99	69.56	81.20	70.48	82.58	67.39
72.83	39.74	82.59	37.54	133.09	9.72	155.05	15.00	135.43	9.46	81.34	69.74	81.60	70.58	83.02	67.46
72.83	40.00	82.45	37.74	132.60	9.78	155.05	15.00	135.50	9.31	81.65	70.16	81.91	70.73	83.33	67.61
72.83	40.18	82.23	37.96	132.81	9.64	155.05	15.00	135.72	9.24	81.74	70.86	82.04	70.92	83.42	67.71
72.83	40.30	82.01	38.01	132.25	9.99	155.82	15.00	136.02	9.24	81.74	71.22	82.04	71.25	83.42	67.96

72.83	42.76	81.79	40.36	131.27	10.14	155.43	15.00	136.16	9.17	81.74	71.46	82.09	71.41	83.47	68.11
72.83	42.17	81.34	39.79	131.41	10.14	155.43	15.00	136.16	9.09	81.70	71.61	82.04	71.52	83.42	68.26
72.83	41.68	80.86	39.35	130.93	10.28	155.05	15.00	135.87	9.16	81.61	71.81	82.00	71.67	83.33	68.46
72.83	41.46	80.50	39.22	131.48	9.89	155.05	15.00	135.87	9.09	81.43	71.76	81.69	71.93	82.71	69.22
72.83	41.05	80.15	38.70	131.34	9.75	154.29	15.00	135.50	9.00	81.17	71.46	81.38	71.93	82.22	69.62
72.83	40.90	79.84	38.50	139.35	7.55	160.20	15.00	137.50	8.65	80.86	71.58	81.07	72.02	81.78	69.91
72.83	40.71	79.45	38.37	140.43	7.37	161.03	15.00	138.40	8.44	80.50	71.66	80.71	72.10	81.38	70.14
72.83	40.86	79.18	38.50	140.59	7.21	161.87	15.00	138.78	8.29	80.24	71.69	80.40	72.13	81.02	70.28
72.83	40.71	78.88	38.31	141.13	7.04	162.72	15.00	139.09	8.14	79.93	71.54	80.14	72.01	80.71	70.25
72.83	40.69	78.53	38.19	140.90	6.98	162.72	15.00	139.16	8.07	79.67	71.69	79.83	72.10	80.36	70.39
72.83	40.66	78.13	38.18	140.27	7.09	162.29	15.00	139.16	8.07	79.31	71.81	79.48	72.21	79.96	70.59
72.83	39.99	77.82	37.51	140.51	7.06	162.29	15.00	139.16	7.99	79.01	71.83	79.17	72.27	79.61	70.70
72.83	39.51	77.52	36.88	139.42	7.13	161.45	15.00	138.70	7.98	78.70	71.80	78.87	72.17	79.30	70.73
72.83	38.76	77.17	36.34	139.19	7.15	161.03	15.00	138.40	8.05	78.44	71.80	78.60	72.12	79.04	70.68
72.83	38.88	76.82	36.56	139.19	7.11	161.45	15.00	138.55	7.98	78.09	71.83	78.30	72.14	78.73	70.73
72.83	38.59	76.52	36.13	138.97	7.07	161.03	15.00	138.25	7.90	77.74	71.88	77.95	72.14	78.34	70.81
72.83	38.31	76.17	35.87	138.89	6.61	160.20	15.00	138.02	7.58	77.39	71.93	77.60	72.16	77.99	70.81
72.83	38.70	75.99	36.49	138.66	6.72	160.61	15.00	137.72	7.65	77.04	71.83	77.25	72.18	77.64	70.89
72.83	38.83	75.91	36.43	138.51	5.87	159.38	15.00	137.27	7.11	76.69	71.80	76.85	72.23	77.34	70.95
72.83	39.36	75.95	37.12	138.13	5.16	158.98	15.00	136.97	6.41	76.43	71.71	76.59	72.14	77.03	70.92
72.83	39.49	75.99	37.20	138.05	4.79	158.98	15.00	137.05	6.02	76.26	71.40	76.38	72.06	76.81	70.80
72.83	40.56	76.34	38.25	137.45	4.57	159.38	15.00	136.83	5.78	76.08	71.35	76.20	71.98	76.68	70.73
72.83	40.64	76.65	38.38	136.93	4.50	159.79	15.00	136.53	5.78	76.04	70.69	76.11	71.74	76.59	70.57

72.83	40.07	76.95	37.67	137.15	4.58	160.20	15.00	136.09	5.93	76.12	70.58	76.16	71.60	76.59	70.48
72.83	40.62	77.43	38.21	137.75	4.69	161.03	15.00	136.16	6.08	76.21	71.57	76.33	71.94	77.16	70.22
72.83	41.10	77.87	38.62	138.21	4.48	161.03	15.00	136.46	5.93	76.34	71.79	76.55	71.99	77.51	69.92
72.83	40.93	78.26	38.36	139.35	4.23	161.87	15.00	136.83	5.78	76.47	71.95	76.68	72.06	77.77	69.74
72.83	40.03	78.53	37.50	139.19	4.07	162.29	15.00	137.12	5.63	76.60	72.06	76.90	72.12	78.03	69.62
72.83	39.26	78.88	36.86	140.43	3.86	163.14	15.00	137.80	5.49	76.82	71.16	77.16	71.91	78.34	69.29
72.83	38.36	79.18	36.02	140.27	3.79	163.58	15.00	137.95	5.41	77.13	69.82	77.42	71.04	78.60	68.48
72.83	37.61	79.45	35.19	137.45	4.19	162.29	15.00	137.72	5.25	77.43	69.26	77.68	70.57	78.91	68.03
72.83	36.73	79.75	34.39	132.74	4.93	157.38	15.00	135.07	5.57	77.69	68.93	77.99	70.24	79.22	67.66
72.83	35.75	80.15	33.39	131.55	4.61	155.82	15.00	133.84	5.43	77.96	68.59	78.25	69.88	79.48	67.33
72.83	35.57	80.55	33.16	131.27	4.71	155.43	15.00	133.27	5.50	78.26	68.29	78.51	69.64	79.79	67.06
72.83	36.53	80.94	34.33	131.62	4.73	155.43	15.00	133.42	5.50	78.57	68.05	78.82	69.40	80.10	66.81
72.83	38.02	81.39	35.75	131.97	4.72	155.82	15.00	133.77	5.51	78.88	68.05	79.13	69.25	80.45	66.64
72.83	39.01	82.05	36.71	132.04	4.81	155.82	15.00	133.99	5.51	79.23	68.09	79.48	69.19	80.80	66.49
72.83	39.36	83.03	36.91	132.81	4.85	156.59	15.00	134.49	5.67	79.58	68.15	79.83	69.17	81.15	66.43
72.83	39.22	84.11	36.69	133.59	5.16	157.77	15.00	135.58	5.69	79.97	67.98	80.23	69.09	81.55	66.32
72.83	39.11	84.87	36.33	134.59	5.56	158.98	15.00	136.68	6.01	80.46	67.73	80.67	68.95	82.00	66.15
72.83	39.16	85.05	36.43	134.74	5.96	159.38	15.00	137.05	6.33	80.99	67.57	81.20	68.79	82.53	66.01
72.83	39.36	84.42	36.97	135.83	6.29	158.98	15.00	137.12	6.64	81.48	67.52	81.69	68.72	83.02	65.91
72.83	39.51	83.75	37.14	136.41	6.31	159.79	15.00	137.65	6.73	81.87	67.53	82.13	68.74	83.47	65.86
72.83	39.91	83.26	37.55	137.38	6.09	160.20	15.00	138.10	6.65	82.19	67.90	82.44	68.74	83.78	65.83
72.83	40.34	82.81	38.03	137.60	6.55	163.14	15.00	140.55	6.61	82.32	68.76	82.62	69.09	83.91	66.08
72.83	41.31	82.59	38.84	138.58	6.48	164.01	15.00	141.49	6.55	82.36	69.36	82.71	69.55	83.96	66.45

72.83	42.06	82.27	39.80	139.35	6.42	164.01	15.00	142.05	6.48	82.36	69.63	82.71	69.79	84.00	66.73
72.83	42.53	81.92	40.12	134.02	6.85	158.98	15.00	138.32	6.74	82.36	69.88	82.71	70.09	84.00	67.10
72.83	43.00	81.52	40.69	133.44	7.03	157.38	15.00	136.75	7.06	82.32	70.41	82.67	70.45	83.91	67.46
72.83	43.79	81.21	41.48	132.95	7.26	156.20	15.00	135.72	7.31	82.19	70.70	82.53	70.70	83.78	67.75
72.83	44.29	80.81	41.95	132.67	7.43	155.82	15.00	135.21	7.54	82.05	70.92	82.40	70.96	83.65	68.01
72.83	45.33	80.28	42.82	132.25	8.65	155.05	15.00	133.49	8.58	81.87	71.42	82.26	71.25	83.47	68.32
72.83	45.65	79.89	43.21	131.55	8.89	153.91	15.00	131.87	9.02	81.65	71.42	82.04	71.43	83.24	68.57
72.83	46.21	79.49	43.84	131.27	9.04	153.91	15.00	131.38	9.24	81.43	71.58	81.78	71.55	82.98	68.76
72.83	46.51	79.18	44.07	130.11	9.35	152.43	15.00	130.28	9.52	81.17	71.97	81.51	71.83	82.67	69.09
72.83	47.04	78.88	44.59	129.63	9.57	152.06	15.00	130.49	9.53	80.86	72.23	81.24	72.07	82.35	69.33
72.83	47.27	78.44	44.80	129.57	9.64	151.69	15.00	130.08	9.67	80.55	72.38	80.94	72.24	82.04	69.51
72.83	47.59	78.04	45.03	129.16	9.98	151.33	15.00	129.88	9.82	80.24	72.59	80.63	72.39	81.73	69.69
72.83	47.75	77.61	45.15	129.57	9.77	151.33	15.00	130.28	9.75	79.93	72.73	80.32	72.56	81.42	69.87
72.83	47.79	77.26	45.19	128.56	9.92	150.97	15.00	129.67	9.82	79.62	72.76	80.01	72.65	81.11	69.96
72.83	48.12	76.86	45.49	128.56	9.78	150.61	15.00	129.47	9.74	79.31	73.05	79.70	72.80	80.80	70.14
72.83	48.25	76.52	45.54	127.69	9.92	149.90	15.00	128.53	9.79	78.92	73.19	79.35	72.94	80.45	70.28
72.83	47.91	76.21	45.30	127.36	9.63	149.19	15.00	128.06	9.71	78.61	73.30	79.00	73.05	80.05	70.39
72.83	48.46	75.86	45.93	127.17	9.47	148.84	15.00	127.67	9.63	78.35	73.33	78.73	73.11	79.79	70.45
72.83	48.79	75.60	46.19	126.58	9.47	148.49	15.00	127.34	9.54	77.96	73.47	78.38	73.16	79.44	70.48
72.83	48.94	75.39	46.35	125.86	9.34	148.15	15.00	127.01	9.38	77.56	73.57	77.99	73.24	79.08	70.59
72.83	49.19	75.30	46.60	125.48	9.18	147.46	15.00	126.35	9.30	77.30	73.63	77.68	73.32	78.78	70.65
72.83	49.32	75.26	46.85	124.96	9.17	147.46	15.00	126.42	9.22	77.04	73.55	77.42	73.35	78.51	70.65
72.83	49.51	75.26	46.99	124.96	9.01	147.11	15.00	126.29	9.14	76.73	73.40	77.16	73.32	78.25	70.62

72.83	49.52	75.30	46.99	125.16	9.15	146.77	15.00	125.26	9.35	76.52	73.28	76.90	73.27	78.03	70.60
72.83	49.43	75.43	46.89	124.26	9.46	146.43	15.00	123.67	9.74	76.38	72.56	76.73	72.86	77.90	70.23
72.83	49.34	75.47	46.78	123.76	9.44	145.76	15.00	122.54	9.91	76.21	72.90	76.55	72.99	77.73	70.36
72.83	49.09	75.65	46.50	123.95	10.17	145.76	15.00	123.98	10.31	76.08	72.32	76.46	72.81	77.60	70.14
72.83	49.05	75.82	46.56	124.58	9.33	146.10	15.00	125.00	9.58	75.99	72.17	76.38	72.62	77.55	69.99
72.83	49.13	76.08	46.57	124.45	9.44	146.10	15.00	124.94	9.57	75.95	71.93	76.29	72.46	77.51	69.80
72.83	48.78	76.43	46.26	124.90	9.50	146.77	15.00	125.38	9.66	75.99	71.84	76.29	72.41	77.51	69.74
72.83	48.80	76.78	46.41	124.58	9.65	146.77	15.00	125.26	9.73	75.95	72.69	76.29	72.76	77.51	69.98
72.83	48.70	77.21	46.22	125.09	9.88	146.77	15.00	125.19	10.11	75.99	73.08	76.33	73.00	77.55	70.17
72.83	49.07	77.56	46.73	125.28	10.06	147.11	15.00	125.71	10.12	76.04	73.29	76.38	73.15	77.64	70.23
72.83	48.74	77.91	46.25	124.96	10.25	146.77	15.00	125.38	10.26	76.08	73.41	76.42	73.24	77.73	70.30
72.83	48.45	78.35	45.99	125.28	10.19	147.46	15.00	126.10	10.20	76.12	73.51	76.51	73.34	77.82	70.31
72.83	48.58	78.70	46.10	125.61	10.26	147.46	15.00	126.03	10.35	76.21	73.52	76.59	73.38	77.90	70.35
72.83	48.11	78.83	45.74	126.38	10.57	148.15	15.00	126.68	10.52	76.38	73.56	76.73	73.42	78.08	70.34
72.83	48.38	79.14	45.81	126.64	10.86	148.15	15.00	126.62	10.89	76.52	73.55	76.90	73.44	78.21	70.32
72.83	48.13	79.80	45.40	127.36	10.82	148.84	15.00	127.01	10.90	76.65	73.56	77.07	73.43	78.38	70.28
72.83	49.62	80.02	47.05	127.63	10.46	149.54	15.00	127.47	10.68	76.78	73.58	77.25	73.48	78.56	70.30
72.83	48.84	80.37	46.15	127.50	10.39	149.19	15.00	127.20	10.60	77.30	72.75	77.55	73.19	78.91	70.07
72.83	47.23	80.90	44.92	128.36	10.11	149.90	15.00	127.67	10.46	77.52	73.01	77.86	73.22	79.17	70.03
72.83	47.97	81.30	45.30	127.36	10.34	149.90	15.00	127.40	10.61	77.82	72.98	78.12	73.25	79.44	70.03
72.83	47.61	80.77	45.47	127.56	10.71	149.90	15.00	127.07	10.83	78.17	72.90	78.47	73.20	79.88	69.92
72.83	48.25	79.89	46.11	128.96	10.52	150.61	15.00	127.47	10.99	78.39	72.92	78.73	73.17	80.14	69.83
72.83	49.16	79.05	46.22	129.23	10.51	151.33	15.00	128.60	10.78	78.61	72.98	78.95	73.10	80.36	69.76

72.83	49.23	79.09	46.97	129.50	10.29	151.33	15.00	128.86	10.64	78.53	73.32	78.95	73.19	80.36	69.82
72.83	48.69	78.79	46.44	130.79	9.78	152.43	15.00	130.63	10.14	78.44	73.58	78.87	73.39	80.23	70.05
72.83	48.05	78.53	45.38	130.65	9.66	152.79	15.00	131.73	9.70	78.35	73.66	78.78	73.47	80.14	70.19
72.83	46.77	78.57	44.23	130.52	9.63	153.54	15.00	132.50	9.56	78.22	73.73	78.69	73.55	80.01	70.30
72.83	47.02	78.39	44.68	130.45	9.56	153.54	15.00	132.78	9.38	78.09	73.81	78.56	73.59	79.88	70.37
72.83	47.42	78.00	45.22	129.70	9.60	152.79	15.00	132.15	9.40	77.96	73.70	78.43	73.49	79.74	70.30
72.83	47.62	77.61	45.51	129.50	9.53	152.43	15.00	132.36	9.33	77.82	73.89	78.30	73.59	79.61	70.41
72.83	47.98	77.21	45.77	129.63	9.42	152.43	15.00	132.15	9.25	77.69	74.12	78.21	73.70	79.52	70.46
72.83	48.17	76.82	45.88	129.09	9.88	151.69	15.00	130.97	9.61	77.48	74.21	77.99	73.77	79.30	70.52
72.83	48.18	76.52	46.00	128.49	9.90	151.33	15.00	130.49	9.68	77.26	74.33	77.82	73.78	79.13	70.57
72.83	48.29	76.21	46.00	127.63	10.19	150.97	15.00	129.67	9.74	77.08	74.31	77.64	73.79	78.95	70.55
72.83	48.52	75.95	46.19	126.90	10.34	149.54	15.00	127.86	10.24	76.82	74.52	77.42	73.91	78.78	70.68
72.83	48.79	75.69	46.44	124.84	10.75	148.49	15.00	127.93	10.16	76.60	74.64	77.20	73.97	78.56	70.75
72.83	48.88	75.52	46.51	125.03	10.56	148.15	15.00	127.40	10.15	76.38	74.62	76.99	74.01	78.34	70.75
72.83	48.93	75.34	46.61	125.61	10.50	148.15	15.00	127.01	10.22	76.21	74.69	76.77	74.02	78.17	70.79
72.83	49.07	75.12	46.75	124.58	10.75	147.46	15.00	126.03	10.43	76.04	74.67	76.59	74.03	77.95	70.80
72.83	49.06	74.95	46.70	124.26	10.65	147.11	15.00	125.51	10.42	75.86	74.71	76.42	74.07	77.77	70.84
72.83	49.11	74.74	46.78	123.88	10.75	146.43	15.00	125.26	10.49	75.65	74.77	76.25	74.14	77.60	70.88
72.83	49.08	74.48	46.65	123.95	10.59	146.10	15.00	124.75	10.48	75.47	74.81	76.07	74.20	77.42	70.90
72.83	49.08	74.35	46.76	123.13	10.47	145.76	15.00	124.55	10.32	75.30	74.85	75.85	74.18	77.25	70.94
72.83	49.31	74.17	46.89	122.82	10.57	145.43	15.00	123.98	10.39	75.12	74.83	75.68	74.22	77.07	70.98
72.83	49.37	74.09	46.97	122.50	10.53	145.09	15.00	123.79	10.38	74.91	75.04	75.51	74.32	76.85	71.05
72.83	49.43	73.96	47.06	122.26	10.59	144.43	15.00	123.23	10.45	74.74	75.02	75.33	74.33	76.68	71.09

72.83	49.36	73.91	46.94	121.33	10.83	143.78	15.00	122.60	10.66	74.60	75.09	75.16	74.37	76.51	71.13
72.83	49.36	73.96	46.88	121.09	11.12	143.45	15.00	122.42	10.81	74.48	74.96	75.03	74.33	76.42	71.09
72.83	49.55	73.91	47.11	121.33	11.15	143.45	15.00	122.36	10.92	74.35	74.95	74.94	74.32	76.29	71.05
72.83	49.43	73.96	47.11	119.57	11.82	143.13	15.00	121.98	11.10	74.30	74.74	74.86	74.22	76.20	71.01
72.83	49.97	74.04	47.66	119.15	11.92	142.81	15.00	121.74	11.13	74.30	74.48	74.81	74.13	76.16	70.91
72.83	50.08	74.17	47.80	119.33	12.82	142.17	15.00	121.31	11.84	74.26	74.45	74.77	74.06	76.11	70.91
72.83	49.78	74.30	47.54	119.99	12.15	143.13	15.00	122.11	11.48	74.22	74.21	74.73	73.97	76.03	70.84
72.83	49.28	74.39	47.19	120.23	12.10	143.78	15.00	122.98	11.27	74.22	74.44	74.68	74.02	76.03	70.84
72.83	48.71	74.65	46.42	125.03	10.71	144.76	15.00	125.19	10.79	74.17	74.47	74.68	74.05	76.03	70.81
72.83	48.47	74.78	46.04	125.61	10.66	145.76	15.00	126.35	10.43	74.26	74.30	74.77	74.03	76.11	70.79
72.83	47.83	74.87	45.26	125.54	10.73	146.43	15.00	126.88	10.37	74.30	74.51	74.77	74.09	76.11	70.85
72.83	47.39	74.91	44.81	126.38	10.30	146.77	15.00	127.40	10.15	74.30	74.54	74.81	74.16	76.16	70.91
72.83	47.20	75.08	44.75	126.25	10.21	146.77	15.00	127.67	10.01	74.30	74.54	74.81	74.16	76.16	70.88
72.83	46.99	75.30	44.48	126.84	10.17	147.11	15.00	127.93	9.93	74.35	74.54	74.81	74.18	76.16	70.91
72.83	46.66	75.56	44.02	126.84	10.06	147.11	15.00	128.20	9.86	74.39	74.55	74.86	74.16	76.20	70.92
72.83	46.57	75.65	44.16	126.77	10.09	147.46	15.00	128.40	9.94	74.43	74.52	74.90	74.19	76.29	70.90
72.83	46.91	75.99	44.53	126.77	10.12	147.80	15.00	128.46	9.87	74.52	74.44	74.99	74.15	76.33	70.87
72.83	46.86	76.69	44.33	127.04	10.02	147.46	15.00	128.73	9.80	74.60	74.42	75.07	74.13	76.42	70.82
72.83	46.28	77.61	43.61	127.23	10.18	147.80	15.00	128.80	9.84	74.74	74.35	75.20	74.11	76.55	70.84
72.83	45.57	78.57	42.81	127.36	10.25	148.49	15.00	129.00	9.88	74.91	74.28	75.38	74.10	76.73	70.79
72.83	44.36	79.53	41.21	128.03	10.26	148.49	15.00	129.34	9.88	75.21	74.11	75.64	74.04	77.03	70.71
72.83	43.61	80.02	41.05	128.22	10.33	148.84	15.00	129.54	9.93	75.56	73.91	75.99	73.96	77.38	70.56
72.83	43.55	79.49	41.11	128.82	10.15	149.19	15.00	130.08	9.82	75.95	73.75	76.33	73.85	77.77	70.46

72.83	44.47	78.48	42.23	129.36	9.94	149.19	15.00	130.49	9.75	76.26	73.64	76.64	73.74	78.12	70.34
72.83	44.73	77.91	42.37	130.38	9.68	149.90	15.00	131.11	9.69	76.47	73.66	76.90	73.68	78.34	70.25
72.83	45.03	77.69	42.52	130.31	9.54	149.54	15.00	131.04	9.61	76.52	73.84	77.03	73.72	78.43	70.31
72.83	44.88	77.43	42.38	129.70	9.79	149.19	15.00	130.63	9.68	76.56	73.96	77.07	73.81	78.43	70.37
72.83	46.26	77.17	44.00	129.30	10.47	149.90	15.00	130.83	9.99	76.52	74.08	77.03	73.84	78.43	70.46
72.83	45.71	76.65	43.47	128.76	10.45	150.25	15.00	131.11	9.84	76.52	74.16	77.03	73.90	78.38	70.55
72.83	45.84	76.30	43.41	128.89	10.23	149.90	15.00	131.25	9.77	76.47	74.25	76.94	73.92	78.30	70.63
72.83	46.41	76.52	44.06	128.29	10.42	149.90	15.00	131.11	9.69	76.34	74.41	76.81	73.99	78.17	70.71
72.83	46.78	76.30	44.43	128.16	10.21	149.54	15.00	130.56	9.76	76.17	74.51	76.64	74.03	77.99	70.87
72.83	45.85	75.82	43.54	128.22	10.14	148.84	15.00	130.63	9.60	76.08	74.18	76.55	73.85	77.90	70.68
72.83	46.20	74.95	43.69	126.90	10.23	149.54	15.00	130.63	9.53	76.04	73.91	76.55	73.70	77.90	70.47
72.83	45.79	74.87	43.45	127.10	10.38	149.54	15.00	130.83	9.38	75.91	73.81	76.42	73.57	77.82	70.28
72.83	45.89	74.52	43.60	127.43	10.12	148.49	15.00	129.94	9.52	75.69	73.93	76.25	73.52	77.68	70.24
72.83	46.16	74.22	43.82	125.03	10.43	149.19	15.00	129.13	9.65	75.43	73.93	76.03	73.55	77.42	70.24
72.83	46.50	73.91	44.19	125.28	10.22	149.19	15.00	128.66	9.64	75.26	74.00	75.81	73.56	77.20	70.25
72.83	46.86	73.65	44.55	124.90	10.37	149.19	15.00	128.66	9.57	75.00	74.00	75.59	73.57	77.03	70.26
72.83	47.26	73.40	44.89	124.64	10.45	148.84	15.00	128.46	9.64	74.78	74.03	75.38	73.54	76.77	70.26
72.83	47.79	73.14	45.46	124.71	10.22	148.49	15.00	128.00	9.63	74.56	74.10	75.16	73.58	76.55	70.30
72.83	48.15	72.88	45.91	124.39	10.29	148.49	15.00	128.13	9.56	74.35	74.19	74.94	73.61	76.33	70.34
72.83	48.48	72.57	46.13	124.39	10.18	148.15	15.00	127.86	9.55	74.09	74.28	74.73	73.65	76.07	70.40
72.83	48.81	72.36	46.40	124.45	10.21	147.80	15.00	127.14	9.69	73.87	74.29	74.47	73.71	75.85	70.44
72.83	49.11	72.14	46.74	123.76	10.31	146.77	15.00	125.90	9.90	73.61	74.23	74.25	73.71	75.64	70.45
72.83	49.09	71.88	46.71	123.44	10.37	146.43	15.00	125.64	9.89	73.40	74.29	74.03	73.69	75.42	70.42

72.83	49.40	71.76	46.95	123.44	10.32	146.43	15.00	125.51	9.89	73.14	74.53	73.77	73.78	75.12	70.54
72.83	49.80	71.67	47.39	122.50	10.58	146.10	15.00	125.45	9.92	72.88	74.67	73.47	73.92	74.86	70.69
72.83	50.31	71.67	47.82	122.38	10.44	146.77	15.00	126.10	9.75	72.62	74.79	73.26	74.02	74.64	70.76
72.83	50.43	71.67	48.06	122.44	10.34	146.10	15.00	125.97	9.67	72.49	74.80	73.08	74.06	74.47	70.80
72.83	51.94	72.06	49.75	122.07	10.44	146.10	15.00	125.71	9.78	72.36	74.70	72.96	74.04	74.34	70.78
72.83	51.51	72.19	48.71	122.88	10.27	145.76	15.00	125.19	9.88	72.27	74.78	72.83	74.09	74.21	70.86
72.83	51.65	72.49	49.16	123.07	10.38	145.76	15.00	124.87	10.03	72.32	74.73	72.83	74.11	74.25	70.84
72.83	51.35	72.75	48.94	124.14	10.45	144.76	15.00	124.62	10.32	72.32	74.81	72.87	74.21	74.25	70.89
72.83	51.40	72.96	48.66	125.09	10.10	145.09	15.00	126.23	9.90	72.32	74.84	72.87	74.24	74.25	70.92
72.83	51.55	73.18	49.05	124.84	10.02	145.43	15.00	126.55	9.83	72.36	74.85	72.87	74.26	74.30	70.93
72.83	51.90	73.31	49.24	125.09	10.19	145.76	15.00	126.75	9.91	72.36	74.79	72.91	74.27	74.34	70.90
72.83	51.53	73.48	49.04	125.61	10.03	145.76	15.00	126.94	9.84	72.44	74.80	73.00	74.28	74.42	70.91
72.83	51.56	73.78	48.99	125.41	10.04	145.76	15.00	127.01	9.76	72.53	74.78	73.04	74.28	74.47	70.89
72.83	51.64	74.04	49.16	125.28	10.05	146.10	15.00	127.07	9.69	72.57	74.78	73.13	74.29	74.55	70.90
72.83	51.60	74.39	49.14	125.22	9.79	146.10	15.00	127.20	9.54	72.70	74.74	73.21	74.30	74.64	70.85
72.83	51.57	74.74	49.14	125.35	9.79	146.43	15.00	127.14	9.54	72.83	74.73	73.34	74.29	74.77	70.86
72.83	51.53	75.12	49.15	126.12	9.50	146.77	15.00	127.40	9.39	72.96	74.68	73.47	74.30	74.94	70.85
72.83	51.58	75.26	49.34	125.54	9.61	146.43	15.00	127.27	9.39	73.14	74.61	73.65	74.29	75.07	70.80
72.83	51.41	75.56	49.05	126.19	9.51	146.77	15.00	127.53	9.39	73.35	74.58	73.77	74.28	75.29	70.77
72.83	50.95	76.21	48.39	126.32	9.48	146.77	15.00	127.73	9.32	73.52	74.57	73.99	74.27	75.46	70.78
72.83	50.24	77.13	47.49	126.51	9.33	147.11	15.00	128.00	9.25	73.70	74.50	74.16	74.26	75.64	70.74
72.83	49.18	78.17	46.42	127.50	9.01	146.77	15.00	128.40	9.11	74.00	74.39	74.42	74.26	75.90	70.71
72.83	48.02	79.18	45.19	127.36	9.12	147.11	15.00	128.33	9.18	74.35	74.19	74.77	74.18	76.25	70.66

72.83	47.12	79.67	44.78	127.43	9.15	147.46	15.00	128.40	9.14	74.78	74.01	75.16	74.11	76.64	70.52
72.83	46.71	79.14	44.18	127.36	9.17	147.80	15.00	128.33	9.18	75.21	73.85	75.59	74.04	77.12	70.42
72.83	47.23	78.13	45.01	127.30	9.18	147.46	15.00	128.06	9.25	75.60	73.77	75.94	73.96	77.51	70.31
72.83	47.51	77.65	45.19	126.71	9.36	147.11	15.00	127.93	9.25	75.82	73.88	76.20	73.90	77.77	70.25
72.83	49.47	77.26	47.41	126.58	9.29	147.11	15.00	127.93	9.17	75.86	74.12	76.29	73.96	77.86	70.32
72.83	49.54	76.91	47.25	125.22	9.67	147.46	15.00	127.60	9.32	75.91	74.24	76.38	74.03	77.90	70.38
72.83	49.36	76.73	46.94	127.04	9.58	148.49	15.00	128.86	9.27	75.95	74.31	76.42	74.10	77.90	70.47
72.83	55.90	74.22	54.02	118.61	12.09	139.97	15.00	126.81	9.38	75.95	74.43	76.42	74.12	77.90	70.59
72.83	55.58	74.17	53.63	117.08	14.64	123.57	15.00	104.62	23.52	75.91	61.79	76.33	63.85	77.64	61.21
72.83	55.76	74.09	53.84	125.22	11.32	136.94	15.00	116.59	16.49	74.00	61.87	73.77	64.67	74.21	63.80
72.83	55.97	74.04	54.08	128.49	10.08	143.13	15.00	122.17	13.66	74.00	64.02	73.95	64.65	74.73	62.94
72.83	55.77	73.91	53.76	130.72	9.26	147.11	15.00	125.45	12.15	73.96	65.29	74.08	65.36	74.99	63.24
72.83	55.78	74.04	53.61	132.25	8.71	149.90	15.00	127.73	11.22	73.96	66.22	74.12	66.09	75.16	63.77
72.83	54.94	73.96	52.93	133.66	8.45	152.06	15.00	129.34	10.65	73.91	67.05	74.16	66.75	75.25	64.29
72.83	54.59	73.83	52.62	134.81	8.08	153.91	15.00	130.35	10.25	73.83	67.67	74.12	67.31	75.25	64.78
72.83	54.22	73.57	52.14	135.24	7.81	155.05	15.00	130.90	9.84	73.74	68.17	74.08	67.73	75.25	65.17
72.83	53.98	73.27	51.92	135.17	7.66	155.05	15.00	131.18	9.54	73.65	68.58	74.03	68.17	75.25	65.50
72.83	53.89	73.05	51.73	135.10	7.52	155.43	15.00	131.31	9.39	73.52	69.28	73.99	68.67	75.20	65.95
72.83	53.87	72.79	51.76	134.95	7.44	155.43	15.00	131.52	9.16	73.35	69.89	73.82	69.19	75.07	66.39
72.83	54.11	72.62	52.09	135.24	7.37	155.82	15.00	131.73	9.01	73.14	70.34	73.65	69.62	74.90	66.76
72.83	54.88	72.53	52.91	135.10	7.33	155.82	15.00	131.59	8.93	72.96	70.76	73.47	69.99	74.77	67.11
72.83	55.00	72.40	52.99	134.74	7.27	155.43	15.00	131.45	8.86	72.79	71.10	73.34	70.33	74.64	67.40
72.83	55.21	72.27	53.18	134.30	7.39	154.67	15.00	131.11	8.85	72.66	71.46	73.21	70.67	74.51	67.71

72.83	55.51	72.23	53.47	133.73	7.40	154.29	15.00	130.97	8.81	72.53	71.75	73.08	70.98	74.42	67.97
72.83	55.76	72.19	53.67	133.80	7.40	154.67	15.00	130.69	8.77	72.44	72.00	73.00	71.21	74.34	68.20
72.83	56.00	72.14	53.93	133.73	7.41	154.67	15.00	130.56	8.76	72.36	72.28	72.91	71.46	74.25	68.43
72.83	56.28	72.14	54.25	134.02	7.42	155.05	15.00	130.63	8.76	72.27	72.45	72.87	71.69	74.21	68.61
72.83	56.28	72.14	54.29	132.04	8.08	154.29	15.00	130.35	8.99	72.23	72.68	72.78	71.89	74.16	68.78
72.83	56.29	72.14	54.25	129.36	8.51	152.43	15.00	129.13	9.12	72.19	72.82	72.74	72.09	74.12	68.95
72.83	56.34	72.14	54.29	129.77	8.43	152.43	15.00	128.80	9.19	72.14	72.96	72.74	72.27	74.12	69.10
72.83	56.26	72.27	54.10	129.97	8.37	152.43	15.00	128.93	9.19	72.14	73.14	72.70	72.47	74.08	69.25
72.83	56.30	72.40	54.20	130.11	8.29	152.06	15.00	129.07	9.12	72.14	73.17	72.70	72.58	74.08	69.34
72.83	56.28	72.53	54.16	129.77	8.47	151.69	15.00	128.80	9.11	72.19	73.20	72.74	72.62	74.12	69.40
72.83	56.20	72.79	54.04	130.04	8.52	152.06	15.00	128.93	9.19	72.23	73.26	72.78	72.74	74.21	69.47
72.83	56.19	73.01	53.97	130.65	8.31	152.79	15.00	129.40	9.12	72.32	73.21	72.87	72.78	74.30	69.45
72.83	56.00	73.31	53.81	131.00	8.58	153.16	15.00	129.67	9.28	72.53	73.00	73.00	72.70	74.47	69.38
72.83	56.36	73.57	54.13	131.34	8.65	153.54	15.00	129.94	9.29	72.70	72.88	73.17	72.66	74.64	69.33
72.83	55.32	74.39	52.80	131.97	8.34	153.91	15.00	130.28	9.22	72.88	72.81	73.34	72.65	74.81	69.32
72.83	54.78	74.52	52.44	132.32	8.25	154.29	15.00	130.56	9.07	73.09	73.01	73.52	72.82	74.99	69.46
72.83	54.82	74.69	52.56	132.95	7.88	154.67	15.00	130.83	8.92	73.52	72.38	73.86	72.62	75.33	69.29
72.83	54.25	74.95	51.93	133.37	7.92	155.43	15.00	131.45	8.86	73.78	72.46	74.12	72.59	75.64	69.23
72.83	53.70	75.26	51.21	133.80	7.74	155.43	15.00	131.80	8.71	73.96	72.57	74.34	72.67	75.81	69.30
72.83	53.25	75.56	50.77	134.09	7.51	155.82	15.00	132.08	8.48	74.17	72.48	74.55	72.66	76.03	69.24
72.83	52.68	75.86	50.16	134.45	7.41	156.20	15.00	132.36	8.41	74.39	72.44	74.77	72.66	76.25	69.23
72.83	52.39	76.21	49.91	135.02	7.32	156.59	15.00	132.85	8.34	74.65	72.38	74.99	72.62	76.46	69.22
72.83	51.69	76.91	49.52	135.68	7.29	156.98	15.00	133.13	8.35	74.87	72.28	75.20	72.59	76.73	69.19

72.83	50.97	77.82	48.78	136.49	6.78	157.77	15.00	133.63	8.05	75.17	72.17	75.46	72.55	76.99	69.15
72.83	51.08	78.57	48.84	137.60	6.46	158.57	15.00	134.49	7.68	75.60	71.77	75.81	72.41	77.38	69.01
72.83	53.44	78.74	51.09	138.89	6.32	159.79	15.00	135.58	7.62	76.12	71.47	76.29	72.26	77.86	68.85
72.83	52.54	80.59	49.59	139.58	6.18	160.61	15.00	136.38	7.48	76.60	71.52	76.81	72.20	78.38	68.75
72.83	51.23	79.71	48.93	139.96	6.04	161.03	15.00	136.97	7.33	77.13	71.96	77.29	72.51	78.82	68.98
72.83	52.62	78.53	50.56	139.81	5.70	161.03	15.00	137.05	7.18	77.65	71.87	77.82	72.57	79.35	69.03
72.83	53.03	78.22	50.92	140.04	6.21	161.45	15.00	137.27	7.42	77.87	72.19	78.17	72.57	79.61	69.03
72.83	52.76	77.96	50.65	140.35	6.77	161.87	15.00	137.87	7.81	77.69	72.76	78.08	72.83	79.48	69.34
72.83	52.57	78.22	50.60	140.51	6.93	161.87	15.00	138.10	7.97	77.61	73.16	78.03	73.12	79.44	69.64
72.83	51.97	78.17	50.09	140.98	6.85	162.29	15.00	138.40	7.90	77.52	73.48	77.95	73.32	79.35	69.90
72.83	51.84	78.17	49.91	140.66	6.78	162.29	15.00	138.40	7.82	77.69	73.11	78.08	73.27	79.52	69.86
72.83	52.39	77.91	50.44	141.84	7.06	163.58	15.00	139.55	7.92	77.74	73.36	78.12	73.37	79.52	69.95
72.83	53.13	77.74	51.11	143.21	6.32	165.33	15.00	141.02	7.40	77.87	73.40	78.21	73.46	79.61	70.05
72.83	52.31	77.34	50.25	143.61	6.06	165.77	15.00	141.49	7.09	77.91	73.32	78.25	73.59	79.66	70.20
72.83	52.12	77.00	50.03	151.05	4.81	168.51	15.00	142.69	6.96	77.96	73.44	78.25	73.62	79.66	70.26
72.83	52.17	76.73	50.19	152.33	4.56	169.45	15.00	143.01	6.81	77.78	73.71	78.17	73.67	79.52	70.34
72.83	52.40	76.47	50.43	152.70	4.53	169.92	15.00	143.58	6.74	77.52	73.92	77.95	73.79	79.30	70.46
72.83	52.74	76.21	50.80	152.60	4.52	170.40	15.00	143.98	6.59	77.30	74.22	77.77	73.95	79.13	70.65
72.83	53.63	76.04	51.73	152.24	4.54	169.45	15.00	143.42	6.66	77.08	74.34	77.60	74.05	78.91	70.78
72.83	54.12	75.86	52.26	152.42	4.47	169.92	15.00	143.42	6.58	76.86	74.50	77.42	74.17	78.73	70.91
72.83	54.07	75.65	52.17	152.51	4.33	169.92	15.00	143.50	6.46	76.73	74.63	77.25	74.27	78.60	70.99
72.83	54.44	75.47	52.57	152.14	4.38	169.92	15.00	143.25	6.50	76.56	74.73	77.12	74.35	78.47	71.09
72.83	54.55	75.30	52.68	152.24	4.29	169.92	15.00	143.09	6.50	76.38	74.88	76.90	74.41	78.30	71.16

72.83	54.66	75.12	52.82	151.78	4.22	169.45	15.00	142.77	6.41	76.21	74.98	76.73	74.54	78.08	71.29
72.83	55.12	74.95	53.24	151.05	4.29	168.98	15.00	142.13	6.48	75.99	75.10	76.51	74.66	77.90	71.39
72.83	55.82	74.82	53.86	150.42	4.30	168.05	15.00	141.89	6.40	75.86	75.17	76.38	74.71	77.73	71.49
72.83	55.90	74.65	54.06	150.42	4.35	168.05	15.00	141.65	6.40	75.65	75.27	76.20	74.77	77.55	71.56
72.83	55.86	74.52	53.94	150.51	4.30	168.05	15.00	141.65	6.44	75.52	75.20	76.03	74.78	77.38	71.57
72.83	55.88	74.39	53.96	149.45	4.30	167.59	15.00	141.02	6.39	75.30	75.32	75.85	74.82	77.20	71.62
72.83	56.00	74.35	54.00	149.71	4.28	167.13	15.00	140.71	6.38	75.17	75.33	75.68	74.89	77.03	71.66
72.83	56.27	74.22	54.34	150.42	4.12	167.59	15.00	140.94	6.31	75.04	75.32	75.55	74.91	76.90	71.67
72.83	56.62	74.30	54.76	150.42	4.21	168.05	15.00	140.94	6.39	74.91	75.27	75.42	74.86	76.81	71.60
72.83	56.46	74.26	54.51	144.26	5.69	166.22	15.00	139.85	6.99	74.78	75.40	75.33	74.91	76.68	71.65
72.83	56.17	74.65	54.07	140.12	6.26	163.14	15.00	138.78	6.98	74.82	75.24	75.33	74.94	76.73	71.62
72.83	56.07	74.56	54.00	137.01	6.89	159.38	15.00	136.53	7.37	74.74	75.34	75.25	74.96	76.64	71.62
72.83	55.55	74.74	53.73	136.41	7.02	158.98	15.00	135.65	7.62	74.65	75.45	75.16	75.01	76.55	71.70
72.83	55.34	74.91	53.40	136.56	7.04	158.57	15.00	135.43	7.77	74.60	75.50	75.12	75.03	76.51	71.75
72.83	55.04	74.87	53.12	138.28	6.79	160.20	15.00	136.23	7.67	74.52	75.52	75.07	75.09	76.42	71.74
72.83	55.01	75.00	52.97	139.19	6.61	161.03	15.00	136.90	7.49	74.52	75.52	75.03	75.08	76.42	71.74
72.83	54.29	75.43	52.14	139.50	6.33	161.03	15.00	137.05	7.34	74.48	75.52	75.03	75.08	76.42	71.71
72.83	53.98	75.82	51.99	140.04	6.28	161.45	15.00	137.42	7.34	74.52	75.49	75.03	75.08	76.42	71.68
72.83	53.73	76.17	51.69	140.74	6.12	162.29	15.00	137.95	7.19	74.52	75.46	75.03	75.05	76.46	71.66
72.83	53.56	76.47	51.61	141.29	5.86	163.14	15.00	138.55	7.05	74.60	75.41	75.12	75.03	76.59	71.58
72.83	53.29	76.73	51.19	141.92	6.17	163.58	15.00	139.01	7.21	74.69	75.37	75.25	74.99	76.73	71.51
72.83	52.83	76.78	50.82	142.56	6.11	164.45	15.00	139.62	7.14	74.82	75.32	75.33	74.94	76.85	71.43
72.83	52.18	77.00	50.21	143.04	6.10	164.89	15.00	140.16	7.19	74.95	75.25	75.46	74.93	77.03	71.36

72.83	51.79	76.82	49.47	143.77	6.06	165.33	15.00	140.55	7.16	75.08	75.21	75.64	74.86	77.16	71.31
72.83	51.61	77.34	49.50	142.48	6.48	164.45	15.00	139.85	7.53	75.26	75.14	75.77	74.84	77.29	71.24
72.83	51.18	78.22	48.87	142.56	6.61	164.01	15.00	139.47	7.68	75.30	75.08	75.85	74.79	77.38	71.22
72.83	50.66	79.01	48.12	143.53	6.54	164.89	15.00	140.32	7.62	75.43	75.10	75.94	74.80	77.46	71.20
72.83	49.32	79.97	46.50	143.53	6.36	165.77	15.00	141.42	7.40	75.60	75.03	76.11	74.79	77.64	71.19
72.83	49.37	79.40	47.39	146.17	5.96	168.05	15.00	143.01	7.20	75.86	74.88	76.33	74.73	77.90	71.06
72.83	50.45	78.39	48.64	148.57	5.60	170.40	15.00	144.97	6.84	76.21	74.75	76.68	74.65	78.25	70.92
72.83	51.86	77.69	49.94	149.89	5.32	171.86	15.00	145.47	6.69	76.43	74.65	76.94	74.53	78.51	70.80
72.83	52.51	77.21	50.48	149.54	5.41	171.86	15.00	145.55	6.69	76.56	74.73	77.07	74.55	78.60	70.87
72.83	54.81	76.95	52.86	148.92	5.75	171.86	15.00	146.39	6.78	76.52	74.78	77.07	74.64	78.56	70.98
72.83	53.95	76.65	51.81	148.31	5.80	171.37	15.00	146.56	6.78	76.52	74.87	77.03	74.66	78.51	71.10
72.83	53.55	76.43	51.36	148.31	5.85	171.37	15.00	146.82	6.71	76.43	75.03	76.94	74.74	78.43	71.24
72.83	53.28	76.17	51.07	147.28	5.99	170.40	15.00	146.48	6.70	76.38	75.12	76.85	74.82	78.34	71.35
72.83	53.00	75.86	50.74	147.71	6.39	170.40	15.00	146.31	7.09	76.30	75.22	76.81	74.87	78.21	71.45
72.83	53.08	75.99	50.84	152.05	5.49	172.84	15.00	147.84	6.80	76.17	75.27	76.68	74.91	78.08	71.59
72.83	52.51	75.73	50.58	152.33	5.27	173.34	15.00	148.53	6.50	76.04	75.34	76.51	74.95	77.86	71.68
72.83	52.29	75.34	50.29	151.32	5.38	172.35	15.00	147.93	6.49	75.95	75.13	76.42	74.94	77.77	71.70
72.83	52.26	74.95	50.32	151.41	5.15	172.84	15.00	148.10	6.34	75.82	75.20	76.29	74.90	77.64	71.69
72.83	52.23	74.56	50.26	150.60	5.20	170.88	15.00	147.50	6.33	75.60	75.12	76.11	74.88	77.46	71.67
72.83	52.18	74.26	50.17	149.63	5.26	169.45	15.00	146.39	6.39	75.43	75.21	75.94	74.86	77.29	71.68
72.83	52.28	74.00	50.28	149.27	5.22	169.45	15.00	145.97	6.46	75.21	75.39	75.72	74.96	77.03	71.75
72.83	52.64	73.78	50.70	149.27	5.10	170.40	15.00	146.22	6.31	74.95	75.39	75.51	74.99	76.77	71.81
72.83	52.60	73.57	50.64	148.83	5.18	169.45	15.00	145.89	6.26	74.74	75.34	75.25	74.96	76.59	71.79

72.83	52.86	73.40	50.95	148.57	5.13	168.98	15.00	145.55	6.22	74.52	75.38	75.07	74.94	76.38	71.80
72.83	53.26	73.22	51.33	148.05	5.00	168.51	15.00	144.97	6.13	74.30	75.32	74.90	74.95	76.20	71.78
72.83	53.59	73.09	51.75	147.88	4.80	168.98	15.00	144.80	6.05	74.13	75.51	74.68	74.99	76.03	71.82
72.83	53.93	72.96	51.96	147.62	4.69	168.51	15.00	144.80	5.90	73.96	75.46	74.51	75.00	75.85	71.80
72.83	54.61	72.88	52.68	146.60	4.76	167.59	15.00	143.74	5.96	73.78	75.56	74.34	75.04	75.68	71.84
72.83	54.63	72.75	52.76	146.94	4.59	168.98	15.00	144.48	5.81	73.65	75.63	74.21	75.11	75.55	71.89
72.83	54.93	72.62	52.99	146.09	4.59	167.13	15.00	143.66	5.72	73.52	75.64	74.03	75.15	75.38	71.90
72.83	55.23	72.57	53.28	145.92	4.68	167.13	15.00	143.50	5.80	73.40	75.69	73.90	75.19	75.25	71.94
72.83	55.39	72.53	53.41	146.09	4.75	168.05	15.00	143.74	5.80	73.27	75.67	73.77	75.18	75.16	71.93
72.83	55.70	72.53	53.70	146.43	4.84	167.59	15.00	143.98	5.89	73.14	75.69	73.65	75.22	75.03	71.92
72.83	56.49	72.79	54.51	147.97	4.55	168.98	15.00	144.48	5.81	73.05	75.59	73.56	75.15	74.94	71.88
72.83	56.06	72.75	53.90	147.54	4.86	168.98	15.00	143.90	6.04	72.96	75.58	73.47	75.17	74.90	71.88
72.83	55.79	73.01	54.01	140.74	5.81	163.14	15.00	139.55	6.68	73.09	75.39	73.56	75.18	74.99	71.83
72.83	55.61	73.48	53.55	139.35	6.11	161.45	15.00	137.72	6.96	73.05	75.56	73.56	75.18	74.99	71.83
72.83	55.32	73.83	53.24	138.97	6.39	161.03	15.00	136.90	7.33	73.01	75.64	73.52	75.24	74.94	71.88
72.83	54.98	74.17	52.95	139.89	6.45	162.29	15.00	136.75	7.56	73.05	75.68	73.52	75.27	74.94	71.88
72.83	54.58	74.65	52.62	139.42	6.49	162.29	15.00	136.53	7.64	73.09	75.62	73.60	75.25	75.03	71.83
72.83	54.10	74.87	52.06	139.35	6.42	161.87	15.00	135.87	7.66	73.18	75.61	73.69	75.23	75.12	71.78
72.83	54.00	74.69	52.16	139.50	6.35	161.87	15.00	135.72	7.62	73.31	75.53	73.82	75.18	75.29	71.68
72.83	54.21	74.65	52.31	139.89	6.16	162.29	15.00	135.87	7.55	73.44	75.52	73.95	75.14	75.42	71.61
72.83	54.34	74.82	52.37	139.89	6.06	162.29	15.00	135.87	7.39	73.52	75.47	74.08	75.12	75.55	71.56
72.83	54.29	75.00	52.22	140.20	5.92	162.72	15.00	135.94	7.32	73.65	75.48	74.16	75.10	75.68	71.55
72.83	53.99	75.17	51.90	140.74	5.68	162.72	15.00	136.38	7.09	73.74	75.46	74.30	75.12	75.77	71.52

72.83	53.62	75.30	51.42	141.61	5.62	164.01	15.00	136.90	7.02	73.87	75.39	74.42	75.08	75.94	71.48
72.83	53.99	75.60	51.89	142.16	5.80	164.45	15.00	137.35	7.26	74.00	75.38	74.55	75.06	76.07	71.47
72.83	53.68	75.99	51.48	142.80	6.13	164.89	15.00	137.72	7.58	74.17	75.31	74.68	75.02	76.20	71.39
72.83	53.06	76.69	50.75	143.04	6.42	165.33	15.00	138.10	7.89	74.35	75.24	74.86	75.01	76.38	71.35
72.83	51.80	77.56	49.24	144.02	6.58	166.22	15.00	138.70	8.06	74.52	75.14	75.03	74.94	76.59	71.31
72.83	50.90	78.96	47.95	144.35	6.67	166.67	15.00	139.39	8.07	74.82	75.03	75.29	74.88	76.90	71.20
72.83	48.86	80.46	45.46	144.76	6.70	167.13	15.00	139.85	8.15	75.26	74.82	75.68	74.78	77.29	71.03
72.83	48.37	81.21	45.28	144.76	6.75	167.13	15.00	140.01	8.16	75.65	74.66	76.11	74.65	77.77	70.84
72.83	48.11	80.37	46.30	145.01	6.72	167.13	15.00	140.24	8.08	76.17	74.45	76.59	74.52	78.25	70.68
72.83	49.89	78.61	48.13	145.92	6.54	168.05	15.00	140.79	7.94	76.60	74.26	77.12	74.38	78.73	70.53
72.83	51.99	77.96	50.14	145.84	6.50	168.05	15.00	141.10	7.86	76.95	74.24	77.46	74.24	79.08	70.41
72.83	52.33	77.74	50.24	145.50	6.46	168.05	15.00	141.02	7.86	76.95	74.45	77.46	74.36	79.00	70.58
72.83	52.65	77.48	50.64	145.76	6.64	168.05	15.00	141.02	7.94	76.91	74.56	77.42	74.44	78.91	70.75
72.83	52.66	77.17	50.46	145.76	6.73	168.05	15.00	141.26	8.02	76.91	74.65	77.42	74.50	78.87	70.90
72.83	52.67	76.95	50.60	145.25	6.71	168.05	15.00	141.18	8.02	76.86	74.76	77.38	74.58	78.82	71.04
72.83	52.57	76.73	50.51	144.43	6.87	167.13	15.00	140.63	8.17	76.82	74.90	77.34	74.66	78.73	71.15
72.83	53.09	76.56	50.77	144.02	7.06	166.67	15.00	140.40	8.24	76.69	75.03	77.20	74.74	78.65	71.29
72.83	53.14	76.65	51.10	143.61	7.09	166.22	15.00	140.09	8.31	76.60	75.05	77.12	74.82	78.47	71.39
72.83	52.78	76.43	50.93	143.04	7.26	165.77	15.00	139.55	8.46	76.47	75.04	76.99	74.83	78.38	71.47
72.83	52.73	76.12	50.88	142.96	7.32	165.77	15.00	139.55	8.46	76.52	74.75	76.94	74.80	78.34	71.44
72.83	52.86	75.82	50.94	142.40	7.39	165.33	15.00	139.09	8.53	76.38	74.91	76.85	74.76	78.25	71.40
72.83	52.99	75.52	51.11	142.16	7.39	165.33	15.00	138.86	8.52	76.21	74.98	76.73	74.77	78.08	71.44
72.83	53.26	75.30	51.36	141.92	7.54	164.89	15.00	138.63	8.60	76.08	75.02	76.55	74.78	77.95	71.48

72.83	53.49	75.08	51.59	140.98	7.67	164.45	15.00	138.17	8.59	75.91	75.12	76.42	74.83	77.77	71.50
72.83	53.76	74.91	51.89	140.90	7.58	164.01	15.00	137.87	8.58	75.73	75.25	76.25	74.90	77.64	71.60
72.83	53.91	74.69	51.98	140.35	7.65	163.58	15.00	137.65	8.58	75.60	75.23	76.11	74.91	77.51	71.59
72.83	54.27	74.56	52.39	139.96	7.63	163.14	15.00	137.35	8.57	75.43	75.30	75.94	74.95	77.34	71.66
72.83	54.25	74.35	52.33	139.35	7.79	162.72	15.00	136.97	8.57	75.26	75.34	75.77	74.93	77.16	71.67
72.83	54.33	74.22	52.44	139.27	7.57	163.14	15.00	136.68	8.56	75.08	75.44	75.64	75.03	77.03	71.75
72.83	54.45	74.04	52.50	139.04	7.51	162.29	15.00	136.38	8.48	74.95	75.34	75.46	75.01	76.81	71.72
72.83	54.75	73.87	52.79	138.97	7.61	162.29	15.00	136.02	8.63	74.78	75.40	75.29	75.02	76.64	71.76
72.83	54.83	73.78	52.93	138.58	7.51	161.45	15.00	135.50	8.70	74.60	75.47	75.16	75.07	76.51	71.78
72.83	54.92	73.65	52.94	138.13	7.62	161.03	15.00	135.21	8.69	74.48	75.43	74.99	75.05	76.33	71.79
72.83	55.07	73.57	53.11	137.83	7.75	160.61	15.00	134.70	8.84	74.35	75.53	74.86	75.12	76.25	71.81
72.83	55.16	73.57	53.17	137.01	7.87	159.79	15.00	134.27	8.98	74.26	75.46	74.77	75.11	76.11	71.77
72.83	55.25	73.48	53.19	137.45	7.92	159.79	15.00	133.91	9.05	74.13	75.59	74.64	75.22	76.03	71.88
72.83	56.57	73.78	54.74	137.75	7.89	160.20	15.00	134.20	8.98	74.04	75.56	74.55	75.12	75.94	71.78
72.83	55.43	73.91	53.55	137.45	8.03	160.20	15.00	134.13	9.06	73.91	75.43	74.42	75.08	75.81	71.77
72.83	54.92	74.22	53.08	137.15	7.97	159.79	15.00	133.70	9.13	73.96	75.31	74.42	75.16	75.85	71.80
72.83	54.45	74.65	52.47	137.01	8.02	159.38	15.00	133.35	9.20	73.96	75.52	74.47	75.17	75.90	71.77
72.83	54.34	74.69	52.50	137.45	7.94	159.79	15.00	133.35	9.20	73.91	75.60	74.42	75.22	75.85	71.80
72.83	54.29	74.91	52.38	137.98	8.00	160.20	15.00	133.84	9.17	73.91	75.60	74.47	75.23	75.90	71.80
72.83	54.15	75.12	52.22	138.74	7.88	161.03	15.00	134.63	9.14	73.96	75.58	74.51	75.20	75.94	71.72
72.83	53.96	75.60	51.99	138.81	7.93	161.45	15.00	135.07	9.15	74.04	75.56	74.60	75.18	76.03	71.70
72.83	53.81	75.73	51.75	139.19	7.90	161.87	15.00	135.36	9.08	74.17	75.51	74.68	75.16	76.16	71.65
72.83	53.41	76.26	51.25	139.35	8.03	161.87	15.00	135.65	9.20	74.26	75.46	74.81	75.15	76.29	71.55

72.83	52.98	76.73	50.81	139.50	8.05	161.87	15.00	135.87	9.16	74.43	75.37	74.94	75.07	76.46	71.51
72.83	52.38	77.08	50.42	139.81	8.00	162.29	15.00	136.09	9.17	74.60	75.33	75.12	75.03	76.64	71.44
72.83	52.01	77.21	49.97	140.35	8.12	162.72	15.00	136.53	9.25	74.78	75.23	75.29	75.00	76.81	71.37
72.83	51.72	77.56	49.78	140.90	7.85	163.58	15.00	136.97	9.11	74.95	75.13	75.46	74.93	77.03	71.24
72.83	51.29	77.74	49.29	140.90	7.95	163.58	15.00	137.27	9.11	75.12	75.09	75.68	74.89	77.25	71.20
72.83	51.09	77.78	49.04	140.43	8.31	163.58	15.00	137.27	9.19	75.30	75.11	75.85	74.88	77.42	71.16
72.83	51.05	77.52	49.28	142.00	8.44	164.45	15.00	137.57	9.50	75.47	75.02	75.99	74.81	77.55	71.12
72.83	51.73	77.34	49.74	142.08	8.25	164.89	15.00	137.87	9.35	75.65	74.95	76.11	74.79	77.68	71.07
72.83	52.29	76.73	50.35	143.13	7.95	165.77	15.00	138.17	9.28	75.73	74.93	76.25	74.75	77.82	71.06
72.83	52.59	76.26	50.56	143.86	7.91	166.67	15.00	138.78	9.29	75.86	74.91	76.33	74.73	77.77	71.14
72.83	52.75	75.82	50.53	144.10	7.86	167.59	15.00	139.16	9.15	75.69	74.84	75.90	75.18	76.85	72.38
72.83	53.73	75.60	51.69	144.02	7.75	167.13	15.00	139.01	8.99	75.47	74.84	75.68	75.27	76.46	72.84
72.83	54.10	75.43	52.02	142.88	7.79	166.22	15.00	139.01	8.91	75.26	74.90	75.46	75.28	76.20	73.07
72.83	54.23	75.56	52.05	143.45	7.76	166.67	15.00	138.70	9.06	75.08	74.91	75.25	75.34	75.94	73.31
72.83	54.10	75.43	51.86	143.29	7.59	166.67	15.00	138.63	8.91	74.95	74.96	75.12	75.38	75.77	73.50
72.83	54.03	75.34	51.86	142.88	7.36	166.22	15.00	138.63	8.67	74.91	74.87	75.03	75.49	75.64	73.60
72.83	53.70	75.12	51.65	142.32	7.29	164.89	15.00	137.72	8.58	74.91	74.78	74.94	75.51	75.55	73.68
72.83	53.87	74.87	51.65	142.64	7.30	165.33	15.00	137.95	8.62	74.91	74.63	74.90	75.48	75.46	73.76
72.83	53.87	74.91	51.72	142.24	7.43	165.77	15.00	137.87	8.66	74.78	74.68	74.77	75.52	75.33	73.83
72.83	53.92	74.74	51.73	142.32	7.37	165.77	15.00	137.95	8.59	74.48	74.76	74.55	75.50	75.12	73.90
72.83	54.22	74.52	52.06	142.40	7.31	165.77	15.00	137.87	8.58	74.48	74.67	74.47	75.57	75.03	73.95
72.83	54.05	74.00	52.26	141.61	7.38	164.89	15.00	137.50	8.58	74.26	74.65	74.30	75.38	74.81	73.89
72.83	54.64	74.00	52.38	141.69	7.26	164.89	15.00	137.35	8.50	74.00	74.74	74.12	75.39	74.68	73.85

72.83	54.64	73.91	52.47	141.45	7.29	164.89	15.00	137.20	8.49	73.87	74.78	73.99	75.38	74.55	73.84
72.83	54.78	73.74	52.62	141.06	7.27	164.01	15.00	136.97	8.49	73.70	74.85	73.86	75.36	74.38	73.82
72.83	55.06	73.61	52.97	140.51	7.40	164.01	15.00	136.46	8.56	73.52	74.92	73.69	75.40	74.25	73.83
72.83	55.23	73.48	53.07	139.96	7.47	163.14	15.00	136.09	8.55	73.40	74.96	73.52	75.38	74.08	73.87
72.83	55.65	73.35	53.59	139.50	7.50	162.72	15.00	135.65	8.62	73.22	75.03	73.39	75.43	73.95	73.86
72.83	56.14	73.22	54.10	139.81	7.43	162.72	15.00	135.58	8.62	73.09	75.04	73.26	75.41	73.82	73.87
72.83	56.23	73.09	54.08	139.58	7.39	162.72	15.00	135.58	8.58	72.92	75.05	73.08	75.45	73.69	73.89
72.83	56.30	72.96	54.20	139.42	7.35	162.72	15.00	135.43	8.54	72.79	75.10	72.96	75.46	73.56	73.90
72.83	56.42	72.88	54.34	139.19	7.42	162.29	15.00	135.28	8.62	72.66	75.11	72.83	75.48	73.39	73.91
72.83	56.47	72.75	54.35	139.58	7.21	162.72	15.00	135.50	8.47	72.53	75.13	72.70	75.49	73.30	73.93
72.83	56.56	72.70	54.43	139.35	7.21	162.72	15.00	135.43	8.46	72.40	75.14	72.57	75.51	73.17	73.95
72.83	56.50	72.66	54.38	139.12	7.34	162.72	15.00	135.14	8.54	72.27	75.13	72.48	75.50	73.04	73.93
72.83	56.59	72.57	54.43	138.28	7.40	161.87	15.00	134.63	8.60	72.19	75.15	72.35	75.51	72.96	73.90
72.83	56.55	72.53	54.40	138.43	7.39	161.45	15.00	134.56	8.60	72.10	75.14	72.26	75.50	72.87	73.89
72.83	56.64	72.53	54.49	137.90	7.50	161.45	15.00	134.27	8.60	72.01	75.16	72.18	75.47	72.78	73.88
72.83	57.94	72.88	56.15	138.36	7.46	161.45	15.00	134.34	8.60	71.93	75.15	72.09	75.48	72.70	73.87
72.83	57.15	73.05	54.87	137.90	7.55	161.03	15.00	133.91	8.67	71.84	75.14	72.01	75.50	72.65	73.86
72.83	56.81	73.48	54.43	137.98	7.59	161.03	15.00	133.49	8.89	71.97	74.89	72.05	75.51	72.70	73.87
72.83	56.58	73.65	54.29	138.28	7.63	161.45	15.00	133.84	8.90	71.93	75.00	72.09	75.46	72.74	73.78
72.83	56.52	73.65	54.43	138.51	7.64	161.87	15.00	133.99	8.82	71.93	75.03	72.09	75.46	72.78	73.73
72.83	56.40	73.74	54.20	138.74	7.40	162.29	15.00	134.70	8.61	71.97	75.01	72.14	75.40	72.83	73.68
72.83	56.15	73.78	53.79	138.51	7.27	161.87	15.00	134.63	8.53	72.01	75.01	72.18	75.38	72.87	73.62
72.83	55.82	73.83	53.56	138.28	7.39	161.45	15.00	134.70	8.53	72.06	74.99	72.22	75.35	72.91	73.60

72.83	55.46	74.09	53.07	138.36	7.21	161.45	15.00	134.70	8.45	72.06	74.96	72.26	75.36	72.96	73.58
72.83	55.31	74.09	53.06	138.28	7.16	161.45	15.00	134.70	8.38	72.10	74.94	72.31	75.31	73.00	73.55
72.83	56.38	73.96	54.41	138.58	7.06	161.45	15.00	134.78	8.38	72.14	74.91	72.35	75.28	73.04	73.47
72.83	56.55	73.70	54.56	138.51	7.13	161.45	15.00	134.78	8.38	72.19	74.89	72.39	75.26	73.08	73.41
72.83	56.64	73.70	54.50	138.43	7.17	161.03	15.00	134.78	8.38	72.27	74.81	72.44	75.20	73.17	73.42
72.83	57.73	73.83	55.35	138.51	7.10	161.45	15.00	134.78	8.38	72.27	74.81	72.44	75.20	73.13	73.42
72.83	57.39	73.96	55.09	138.89	7.25	161.45	15.00	134.92	8.46	72.23	74.80	72.44	75.20	73.08	73.44
72.83	57.56	73.74	55.18	139.35	7.22	161.87	15.00	135.43	8.54	72.32	74.73	72.48	75.21	73.17	73.42
72.83	57.75	73.52	55.24	139.96	7.14	162.72	15.00	135.94	8.43	72.36	74.73	72.52	75.18	73.26	73.40
72.83	58.00	73.40	55.41	140.51	7.07	163.14	15.00	136.38	8.40	72.49	74.57	72.70	75.15	73.39	73.42
72.83	58.18	73.14	55.67	141.06	6.98	163.58	15.00	137.05	8.26	72.70	74.45	72.87	75.02	73.56	73.29
72.83	58.72	73.09	55.96	141.53	6.86	164.45	15.00	137.57	8.12	72.66	74.56	72.83	75.02	73.47	73.34
72.83	58.93	72.83	56.10	141.76	6.79	164.89	15.00	138.02	8.05	72.57	74.73	72.83	75.07	73.43	73.39
72.83	58.96	72.66	56.22	141.21	6.94	164.45	15.00	137.80	8.12	72.53	74.84	72.74	75.15	73.34	73.47
72.83	58.92	72.49	56.18	141.06	6.78	164.45	15.00	137.65	8.04	72.49	74.92	72.70	75.18	73.30	73.47
72.83	58.85	72.44	56.02	141.06	6.80	164.01	15.00	137.50	8.04	72.40	74.97	72.65	75.20	73.26	73.55
72.83	59.00	72.40	56.39	140.66	6.85	164.01	15.00	136.97	8.03	72.32	75.02	72.52	75.24	73.13	73.62
72.83	59.03	72.32	56.40	140.59	7.08	163.58	15.00	136.90	8.22	72.23	75.07	72.44	75.32	73.00	73.70
72.83	58.84	72.23	56.13	140.04	6.98	163.14	15.00	136.46	8.17	72.10	75.20	72.31	75.36	72.91	73.75
72.83	58.68	72.14	56.05	139.50	7.04	162.72	15.00	135.87	8.24	72.01	75.24	72.22	75.41	72.83	73.77
72.83	58.36	72.23	55.83	139.04	7.37	161.87	15.00	135.50	8.54	71.93	75.29	72.14	75.43	72.74	73.78
72.83	58.33	72.14	56.03	138.28	7.58	161.45	15.00	135.36	8.54	71.80	75.34	72.05	75.48	72.65	73.83
72.83	58.42	72.01	56.19	137.53	7.34	161.03	15.00	134.85	8.30	71.76	75.30	72.01	75.48	72.61	73.83

72.83	58.41	71.88	56.19	137.38	7.20	161.03	15.00	134.56	8.22	71.71	75.36	71.96	75.44	72.57	73.77
72.83	58.51	71.71	56.33	136.78	7.22	160.61	15.00	134.27	8.18	71.67	75.32	71.92	75.44	72.52	73.73
72.83	58.50	71.54	56.32	136.12	7.28	159.79	15.00	133.91	8.21	71.58	75.34	71.88	75.43	72.48	73.76
72.83	58.59	71.45	56.39	135.83	7.34	159.79	15.00	133.56	8.28	71.50	75.36	71.79	75.45	72.39	73.78
72.83	58.79	71.37	56.67	135.90	7.31	159.38	15.00	133.27	8.27	71.41	75.38	71.66	75.47	72.26	73.79
72.83	58.97	71.28	56.89	135.53	7.44	158.98	15.00	132.92	8.34	71.28	75.42	71.58	75.51	72.18	73.84
72.83	59.18	71.20	57.08	134.95	7.51	158.57	15.00	132.50	8.45	71.20	75.41	71.49	75.50	72.09	73.83
72.83	59.48	71.11	57.42	134.66	7.59	158.17	15.00	132.15	8.56	71.11	75.43	71.40	75.52	72.01	73.88
72.83	59.74	71.02	57.69	134.45	7.69	157.77	15.00	131.87	8.63	71.02	75.39	71.32	75.51	71.92	73.87
72.83	59.79	70.94	57.70	134.30	7.72	157.77	15.00	131.87	8.63	70.98	75.45	71.23	75.53	71.83	73.89
72.83	60.03	70.85	58.00	134.45	7.64	157.77	15.00	131.73	8.63	70.89	75.50	71.15	75.58	71.79	73.91
72.83	60.21	70.81	58.16	134.81	7.61	157.77	15.00	131.73	8.63	70.81	75.54	71.06	75.60	71.66	73.96
72.83	60.27	70.72	58.20	134.88	7.49	157.77	15.00	131.66	8.55	70.72	75.53	70.97	75.59	71.62	73.95
72.83	60.39	70.72	58.35	134.81	7.53	157.77	15.00	131.45	8.63	70.64	75.50	70.93	75.62	71.53	73.97
72.83	60.47	70.68	58.39	134.88	7.66	157.77	15.00	131.18	8.77	70.59	75.58	70.85	75.63	71.45	73.99
72.83	60.44	70.64	58.38	134.52	7.81	157.38	15.00	131.11	8.77	70.51	75.60	70.76	75.65	71.40	74.02
72.83	60.35	70.64	58.25	135.02	7.75	158.17	15.00	130.90	8.92	70.47	75.59	70.76	75.65	71.36	73.98
72.83	60.31	70.81	58.23	135.24	8.01	158.57	15.00	131.66	9.16	70.42	75.62	70.67	75.67	71.32	73.98
72.83	60.03	70.98	57.56	135.17	7.97	158.17	15.00	131.66	9.09	70.38	75.58	70.63	75.67	71.27	73.98
72.83	59.06	71.33	56.60	135.24	8.03	158.17	15.00	131.52	9.16	70.38	75.58	70.63	75.67	71.32	73.95
72.83	57.93	71.80	55.38	135.17	8.02	158.17	15.00	131.59	9.16	70.42	75.59	70.67	75.64	71.32	73.92
72.83	57.55	71.84	55.32	135.53	8.03	158.57	15.00	131.87	9.17	70.47	75.56	70.67	75.64	71.36	73.87
72.83	57.32	72.10	55.10	135.90	8.06	158.57	15.00	131.94	9.25	70.51	75.40	70.76	75.60	71.49	73.77

72.83	56.63	72.27	54.23	135.83	8.18	158.57	15.00	132.08	9.33	70.59	75.40	70.85	75.52	71.58	73.69
72.83	56.20	72.44	53.86	136.12	8.10	158.98	15.00	132.22	9.25	70.68	75.36	70.93	75.50	71.66	73.64
72.83	55.81	72.62	53.39	136.19	8.15	158.98	15.00	132.29	9.33	70.81	75.28	71.02	75.48	71.79	73.57
72.83	55.30	72.83	52.79	136.56	8.11	159.38	15.00	132.57	9.33	70.89	75.24	71.15	75.41	71.92	73.49
72.83	55.00	73.01	52.57	137.01	8.14	159.79	15.00	132.99	9.34	71.02	75.19	71.27	75.39	72.05	73.45
72.83	54.92	73.22	52.49	137.23	8.17	160.20	15.00	133.35	9.35	71.15	75.15	71.45	75.33	72.22	73.38
72.83	54.47	73.48	52.04	137.68	8.33	160.61	15.00	133.70	9.36	71.28	75.11	71.58	75.28	72.35	73.33
72.83	54.15	73.70	51.66	138.05	8.20	160.61	15.00	133.99	9.36	71.41	75.03	71.70	75.24	72.48	73.26
72.83	53.83	74.60	50.98	138.28	8.17	161.03	15.00	134.13	9.36	71.58	74.99	71.83	75.20	72.65	73.22
72.83	52.86	75.43	50.14	138.28	8.15	160.61	15.00	134.20	9.36	71.76	74.90	72.01	75.16	72.83	73.15
72.83	51.95	76.30	49.42	139.04	8.04	161.45	15.00	134.78	9.30	71.97	74.81	72.22	75.09	73.04	73.06
72.83	54.90	75.12	53.35	139.65	7.91	162.29	15.00	135.50	9.16	72.27	74.64	72.52	75.01	73.39	72.92
72.83	55.77	74.78	54.00	140.27	7.75	162.72	15.00	136.16	9.02	72.70	74.42	72.96	74.91	73.82	72.79
72.83	55.34	74.56	53.28	140.98	7.63	163.58	15.00	136.90	8.87	72.96	74.45	73.17	74.88	73.99	72.75
72.83	54.98	74.30	52.90	140.66	7.54	163.58	15.00	137.05	8.72	73.05	74.49	73.26	74.89	74.08	72.82
72.83	55.12	74.09	52.98	140.59	7.50	163.58	15.00	137.12	8.65	73.09	74.55	73.30	74.92	74.08	72.88
72.83	55.51	73.96	53.41	140.59	7.50	163.58	15.00	137.12	8.57	73.09	74.58	73.34	74.96	74.08	72.94
72.83	55.70	73.91	53.74	139.96	7.98	163.14	15.00	136.83	8.95	73.14	74.64	73.34	74.99	74.08	72.99
72.83	55.95	73.87	54.02	139.27	7.97	162.72	15.00	136.38	8.94	73.09	74.67	73.30	75.07	74.03	73.11
72.83	56.02	73.65	54.04	113.25	15.95	127.43	15.00	121.43	11.77	73.22	74.54	73.39	75.08	74.12	73.15
72.83	56.04	73.48	54.06	108.75	21.34	113.59	23.35	94.61	34.76	73.31	74.55	73.43	75.08	74.16	73.21
72.83	56.46	73.35	54.52	124.64	13.81	135.76	15.00	113.84	20.40	73.18	74.68	73.34	75.04	74.03	73.22
72.83	56.64	73.18	54.73	129.43	11.81	144.76	15.00	121.43	16.14	73.05	74.84	73.21	75.12	73.90	73.33

72.83	56.84	73.05	54.92	132.04	10.93	149.90	15.00	125.64	14.11	72.88	74.96	73.08	75.19	73.73	73.45
				133.59	10.18	153.16	15.00	128.26	12.90	72.75	75.01	73.00	75.24	73.60	73.50
				135.24	9.65	156.20	15.00	129.94	11.95	72.66	75.11	72.91	75.26	73.52	73.55
				137.30	8.91	158.98	15.00	131.73	11.23						
				138.58	8.56	161.03	15.00	133.35	10.65						
				139.04	8.27	161.87	15.00	134.27	10.21						
				139.19	8.09	161.87	15.00	134.63	9.91						
				138.89	8.02	161.87	15.00	134.49	9.75						
				139.04	7.88	162.29	15.00	134.42	9.60						
				139.12	7.88	162.72	15.00	134.63	9.53						
				138.74	8.05	162.29	15.00	134.49	9.60						
				138.89	7.95	162.29	15.00	134.63	9.53						
				139.04	7.99	162.72	15.00	134.78	9.49						
				139.19	8.02	162.72	15.00	134.63	9.53						
				139.19	8.02	162.72	15.00	134.70	9.53						
				139.19	8.04	162.72	15.00	134.63	9.49						
				138.81	8.11	162.29	15.00	134.34	9.52						
				138.89	8.09	162.29	15.00	134.27	9.60						
				138.74	8.09	162.29	15.00	134.27	9.52						
				139.04	8.08	162.72	15.00	134.20	9.56						
				139.42	7.94	162.72	15.00	134.42	9.44						
				139.42	8.04	162.72	15.00	134.42	9.52						
				139.89	7.95	163.14	15.00	134.63	9.53						

				139.81	8.02	163.58	15.00	134.99	9.46								
				139.96	8.07	163.58	15.00	134.92	9.53								
				139.73	8.12	163.14	15.00	134.78	9.60								
				138.97	8.41	162.72	15.00	134.27	9.75								
				141.06	7.90	164.89	15.00	135.94	9.47								
				139.89	8.15	163.58	15.00	135.21	9.54								
				139.50	8.35	162.72	15.00	134.70	9.68								
				139.58	8.26	162.72	15.00	134.70	9.68								
				139.58	8.19	162.29	15.00	134.70	9.68								
				139.81	8.16	162.72	15.00	134.92	9.61								
				140.12	8.15	162.72	15.00	135.07	9.53								
				140.51	8.07	163.58	15.00	135.36	9.54								
				141.45	8.01	164.45	15.00	136.02	9.47								
				142.40	7.96	165.33	15.00	136.68	9.49								
				142.32	8.23	165.33	15.00	136.83	9.64								
				143.45	8.42	166.22	15.00	137.42	10.04								
				144.10	8.47	166.67	15.00	138.10	9.97								
				144.18	8.08	166.67	15.00	138.40	9.63								
				144.02	8.18	166.67	15.00	138.25	9.67								
				143.69	8.04	166.67	15.00	137.87	9.66								
				143.37	8.16	165.77	15.00	137.57	9.66								
				143.04	8.33	167.59	15.00	137.80	9.66								
				143.37	8.08	167.59	15.00	138.10	9.51								

				142.80	8.27	167.13	15.00	138.17	9.44								
				143.45	7.99	167.13	15.00	138.40	9.44								
				143.53	8.14	167.13	15.00	138.40	9.44								
				143.69	7.79	167.59	15.00	138.32	9.21								
				143.29	7.71	167.13	15.00	138.17	9.13								
				142.88	7.79	166.67	15.00	137.80	9.12								
				142.32	7.78	165.77	15.00	137.27	9.19								
				142.24	7.87	166.22	15.00	137.42	9.19								
				142.48	7.96	166.22	15.00	137.72	9.27								
				142.40	7.99	166.22	15.00	137.65	9.27								
				142.32	7.94	166.22	15.00	137.42	9.27								
				141.84	8.05	165.77	15.00	137.20	9.34								
				141.76	8.12	165.77	15.00	137.35	9.27								
				141.69	8.03	165.77	15.00	137.12	9.26								
				141.21	8.22	164.89	15.00	136.46	9.44								
				140.74	8.34	164.45	15.00	135.94	9.63								
				140.66	8.35	164.01	15.00	135.50	9.70								
				140.20	8.33	163.58	15.00	135.21	9.69								
				140.43	8.28	163.58	15.00	135.21	9.69								
				139.73	8.41	162.72	15.00	134.20	9.90								
				140.35	8.35	163.58	15.00	134.78	9.83								
				140.82	8.27	164.01	15.00	135.50	9.77								
				139.42	8.69	163.14	15.00	135.58	9.70								

				138.43	8.87	162.72	15.00	135.72	9.62								
				138.28	8.87	162.29	15.00	135.72	9.55								
				138.13	8.83	162.29	15.00	135.80	9.47								
				138.21	8.78	162.29	15.00	135.87	9.47								
				138.36	8.78	162.29	15.00	135.94	9.40								
				138.51	8.67	162.72	15.00	136.02	9.40								
				138.81	8.61	162.72	15.00	136.23	9.32								
				139.04	8.63	163.14	15.00	136.38	9.33								
				139.35	8.58	163.14	15.00	136.68	9.29								
				139.58	8.58	163.58	15.00	136.83	9.34								
				139.58	8.57	164.01	15.00	137.12	9.26								
				140.12	8.51	164.01	15.00	137.20	9.27								
				140.27	8.37	164.01	15.00	137.20	9.19								
				139.89	8.35	164.01	15.00	137.35	9.11								
				140.27	8.30	164.45	15.00	137.65	9.04								
				140.27	8.39	164.45	15.00	137.95	9.05								
				140.43	8.48	164.45	15.00	138.10	9.13								
				140.98	8.37	164.89	15.00	138.63	8.98								
				141.69	8.17	165.77	15.00	139.16	8.88								
				141.45	8.18	165.77	15.00	139.16	8.84								
				141.06	8.46	165.33	15.00	138.86	8.99								
				140.98	8.35	165.33	15.00	138.78	8.99								
				140.74	8.80	164.45	15.00	138.48	9.37								

				140.51	8.61	164.45	15.00	138.25	9.21								
				140.04	8.55	164.01	15.00	138.02	9.20								
				139.96	8.41	164.01	15.00	137.72	9.12								
				139.42	8.35	163.14	15.00	137.35	9.04								
				140.66	8.16	164.45	15.00	137.35	9.11								
				140.51	8.03	164.89	15.00	137.35	9.00								
				140.51	7.87	164.45	15.00	136.90	8.95								
				140.20	7.78	164.01	15.00	136.16	9.02								
				139.96	7.81	163.58	15.00	135.94	8.93								
				139.96	7.65	163.58	15.00	136.02	8.86								
				139.65	7.66	163.58	15.00	135.21	8.92								
				139.65	7.68	163.14	15.00	135.14	8.96								
				139.73	7.58	163.14	15.00	135.21	8.88								
				139.58	7.61	163.14	15.00	135.14	8.88								
				139.19	7.72	162.72	15.00	134.63	8.99								
				139.35	7.70	163.14	15.00	134.56	9.06								
				138.89	7.88	162.72	15.00	134.70	9.07								
				138.66	7.93	162.29	15.00	134.27	9.21								
				138.81	7.90	162.29	15.00	134.20	9.21								
				138.81	7.90	162.29	15.00	133.99	9.28								
				139.04	7.86	163.14	15.00	134.34	9.21								
				138.81	7.93	162.29	15.00	133.77	9.36								
				138.74	8.00	162.29	15.00	133.49	9.43								

				138.66	8.26	161.87	15.00	133.49	9.66								
				136.86	8.75	161.03	15.00	133.49	9.58								
				136.71	8.80	161.03	15.00	134.13	9.52								
				137.15	8.81	161.03	15.00	134.49	9.52								
				137.30	8.80	161.45	15.00	134.70	9.45								
				137.60	8.78	161.87	15.00	135.07	9.42								
				137.68	8.73	161.87	15.00	135.21	9.38								
				138.21	8.56	162.29	15.00	135.50	9.31								
				138.36	8.57	162.72	15.00	135.87	9.24								
				138.74	8.48	162.72	15.00	136.09	9.25								
				138.74	8.56	163.14	15.00	136.23	9.25								
				138.89	8.53	162.72	15.00	136.31	9.25								
				139.12	8.51	163.14	15.00	136.38	9.25								
				139.50	8.36	163.58	15.00	136.83	9.10								
				139.89	8.42	163.58	15.00	136.97	9.18								
				140.27	8.39	164.01	15.00	137.27	9.11								
				140.66	8.31	164.89	15.00	137.80	9.04								
				141.53	7.95	165.33	15.00	138.32	8.86								
				141.92	8.03	166.22	15.00	139.09	8.76								
				142.16	8.02	165.77	15.00	139.62	8.77								
				142.64	7.99	166.67	15.00	140.01	8.78								
				142.96	7.83	167.13	15.00	140.40	8.55								
				142.08	8.15	166.22	15.00	139.93	8.77								

				141.61	8.38	166.22	15.00	139.47	8.92								
				141.29	8.39	165.77	15.00	139.32	8.92								
				141.37	8.37	165.77	15.00	139.24	8.99								
				140.90	8.58	164.89	15.00	138.70	9.06								
				140.51	8.57	164.89	15.00	138.40	9.06								
				139.89	8.61	164.01	15.00	137.95	9.12								
				140.98	8.20	165.33	15.00	138.02	9.13								
				142.96	7.84	166.67	15.00	138.48	9.06								
				142.40	7.90	166.22	15.00	137.87	9.12								
				142.16	7.85	166.22	15.00	137.95	9.05								
				142.24	7.72	166.22	15.00	137.57	9.04								
				142.48	7.59	166.67	15.00	137.80	8.97								
				142.24	7.67	166.22	15.00	137.80	8.89								
				141.92	7.67	166.22	15.00	137.50	8.96								
				141.53	7.71	165.77	15.00	137.12	8.99								
				141.53	7.75	165.77	15.00	136.90	9.03								
				141.53	7.73	165.77	15.00	137.12	9.03								
				140.98	7.85	165.33	15.00	136.68	9.02								
				140.59	7.94	164.45	15.00	135.94	9.17								
				140.74	7.84	164.45	15.00	136.09	9.09								
				140.59	7.80	164.45	15.00	136.02	9.17								
				140.82	7.82	164.89	15.00	135.87	9.16								
				140.27	7.94	164.01	15.00	135.36	9.23								

				140.51	7.91	164.45	15.00	135.43	9.23								
				139.96	7.93	164.01	15.00	135.14	9.30								
				139.73	8.02	163.14	15.00	134.70	9.37								
				140.27	8.24	164.01	15.00	134.92	9.68								
				138.13	8.58	162.72	15.00	135.50	9.31								
				137.90	8.68	162.72	15.00	135.65	9.24								
				138.05	8.59	162.29	15.00	135.58	9.27								
				138.21	8.56	162.72	15.00	135.94	9.24								
				138.58	8.62	162.72	15.00	136.09	9.25								
				138.58	8.59	163.14	15.00	136.09	9.25								
				138.81	8.58	163.14	15.00	136.38	9.25								
				139.35	8.57	163.58	15.00	136.53	9.25								
				139.42	8.62	164.01	15.00	136.90	9.26								
				139.73	8.57	164.01	15.00	137.20	9.27								
				140.12	8.42	164.01	15.00	137.42	9.15								
				140.59	8.37	164.89	15.00	137.72	9.12								
				140.66	8.41	164.89	15.00	138.02	9.05								
				141.13	8.26	165.33	15.00	138.10	9.05								
				141.06	8.23	165.33	15.00	138.25	8.98								
				141.06	8.17	165.33	15.00	138.32	8.90								
				141.37	8.24	165.77	15.00	139.01	8.91								
				140.74	8.41	165.33	15.00	140.01	8.62								
				140.51	8.32	165.33	15.00	139.85	8.62								

				140.27	8.23	164.89	15.00	139.78	8.50								
				140.04	8.30	164.89	15.00	139.70	8.62								
				139.73	8.42	164.45	15.00	139.78	8.62								
				140.12	8.42	164.89	15.00	140.01	8.54								
				140.20	8.25	164.45	15.00	140.01	8.54								
				139.81	8.30	164.01	15.00	139.62	8.54								
				138.97	8.40	163.58	15.00	139.32	8.53								
				138.97	8.46	163.58	15.00	138.78	8.60								
				139.73	8.19	164.01	15.00	139.09	8.53								
				139.19	8.22	164.01	15.00	138.93	8.52								
				138.81	8.35	163.58	15.00	138.63	8.67								
				138.81	8.18	164.45	15.00	138.32	8.59								
				139.27	8.20	163.58	15.00	138.40	8.59								
				138.89	8.21	163.58	15.00	138.48	8.59								
				138.97	8.18	163.58	15.00	138.40	8.52								
				138.51	8.26	163.58	15.00	138.17	8.59								
				138.05	8.31	162.72	15.00	137.80	8.66								
				137.75	8.53	162.72	15.00	137.65	8.81								
				137.90	8.58	162.29	15.00	137.42	8.88								
				137.75	8.55	161.87	15.00	137.27	8.88								
				137.90	8.51	162.29	15.00	137.20	8.88								
				137.98	8.47	162.29	15.00	137.20	8.88								
				138.13	8.44	162.29	15.00	137.35	8.81								

				137.83	8.51	162.29	15.00	137.20	8.80								
				137.90	8.40	162.29	15.00	137.27	8.80								
				137.15	8.49	161.87	15.00	136.83	8.87								
				137.53	8.47	162.29	15.00	136.83	8.87								
				137.53	8.54	161.87	15.00	136.60	8.87								
				138.51	8.67	162.72	15.00	136.68	9.18								
				137.60	8.78	162.29	15.00	137.27	8.96								
				137.38	8.85	162.29	15.00	137.42	8.96								
				137.45	8.80	162.29	15.00	137.35	8.96								
				138.05	8.67	162.29	15.00	137.65	8.89								
				138.28	8.59	163.14	15.00	137.80	8.89								
				137.30	8.83	162.29	15.00	137.65	8.81								
				137.53	8.72	162.29	15.00	137.65	8.81								
				137.38	8.71	162.29	15.00	137.65	8.81								
				137.45	8.77	162.29	15.00	137.80	8.81								
				137.53	8.94	161.87	15.00	137.72	8.97								
				137.30	8.89	161.87	15.00	137.72	8.97								
				137.23	8.96	161.87	15.00	137.65	8.97								
				137.45	9.16	162.29	15.00	134.13	9.90								
				137.15	9.23	162.29	15.00	133.70	9.97								
				139.27	8.56	163.58	15.00	133.27	10.04								
				139.81	8.40	164.45	15.00	133.13	10.03								
				139.19	8.55	163.58	15.00	134.63	9.76								

				134.23	9.61	163.14	15.00	136.31	9.25								
				132.81	9.86	162.72	15.00	139.62	8.77								
				132.04	10.07	163.14	15.00	139.93	8.54								
				130.45	10.34	162.29	15.00	138.32	8.75								
				130.04	10.38	161.45	15.00	137.05	8.95								
				130.59	10.22	161.87	15.00	136.60	9.02								
				131.00	10.18	162.29	15.00	136.31	9.13								
				130.52	10.25	161.87	15.00	135.72	9.24								
				130.45	10.24	161.45	15.00	135.28	9.23								
				130.59	10.10	161.45	15.00	134.99	9.30								
				132.32	9.68	162.29	15.00	135.50	9.23								
				132.74	9.59	162.72	15.00	136.02	9.09								
				132.88	9.58	162.72	15.00	135.94	9.09								
				132.74	9.54	163.14	15.00	135.94	9.01								
				132.25	9.60	162.72	15.00	135.72	9.08								
				132.81	9.49	162.72	15.00	135.87	9.01								
				132.67	9.45	162.72	15.00	135.94	9.01								
				132.46	9.55	162.72	15.00	135.87	9.01								
				132.53	9.54	162.29	15.00	135.80	9.01								
				132.04	9.70	162.72	15.00	135.65	9.08								
				132.46	9.55	162.72	15.00	135.58	9.08								
				132.25	9.65	162.29	15.00	135.58	9.16								
				131.97	9.70	162.29	15.00	135.43	9.16								

				131.97	9.76	161.87	15.00	135.28	9.23								
				132.04	9.69	161.87	15.00	135.21	9.23								
				132.18	9.79	161.87	15.00	135.07	9.23								
				131.00	9.97	161.45	15.00	134.78	9.30								
				131.76	9.81	161.87	15.00	134.85	9.30								
				131.62	9.79	161.87	15.00	134.99	9.23								
				131.55	9.82	161.87	15.00	134.78	9.30								
				131.14	9.90	161.87	15.00	134.06	9.44								
				132.95	9.42	162.29	15.00	133.84	9.51								
				133.52	9.19	163.58	15.00	133.91	9.44								
				134.74	8.80	164.01	15.00	134.27	9.29								
				133.80	9.12	164.01	15.00	134.34	9.29								
				133.66	9.10	164.45	15.00	134.34	9.37								
				134.23	8.89	164.45	15.00	134.56	9.26								
				133.59	9.08	164.45	15.00	134.85	9.15								
				134.30	8.90	165.33	15.00	135.28	9.08								
				134.02	8.90	164.89	15.00	135.65	8.93								
				133.66	8.97	164.45	15.00	135.65	8.93								
				133.73	9.07	164.45	15.00	135.65	8.93								
				134.09	8.93	164.89	15.00	135.80	8.97								
				134.30	8.85	164.89	15.00	135.87	8.93								
				135.32	8.85	165.77	15.00	136.23	8.94								
				136.12	8.67	166.22	15.00	136.60	8.95								

				136.71	8.70	166.67	15.00	136.97	8.95								
				135.90	9.37	167.13	15.00	137.57	9.12								
				135.75	9.33	167.13	15.00	137.95	9.05								
				134.59	9.52	165.77	15.00	137.65	8.97								
				133.94	9.53	165.33	15.00	137.50	8.96								
				133.59	9.48	165.33	15.00	137.42	8.88								
				133.52	9.49	165.33	15.00	137.42	8.81								
				134.66	9.24	165.77	15.00	137.57	8.89								
				134.81	9.21	165.77	15.00	137.65	8.89								
				133.73	9.38	165.33	15.00	137.57	8.85								
				133.23	9.34	164.45	15.00	137.27	8.80								
				133.09	9.44	164.01	15.00	137.12	8.88								
				132.81	9.63	164.01	15.00	137.27	8.88								
				132.74	9.47	164.01	15.00	137.12	8.84								

11.6. Weight Measurements

Acrysol 5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
1.00			1.00			1.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	23.81		BT	27.79		BT	26.86	
PT	23.89	0.08	PT	27.85	0.06	PT	26.95	0.09
P(AG)	23.90	0.01	P(AG)	27.92	0.07	P(AG)	26.96	0.01
1.10			1.10			1.10		
BT	27.92		BT	25.51		BT	24.49	
PT	28.00	0.08	PT	25.56	0.05	PT	24.56	0.07
P(AG)	28.00	0.00	P(AG)	25.63	0.07	P(AG)	24.57	0.01
1.20			1.20			1.20		
BT	27.71		BT	27.17		BT	24.47	
PT	27.80	0.09	PT	27.25	0.08	PT	24.52	0.05
P(AG)	27.81	0.01	P(AG)	27.31	0.06	P(AG)	24.53	0.01

Acrysol 7.5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
2.00			2.00			2.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	22.54		BT	27.00		BT	23.45	
PT	22.61	0.07	PT	27.07	0.07	PT	23.51	0.06
P(AG)	22.61	0.00	P(AG)	27.13	0.06	P(AG)	23.50	-0.01
2.10			2.10			2.10		
BT	24.36		BT	21.25		BT	20.48	
PT	24.45	0.09	PT	21.30	0.05	PT	20.55	0.07
P(AG)	24.45	0.00	P(AG)	21.35	0.05	P(AG)	20.55	0.00
2.20			2.20			2.20		
BT	27.12		BT	22.84		BT	22.52	
PT	27.23	0.11	PT	22.90	0.06	PT	22.60	0.08
P(AG)	27.22	-0.01	P(AG)	22.95	0.05	P(AG)	22.60	0.00

Aquazol 5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
1.00			1.00			1.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	22.61		BT	21.03		BT	26.25	
PT	22.71	0.10	PT	21.12	0.09	PT	26.36	0.11
P(AG)	22.71	0.00	P(AG)	21.17	0.05	P(AG)	26.36	0.00
1.10			1.10			1.10		
BT	22.87		BT	26.84		BT	23.57	
PT	23.00	0.13	PT	26.95	0.11	PT	23.67	0.10
P(AG)	23.00	0.00	P(AG)	27.00	0.05	P(AG)	23.69	0.02
1.20			1.20			1.20		
BT	27.21		BT	25.10		BT	27.03	
PT	27.33	0.12	PT	25.21	0.11	PT	27.14	0.11
P(AG)	27.34	0.01	P(AG)	25.26	0.05	P(AG)	27.15	0.01

Aquazol 7.5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
2.00			2.00			2.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	23.29		BT	28.42		BT	21.89	
PT	23.44	0.15	PT	28.55	0.13	PT	22.03	0.14
P(AG)	23.43	-0.01	P(AG)	28.60	0.05	P(AG)	22.03	0.00
2.10			2.10			2.10		
BT	22.05		BT	29.14		BT	23.00	
PT	22.20	0.15	PT	29.27	0.13	PT	23.15	0.15
P(AG)	22.19	-0.01	P(AG)	29.33	0.06	P(AG)	23.15	0.00
2.20			2.20			2.20		
BT	20.63		BT	30.08		BT	23.52	
PT	20.78	0.15	PT	30.23	0.15	PT	23.65	0.13
P(AG)	20.79	0.01	P(AG)	30.29	0.06	P(AG)	23.66	0.01

Jade 5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
1.00			1.00			1.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	26.82		BT	27.47		BT	27.28	
PT	26.92	0.10	PT	27.55	0.08	PT	27.35	0.07
P(AG)	26.92	0.00	P(AG)	27.61	0.06	P(AG)	27.35	0.00
1.10			1.10			1.10		
BT	21.66		BT	26.42		BT	20.61	
PT	21.75	0.09	PT	26.45	0.03	PT	20.66	0.05
P(AG)	21.76	0.01	P(AG)	26.51	0.06	P(AG)	20.67	0.01
1.20			1.20			1.20		
BT	21.91		BT	28.04		BT	23.72	
PT	22.02	0.11	PT	28.08	0.04	PT	23.78	0.06
P(AG)	22.00	-0.02	P(AG)	28.15	0.07	P(AG)	23.80	0.02

Jade 7.5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
2.00			2.00			2.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	24.98		BT	22.48		BT	22.66	
PT	25.10	0.12	PT	22.58	0.10	PT	22.73	0.07
P(AG)	25.11	0.01	P(AG)	22.62	0.04	P(AG)	22.74	0.01
2.10			2.10			2.10		
BT	22.52		BT	23.89		BT	27.00	
PT	22.64	0.12	PT	23.96	0.07	PT	27.08	0.08
P(AG)	22.65	0.01	P(AG)	23.97	0.01	P(AG)	27.09	0.01
		0.13			0.08			0.09
2.20			2.20			2.20		
BT	17.78		BT	27.14		BT	27.21	
PT	17.87	0.09	PT	27.24	0.10	PT	27.31	0.10
P(AG)	17.88	0.01	P(AG)	27.30	0.06	P(AG)	27.33	0.02

Ethulose .5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
1.00			1.00			1.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	26.12		BT	28.52		BT	21.72	
PT	26.22	0.10	PT	28.58	0.06	PT	21.77	0.05
P(AG)	26.23	0.01	P(AG)	28.64	0.06	P(AG)	21.77	0.00
1.10			1.10			1.10		
BT	23.51		BT	26.65		BT	26.58	
PT	23.61	0.10	PT	26.71	0.06	PT	26.66	0.08
P(AG)	23.62	0.01	P(AG)	26.75	0.04	P(AG)	26.67	0.01
1.20			1.20			1.20		
BT	22.76		BT	23.46		BT	23.98	
PT	22.85	0.09	PT	23.54	0.08	PT	24.03	0.05
P(AG)	22.85	0.00	P(AG)	23.59	0.05	P(AG)	24.04	0.01

Ethulose 1%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
2.00			2.00			2.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	22.68		BT	25.97		BT	19.82	
PT	22.77	0.09	PT	26.05	0.08	PT	19.89	0.07
P(AG)	22.78	0.01	P(AG)	26.10	0.05	P(AG)	19.90	0.01
2.10			2.10			2.10		
BT	24.93		BT	22.10		BT	28.04	
PT	25.02	0.09	PT	22.15	0.05	PT	28.12	0.08
P(AG)	25.04	0.02	P(AG)	22.20	0.05	P(AG)	28.11	-0.01
2.20			2.20			2.20		
BT	21.20		BT	21.72		BT	25.46	
PT	21.27	0.07	PT	21.79	0.07	PT	25.54	0.08
P(AG)	21.29	0.02	P(AG)	21.84	0.05	P(AG)	25.55	0.01

Methylcellulose .5%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
1.00			1.00			1.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	22.92		BT	28.39		BT	21.62	
PT	23.00	0.08	PT	28.45	0.06	PT	21.68	0.06
P(AG)	23.00	0.00	P(AG)	28.52	0.07	P(AG)	21.68	0.00
1.10			1.10			1.10		
BT	23.03		BT	28.95		BT	20.17	
PT	23.12	0.09	PT	29.02	0.07	PT	20.22	0.05
P(AG)	23.12	0.00	P(AG)	29.07	0.05	P(AG)	20.23	0.01
1.20			1.20			1.20		
BT	23.60		BT	28.94		BT	20.67	
PT	23.70	0.10	PT	29.02	0.08	PT	20.70	0.03
P(AG)	23.71	0.01	P(AG)	29.09	0.07	P(AG)	20.70	0.00

Methylcellulose 1%								
CONTROL			RELATIVE HUMIDITY			TEMPERATURE		
2.00			2.00			2.00		
	weight (g)	weight chg (g)		weight (g)	weight chg (g)		weight (g)	weight chg (g)
BT	21.18		BT	25.73		BT	25.96	
PT	21.28	0.10	PT	25.84	0.11	PT	26.03	0.07
P(AG)	21.29	0.01	P(AG)	25.89	0.05	P(AG)	26.03	0.00
2.10			2.10			2.10		
BT	23.44		BT	19.97		BT	19.85	
PT	23.55	0.11	PT	20.05	0.08	PT	19.91	0.06
P(AG)	23.56	0.01	P(AG)	20.10	0.05	P(AG)	19.91	0.00
2.20			2.20			2.20		
BT	24.71		BT	20.31		BT	20.94	
PT	24.82	0.11	PT	20.39	0.08	PT	21.00	0.06
P(AG)	24.82	0.00	P(AG)	20.44	0.05	P(AG)	21.00	0.00

11.7. Colorimetry Data: XYZ Measurements

	BT Control - XYZ			BT Temperature - XYZ			BT Relative Humidity - XYZ		
	x	y	z	x	y	z	x	y	z
Ac 1.0	26.60	23.82	12.56	27.61	24.83	13.20	26.88	23.97	12.53
Ac 1.0	28.06	25.12	12.16	27.01	24.10	12.36	27.52	24.62	13.01
Ac 1.1	27.27	24.53	12.31	25.52	22.89	12.09	27.04	24.12	12.66
Ac 1.1	27.64	24.75	13.15	26.92	24.13	12.76	28.17	25.16	13.26
Ac 1.2	28.59	25.65	13.75	26.26	23.54	12.52	26.26	23.53	12.55
Ac 1.2	28.52	25.52	13.54	27.27	24.32	12.60	26.83	24.04	12.71
Ac 2.0	26.88	23.92	12.40	26.98	24.13	12.69	26.55	23.66	12.29
Ac 2.0	26.72	23.81	12.33	27.83	24.86	12.99	27.06	24.15	12.63
Ac 2.1	26.16	23.39	12.24	27.56	24.64	12.95	26.40	23.45	12.02
Ac 2.1	26.62	23.76	12.38	27.55	24.61	12.94	26.84	23.94	12.37
Ac 2.2	26.58	23.86	12.75	27.47	24.77	13.46	27.63	24.65	12.74
Ac 2.2	27.16	24.27	12.67	28.57	25.53	13.38	28.29	25.22	13.00
Aq 1.0	27.62	24.70	12.17	27.48	24.59	12.86	26.22	23.41	12.33
Aq 1.0	29.14	26.06	13.77	27.98	24.95	12.80	27.06	24.21	12.94
Aq 1.1	28.58	25.64	13.68	28.52	25.62	13.70	25.83	23.08	12.16
Aq 1.1	29.42	26.36	13.97	29.34	26.26	13.78	26.98	24.04	12.54
Aq 1.2	30.38	27.26	14.50	28.60	25.59	13.46	27.24	24.34	12.92
Aq 1.2	30.11	26.95	14.14	28.98	25.85	13.46	26.83	23.96	12.70
Aq 2.0	26.52	23.70	12.46	28.18	25.21	13.35	27.70	24.73	12.73
Aq 2.0	27.77	24.85	12.99	27.27	24.35	12.80	27.88	24.87	12.84
Aq 2.1	27.23	24.30	12.72	27.11	24.38	13.22	26.79	23.89	12.39
Aq 2.1	26.96	24.05	12.59	28.00	25.04	13.22	27.24	24.36	12.74
Aq 2.2	27.91	24.82	12.67	26.68	23.89	12.78	27.64	24.64	12.78
Aq 2.2	27.21	24.15	12.28	28.30	25.32	13.42	26.75	23.91	12.60
J 1.0	28.79	25.84	13.89	27.92	25.06	13.35	26.26	23.47	12.49
J 1.0	29.65	26.51	13.96	28.30	25.37	13.50	27.71	24.76	13.06
J 1.1	28.89	25.75	13.47	29.33	26.50	14.58	28.39	25.38	13.42

J 1.1	29.62	26.50	13.94	28.81	25.88	13.88	28.43	25.42	13.48
J 1.2	30.02	26.83	13.97	27.26	24.38	12.96	27.97	24.94	13.06
J 1.2	29.93	26.77	13.97	27.24	24.39	12.98	28.96	25.63	13.43
J 2.0	27.05	24.15	12.68	27.10	24.25	12.79	25.57	22.82	11.88
J 2.0	26.81	23.92	12.50	27.81	24.86	12.96	25.48	22.74	11.87
J 2.1	26.51	23.76	12.57	27.80	24.82	12.89	26.47	23.59	12.28
J 2.1	27.41	24.52	12.78	28.70	25.69	13.45	26.77	23.87	12.39
J 2.2	26.76	23.84	12.42	28.14	25.18	13.34	26.01	23.33	12.49
J 2.2	27.32	24.36	12.71	27.85	24.92	13.15	26.95	24.10	12.69
E 1.0	28.69	25.73	13.73	28.62	25.60	13.45	27.16	24.25	12.86
E 1.0	28.61	25.60	13.67	29.14	26.08	13.73	27.92	25.00	13.33
E 1.1	29.71	26.67	14.36	28.61	25.67	13.78	27.78	24.73	12.89
E 1.1	30.88	27.79	15.11	28.94	25.86	13.67	27.58	24.66	13.12
E 1.2	29.09	26.05	13.76	27.04	24.32	13.27	26.28	23.55	12.63
E 1.2	30.46	27.30	14.40	27.09	24.27	13.02	28.09	25.07	13.17
E 2.0	26.85	24.02	12.66	28.73	25.83	13.82	25.95	23.26	12.31
E 2.0	27.22	24.24	12.53	28.82	25.77	13.44	26.06	23.28	12.25
E 2.1	27.25	24.40	12.85	27.95	25.02	13.06	26.89	23.98	12.42
E 2.1	27.25	24.32	12.62	28.68	25.67	13.40	26.80	23.95	12.55
E 2.2	26.95	24.06	12.65	28.37	25.48	13.58	26.94	24.09	12.66
E 2.2	26.94	24.08	12.67	28.25	25.32	13.36	26.35	23.56	12.43
M 1.0	28.42	25.47	13.63	29.87	26.60	12.72	27.38	24.42	12.80
M 1.0	29.69	26.61	14.13	29.01	25.96	13.64	28.33	25.30	13.27
M 1.1	29.70	26.67	14.30	27.95	25.13	13.65	27.30	24.39	12.91
M 1.1	30.86	27.70	14.85	29.21	26.16	13.95	27.66	24.74	13.13
M 1.2	29.83	26.73	14.32	29.52	26.50	14.22	28.42	25.39	13.34
M 1.2	30.38	27.27	14.66	28.98	25.98	13.78	28.66	25.71	13.80
M 2.0	27.12	24.27	12.88	26.43	23.65	12.39	27.69	24.68	12.76
M 2.0	27.83	24.92	13.12	26.50	23.77	12.60	27.26	24.42	12.86
M 2.1	27.17	24.38	12.91	27.10	24.20	12.67	26.75	23.86	12.53

M 2.1	27.29	24.43	12.72	27.44	24.55	12.89	26.33	23.54	12.38
M 2.2	25.40	22.74	12.06	27.02	24.10	12.48	27.39	24.43	12.72
M 2.2	26.28	23.46	12.24	27.71	24.72	12.77	26.43	23.56	12.35

	PT Control - XYZ			PT Temperature - XYZ			PT Relative Humidity - XYZ		
	x	y	z	x	y	z	x	y	z
Ac 1.0	23.71	21.15	11.51	22.74	20.21	11.22	25.44	22.72	12.33
Ac 1.0	23.28	20.76	11.35	23.86	21.26	11.62	24.95	22.32	12.19
Ac 1.1	22.26	19.89	10.90	22.93	20.50	11.58	24.73	22.03	11.84
Ac 1.1	22.88	20.46	11.07	24.45	21.99	12.65	25.13	22.37	12.06
Ac 1.2	22.51	20.03	10.90	23.97	21.48	12.16	24.53	21.86	11.87
Ac 1.2	23.38	20.94	11.63	24.96	22.40	12.62	24.92	22.29	12.21
Ac 2.0	23.87	21.22	11.58	22.51	19.95	10.90	22.70	20.02	10.66
Ac 2.0	24.58	21.94	12.10	22.90	20.22	10.86	23.68	21.00	11.25
Ac 2.1	23.43	20.88	11.45	22.21	19.65	10.70	22.64	19.99	10.60
Ac 2.1	23.75	21.20	11.63	23.01	20.46	11.26	22.69	20.03	10.64
Ac 2.2	23.77	21.31	12.05	21.50	18.98	10.35	22.73	20.03	10.57
Ac 2.2	23.81	21.17	11.59	22.38	19.78	10.65	22.89	20.19	10.64
Aq 1.0	24.38	21.89	11.90	27.22	24.45	13.26	27.19	24.29	12.74
Aq 1.0	26.08	23.42	12.61	26.83	24.01	12.87	27.04	24.22	13.01
Aq 1.1	24.95	22.46	12.16	25.93	23.41	13.15	26.16	23.48	12.64
Aq 1.1	26.25	23.53	12.53	26.23	23.57	12.87	27.04	24.22	12.93
Aq 1.2	26.37	23.69	12.65	27.29	24.58	13.50	27.31	24.39	12.85
Aq 1.2	27.19	24.49	13.27	26.07	23.39	12.72	27.00	24.21	13.00
Aq 2.0	25.17	22.50	11.99	25.56	22.78	12.05	26.90	24.02	12.51
Aq 2.0	26.08	23.29	12.17	24.84	22.14	11.73	24.77	21.91	11.05
Aq 2.1	26.12	23.38	12.44	26.20	23.56	12.95	26.48	23.65	12.41
Aq 2.1	25.48	22.79	12.08	24.66	22.03	11.77	25.74	22.96	12.04
Aq 2.2	26.19	23.42	12.32	25.57	22.87	12.34	26.82	23.97	12.59
Aq 2.2	25.37	22.53	11.68	25.40	22.78	12.36	25.23	22.49	11.85
J 1.0	23.15	20.69	11.26	22.43	19.84	10.68	24.04	21.35	11.44

J 1.0	23.30	20.72	11.13	25.09	22.41	12.26	23.87	21.07	11.10
J 1.1	22.58	20.02	10.73	24.13	21.76	12.51	25.35	22.57	12.15
J 1.1	23.55	20.85	11.01	24.81	22.27	12.46	26.28	23.42	12.59
J 1.2	22.68	20.11	10.60	24.12	21.48	11.77	24.57	21.72	11.43
J 1.2	24.22	21.60	11.55	24.06	21.43	11.77	25.17	22.26	11.70
J 2.0	21.15	18.66	9.99	22.94	20.37	10.95	22.30	19.63	10.31
J 2.0	22.78	20.25	10.97	22.70	20.11	10.79	21.34	18.85	10.13
J 2.1	21.89	19.54	10.83	21.10	18.53	9.78	23.43	20.82	11.34
J 2.1	22.09	19.55	10.48	22.18	19.54	10.41	22.11	19.47	10.37
J 2.2	22.16	19.65	10.68	21.76	19.19	10.33	21.33	18.99	10.54
J 2.2	23.00	20.41	11.06	22.22	19.72	10.65	22.45	19.96	10.92
E 1.0	22.83	20.00	10.14	25.00	22.28	11.93	27.02	24.22	13.23
E 1.0	25.80	23.14	12.71	24.36	21.59	11.44	26.68	23.86	12.89
E 1.1	23.78	20.98	10.82	23.92	21.22	11.33	24.04	21.29	11.16
E 1.1	26.87	24.00	12.79	25.35	22.72	12.56	25.29	22.50	11.88
E 1.2	22.62	19.84	10.06	25.43	22.97	13.12	23.53	21.00	11.33
E 1.2	26.30	23.49	12.52	24.27	21.80	12.27	24.58	21.97	11.86
E 2.0	21.77	18.95	9.41	20.56	17.83	8.95	22.71	20.08	10.57
E 2.0	22.84	19.99	9.98	23.00	20.21	10.30	22.14	19.58	10.32
E 2.1	21.39	18.57	9.11	22.76	19.90	10.05	22.23	19.36	9.55
E 2.1	22.21	19.30	9.42	21.11	18.24	8.78	21.09	18.28	8.95
E 2.2	23.66	20.93	10.92	22.08	19.42	10.02	21.99	19.14	9.43
E 2.2	20.00	17.31	8.41	20.46	17.61	8.47	20.02	17.37	8.67
M 1.0	25.96	23.30	12.80	26.63	23.85	13.02	26.85	24.16	13.38
M 1.0	27.21	24.50	13.55	27.05	24.29	13.38	27.32	24.52	13.38
M 1.1	26.57	23.83	13.01	26.01	23.41	13.18	26.87	24.15	13.31
M 1.1	27.16	24.43	13.44	25.95	23.28	12.94	26.88	24.13	13.16
M 1.2	25.80	23.05	12.47	26.72	24.14	13.67	26.20	23.43	12.55
M 1.2	26.71	24.06	13.32	26.98	24.26	13.47	26.95	24.27	13.51
M 2.0	21.83	19.24	10.26	22.28	19.68	10.47	21.36	18.62	9.57

M 2.0	22.50	19.80	10.50	23.70	21.01	11.14	21.89	19.24	10.13
M 2.1	21.25	18.71	10.00	22.45	19.78	10.65	22.33	19.70	10.55
M 2.1	21.81	19.11	9.84	24.57	21.77	11.52	22.33	19.68	10.49
M 2.2	21.44	18.91	10.11	21.83	19.24	10.61	22.77	19.96	10.29
M 2.2	22.06	19.43	10.30	22.08	19.34	10.02	21.67	19.01	9.96

	PAG Control - XYZ			PAG Temperature - XYZ			PAG Relative Humidity - XYZ		
	x	y	z	x	y	z	x	y	z
Ac 1.0	24.87	22.33	12.53	26.13	23.44	13.07	26.13	23.44	13.07
Ac 1.0	23.85	21.32	11.86	25.48	22.89	12.83	25.48	22.89	12.83
Ac 1.1	24.43	21.92	12.18	25.51	22.81	12.58	25.51	22.81	12.58
Ac 1.1	25.10	22.56	12.80	25.38	22.68	12.51	25.38	22.68	12.51
Ac 1.2	23.32	20.78	11.53	24.46	21.84	12.04	24.46	21.84	12.04
Ac 1.2	24.50	21.99	12.46	24.85	22.35	12.63	24.85	22.35	12.63
Ac 2.0	23.34	20.80	11.52	22.86	20.22	10.91	22.86	20.22	10.91
Ac 2.0	24.18	21.60	12.02	23.44	20.83	11.31	23.44	20.83	11.31
Ac 2.1	22.77	20.31	11.28	23.47	20.81	11.14	23.47	20.81	11.14
Ac 2.1	23.46	20.98	11.68	23.26	20.59	11.06	23.26	20.59	11.06
Ac 2.2	22.76	20.28	11.29	22.78	20.14	10.77	22.78	20.14	10.77
Ac 2.2	23.69	21.10	11.65	23.02	20.38	10.94	23.02	20.38	10.94
Aq 1.0	25.94	23.30	12.78	26.31	23.56	12.68	26.31	23.56	12.68
Aq 1.0	26.82	24.16	13.29	26.93	24.19	13.20	26.93	24.19	13.20
Aq 1.1	26.20	23.59	12.90	26.10	23.48	12.80	26.10	23.48	12.80
Aq 1.1	27.24	24.51	13.38	27.11	24.37	13.23	27.11	24.37	13.23
Aq 1.2	27.49	24.74	13.38	26.65	23.86	12.82	26.65	23.86	12.82
Aq 1.2	28.19	25.44	14.09	26.98	24.17	13.04	26.98	24.17	13.04
Aq 2.0	25.49	22.78	12.18	26.99	24.17	12.70	26.99	24.17	12.70
Aq 2.0	26.80	23.97	12.65	24.30	21.50	10.87	24.30	21.50	10.87
Aq 2.1	26.42	23.61	12.51	26.56	23.81	12.66	26.56	23.81	12.66
Aq 2.1	26.81	24.01	12.89	25.75	23.01	12.18	25.75	23.01	12.18
Aq 2.2	27.33	24.47	12.99	26.97	24.18	12.88	26.97	24.18	12.88
Aq 2.2	25.62	22.81	12.00	24.75	22.13	11.88	24.75	22.13	11.88

J 1.0	23.76	21.30	11.91	23.15	20.65	11.35	23.15	20.65	11.35
J 1.0	24.20	21.58	11.85	23.64	20.97	11.36	23.64	20.97	11.36
J 1.1	22.82	20.30	11.11	25.10	22.42	12.31	25.10	22.42	12.31
J 1.1	24.61	21.87	11.80	26.12	23.36	12.82	26.12	23.36	12.82
J 1.2	23.72	21.07	11.30	24.24	21.51	11.57	24.24	21.51	11.57
J 1.2	24.95	22.32	12.18	24.84	22.03	11.76	24.84	22.03	11.76
J 2.0	21.48	18.98	10.28	22.19	19.60	10.42	22.19	19.60	10.42
J 2.0	23.40	20.79	11.33	21.56	19.12	10.41	21.56	19.12	10.41
J 2.1	22.16	19.76	10.95	23.04	20.50	11.16	22.52	19.88	10.58
J 2.1	22.34	19.83	10.86	22.46	19.83	10.60	22.46	19.83	10.60
J 2.2	22.08	19.57	10.71	21.08	18.76	10.33	21.08	18.76	10.33
J 2.2	23.16	20.56	11.19	22.83	20.35	11.19	22.83	20.35	11.19
E 1.0	21.85	19.12	9.71	27.06	24.38	13.68	27.06	24.38	13.68
E 1.0	25.67	23.08	12.86	26.51	23.75	12.96	26.51	23.75	12.96
E 1.1	23.57	20.81	10.82	24.88	22.10	11.77	24.88	22.10	11.77
E 1.1	26.47	23.72	12.96	27.13	24.37	13.53	27.13	24.37	13.53
E 1.2	21.75	19.15	9.94	24.84	22.30	12.39	24.84	22.30	12.39
E 1.2	25.99	23.31	12.69	25.65	22.90	12.35	25.65	22.90	12.35
E 2.0	22.03	19.25	9.74	22.38	19.82	10.46	22.38	19.82	10.46
E 2.0	23.33	20.46	10.34	22.51	19.97	10.63	22.51	19.97	10.63
E 2.1	21.13	18.67	9.24	22.06	19.29	9.66	22.06	19.29	9.66
E 2.1	22.64	19.79	9.92	20.73	17.99	8.86	20.73	17.99	8.86
E 2.2	23.76	21.07	11.08	21.36	18.58	9.15	21.36	18.58	9.15
E 2.2	20.70	17.92	8.78	20.31	17.59	8.69	20.31	17.59	8.69
M 1.0	24.96	22.42	12.46	27.60	24.86	13.87	27.60	24.86	13.87
M 1.0	27.14	24.47	13.69	28.01	25.23	14.03	28.01	25.23	14.03
M 1.1	25.88	23.26	12.87	27.49	24.75	13.78	27.49	24.75	13.78
M 1.1	26.95	24.33	13.70	28.10	25.36	14.27	28.10	25.36	14.27
M 1.2	25.55	22.87	12.59	26.90	24.13	13.16	26.90	24.13	13.16

M 1.2	26.08	23.54	13.25	28.05	25.35	14.34	28.05	25.35	14.34
M 2.0	22.01	19.40	10.44	21.03	18.40	9.54	21.03	18.40	9.54
M 2.0	22.75	20.05	10.72	22.53	19.83	10.39	22.53	19.83	10.39
M 2.1	21.37	18.89	10.32	21.93	19.36	10.33	21.93	19.36	10.33
M 2.1	22.00	19.36	10.15	22.37	19.78	10.53	22.37	19.78	10.53
M 2.2	21.35	18.89	10.32	22.36	19.64	10.20	22.36	19.64	10.20
M 2.2	22.30	19.67	10.45	21.19	18.62	9.78	21.19	18.62	9.78

11.8. Colorimetry Data: CIE L*a*b* Converted Measurements

	BT Control - L*a*b*			BT Temperature - L*a*b*			BT Relative Humidity - L*a*b*		
	L*	a*	b*	L*	a*	b*	L*	a*	b*
Ac 1.0	55.90	17.38	26.13	56.91	17.14	26.23	56.06	17.88	26.49
Ac 1.0	57.19	17.72	29.41	56.18	17.87	27.13	56.70	17.66	26.37
Ac 1.1	56.61	17.07	28.02	54.95	17.01	25.74	56.21	17.87	26.41
Ac 1.1	56.83	17.59	26.24	56.21	17.38	26.16	57.23	18.01	26.63
Ac 1.2	57.70	17.61	26.23	55.62	17.21	25.77	55.61	17.24	25.67
Ac 1.2	57.58	17.88	26.53	56.41	17.94	26.91	56.12	17.39	26.12
Ac 2.0	56.01	18.10	26.74	56.21	17.60	26.35	55.75	17.85	26.59
Ac 2.0	55.90	17.93	26.74	56.94	17.89	26.81	56.24	17.80	26.55
Ac 2.1	55.47	17.45	26.22	56.72	17.79	26.53	55.53	18.20	26.92
Ac 2.1	55.85	17.70	26.52	56.69	17.85	26.51	56.02	17.85	26.83
Ac 2.2	55.95	17.10	25.73	56.85	16.86	25.49	56.73	18.00	27.11
Ac 2.2	56.36	17.72	26.65	57.59	18.01	26.97	57.29	18.22	27.39
Aq 1.0	56.78	17.73	28.66	56.68	17.64	26.70	55.49	17.61	26.03
Aq 1.0	58.10	18.06	26.87	57.02	18.12	27.45	56.30	17.54	25.86
Aq 1.1	57.69	17.63	26.38	57.68	17.44	26.33	55.15	17.47	25.89
Aq 1.1	58.37	17.91	26.87	58.29	17.99	27.18	56.13	17.95	26.58
Aq 1.2	59.21	17.95	27.04	57.65	17.89	26.86	56.42	17.76	26.11
Aq 1.2	58.93	18.18	27.41	57.89	18.30	27.28	56.05	17.70	26.02
Aq 2.0	55.79	17.56	26.21	57.28	17.83	26.50	56.81	17.92	27.27

Aq 2.0	56.93	17.71	26.81	56.44	17.82	26.45	56.94	18.07	27.22
Aq 2.1	56.39	17.89	26.57	56.47	17.01	25.43	55.97	17.88	26.71
Aq 2.1	56.14	17.87	26.45	57.12	17.80	26.56	56.44	17.66	26.61
Aq 2.2	56.90	18.39	27.58	55.98	17.38	25.71	56.72	18.08	26.98
Aq 2.2	56.23	18.45	27.43	57.39	17.85	26.50	56.00	17.61	26.18
J 1.0	57.89	17.60	26.21	57.14	17.40	26.26	55.56	17.51	25.72
J 1.0	58.52	18.18	27.13	57.43	17.63	26.39	56.84	17.86	26.47
J 1.1	57.80	18.36	27.10	58.51	17.00	25.65	57.45	17.94	26.62
J 1.1	58.51	18.10	27.17	57.92	17.51	26.30	57.48	17.94	26.54
J 1.2	58.81	18.31	27.62	56.47	17.65	26.08	57.02	18.14	26.77
J 1.2	58.76	18.19	27.53	56.47	17.56	26.03	57.68	19.17	26.98
J 2.0	56.24	17.77	26.40	56.34	17.56	26.30	54.88	17.51	26.18
J 2.0	56.00	17.81	26.47	56.94	17.84	26.88	54.81	17.48	26.08
J 2.1	55.84	17.28	26.01	56.90	17.94	27.00	55.68	17.84	26.48
J 2.1	56.61	17.64	26.78	57.74	17.87	27.04	55.96	17.84	26.67
J 2.2	55.93	17.96	26.53	57.25	17.78	26.49	55.41	17.05	25.47
J 2.2	56.45	17.99	26.69	57.00	17.72	26.52	56.19	17.60	26.30
E 1.0	57.78	17.66	26.42	57.66	17.92	26.90	56.34	17.80	26.12
E 1.0	57.66	17.89	26.37	58.11	17.99	27.01	57.08	17.66	26.21
E 1.1	58.67	17.76	26.44	57.72	17.61	26.19	56.81	18.25	26.86
E 1.1	59.70	17.72	26.45	57.91	18.09	26.78	56.74	17.77	26.15
E 1.2	58.09	17.88	26.88	56.40	17.04	25.19	55.64	17.24	25.48
E 1.2	59.25	18.09	27.34	56.35	17.45	25.73	57.14	18.04	26.72
E 2.0	56.11	17.51	26.23	57.87	17.43	26.37	55.34	17.15	25.81
E 2.0	56.33	18.10	26.96	57.82	18.02	27.19	55.36	17.49	26.01
E 2.1	56.48	17.55	26.39	57.09	17.73	26.92	56.07	17.90	26.79
E 2.1	56.41	17.89	26.85	57.72	17.87	27.14	56.03	17.67	26.40
E 2.2	56.15	17.75	26.33	57.54	17.43	26.38	56.18	17.61	26.34
E 2.2	56.17	17.64	26.30	57.39	17.63	26.66	55.65	17.46	26.03

M 1.0	57.53	17.67	26.24	58.60	18.68	30.36	56.50	17.99	26.54
M 1.0	58.61	17.93	26.88	58.00	17.97	27.03	57.37	18.01	26.86
M 1.1	58.67	17.74	26.59	57.20	17.25	25.61	56.48	17.74	26.24
M 1.1	59.62	18.01	26.93	58.19	17.92	26.58	56.82	17.74	26.26
M 1.2	58.72	18.02	26.62	58.51	17.70	26.50	57.45	18.02	26.81
M 1.2	59.22	17.93	26.68	58.02	17.76	26.71	57.76	17.62	26.21
M 2.0	56.36	17.57	26.11	55.73	17.42	26.27	56.76	18.09	27.10
M 2.0	56.99	17.68	26.58	55.86	17.19	25.96	56.51	17.48	26.40
M 2.1	56.46	17.31	26.21	56.28	17.78	26.50	55.95	17.82	26.31
M 2.1	56.51	17.58	26.79	56.63	17.66	26.54	55.62	17.50	26.13
M 2.2	54.81	17.12	25.56	56.18	17.90	26.84	56.51	17.99	26.77
M 2.2	55.55	17.61	26.36	56.80	18.01	27.14	55.64	17.81	26.24

	PT Control - L*a*b*			PT Temperature - L*a*b*			PT Relative Humidity - L*a*b*		
	L*	a*	b*	L*	a*	b*	L*	a*	b*
Ac 1.0	53.11	17.09	24.14	52.07	17.26	23.15	54.79	17.37	24.82
Ac 1.0	52.69	17.00	23.84	53.23	17.26	24.04	54.37	17.11	24.47
Ac 1.1	51.71	16.60	23.43	52.39	16.72	22.70	54.06	17.50	24.85
Ac 1.1	52.36	16.66	24.06	54.02	16.45	22.66	54.42	17.67	24.88
Ac 1.2	51.87	17.06	23.70	53.47	16.74	22.99	53.88	17.39	24.46
Ac 1.2	52.88	16.65	23.41	54.45	16.78	23.47	54.33	17.11	24.34
Ac 2.0	53.19	17.46	24.09	51.78	17.44	23.54	51.86	17.97	24.37
Ac 2.0	53.97	17.26	24.00	52.08	17.91	24.16	52.95	17.67	24.57
Ac 2.1	52.82	17.11	23.80	51.44	17.54	23.53	51.82	17.88	24.49
Ac 2.1	53.17	17.07	23.90	52.36	17.22	23.51	51.87	17.89	24.44
Ac 2.2	53.29	16.58	22.97	50.67	17.56	23.24	51.87	18.07	24.65
Ac 2.2	53.14	17.43	23.95	51.59	17.65	23.93	52.05	18.02	24.75
Aq 1.0	53.91	16.61	24.44	56.54	17.17	25.46	56.38	17.75	26.50
Aq 1.0	55.50	16.95	25.31	56.10	17.49	25.69	56.31	17.44	25.70
Aq 1.1	54.51	16.48	24.77	55.50	16.37	23.92	55.57	17.05	25.34
Aq 1.1	55.62	17.18	25.71	55.65	16.96	24.91	56.31	17.41	25.90
Aq 1.2	55.77	17.02	25.68	56.67	16.92	25.06	56.48	17.80	26.38

Aq 1.2	56.58	16.91	25.49	55.47	17.09	24.97	56.30	17.32	25.69
Aq 2.0	54.55	17.26	25.31	54.85	17.64	25.67	56.10	17.76	26.62
Aq 2.0	55.37	17.55	26.26	54.17	17.49	25.35	53.93	18.22	26.82
Aq 2.1	55.46	17.34	25.69	55.65	16.86	24.70	55.74	17.61	26.24
Aq 2.1	54.85	17.27	25.58	54.06	17.15	25.07	55.03	17.61	26.01
Aq 2.2	55.50	17.41	26.07	54.94	17.28	25.05	56.06	17.64	26.32
Aq 2.2	54.59	17.93	26.22	54.84	16.96	24.84	54.55	17.54	25.67
J 1.0	52.61	16.77	23.97	51.65	17.63	23.94	53.33	17.63	24.70
J 1.0	52.64	17.33	24.37	54.46	17.28	24.43	53.03	18.18	25.12
J 1.1	51.86	17.45	24.17	53.78	16.10	22.61	54.62	17.69	25.00
J 1.1	52.78	17.82	24.97	54.31	16.74	23.66	55.50	17.82	25.37
J 1.2	51.97	17.44	24.74	53.47	17.36	24.03	53.72	18.24	25.39
J 1.2	53.60	17.27	24.85	53.42	17.34	23.96	54.31	18.30	25.66
J 2.0	50.28	17.53	23.65	52.26	17.36	24.21	51.41	18.05	24.64
J 2.0	52.11	17.25	23.91	51.96	17.52	24.16	50.52	17.46	23.62
J 2.1	51.31	16.61	22.94	50.13	17.97	24.01	52.75	17.40	23.97
J 2.1	51.32	17.50	23.96	51.31	17.96	24.14	51.23	17.97	24.15
J 2.2	51.44	17.31	23.58	50.91	17.74	23.69	50.67	16.69	22.67
J 2.2	52.29	17.48	23.96	51.51	17.25	23.82	51.79	17.16	23.50
E 1.0	51.83	18.67	25.87	54.32	17.54	25.07	56.31	17.35	25.13
E 1.0	55.22	17.06	24.57	53.58	17.92	25.15	55.95	17.52	25.36
E 1.1	52.92	18.23	25.76	53.19	17.74	24.76	53.26	17.90	25.36
E 1.1	56.08	17.74	25.86	54.78	17.03	24.19	54.55	17.76	25.62
E 1.2	51.66	18.45	25.80	55.04	16.24	23.21	52.95	17.03	24.35
E 1.2	55.57	17.60	25.66	53.82	16.54	23.30	54.00	17.12	24.70
E 2.0	50.63	18.95	26.03	49.29	18.96	25.19	51.93	17.72	24.74
E 2.0	51.83	18.76	26.33	52.08	18.40	25.82	51.35	17.59	24.50
E 2.1	50.19	19.11	26.21	51.72	18.87	25.94	51.10	19.10	26.39
E 2.1	51.03	19.30	26.69	49.78	19.50	26.58	49.83	19.18	26.11
E 2.2	52.88	17.90	25.39	51.17	18.11	25.08	50.85	19.09	26.32

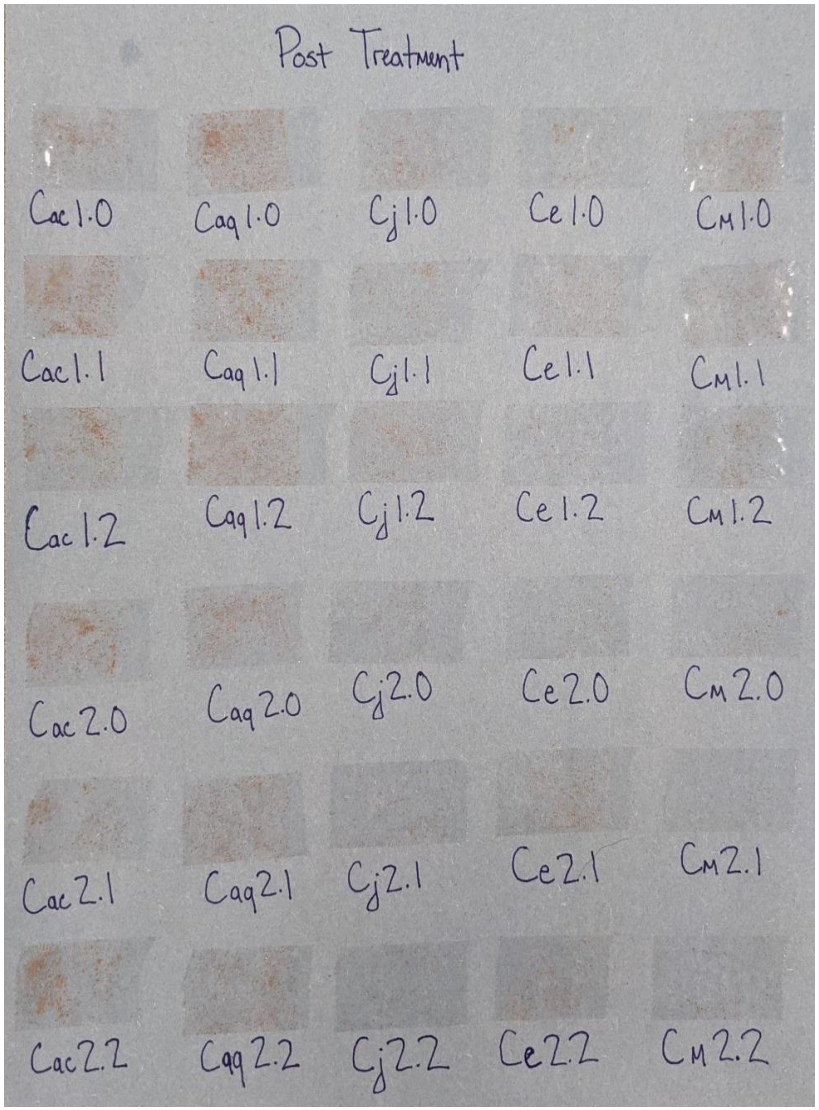
E 2.2	48.65	18.97	25.88	49.02	19.62	26.32	48.72	18.77	25.12
M 1.0	55.38	17.00	24.63	55.94	17.34	25.02	56.25	16.93	24.65
M 1.0	56.58	16.95	24.81	56.38	17.21	24.88	56.60	17.29	25.27
M 1.1	55.92	17.19	25.02	55.49	16.72	23.84	56.24	17.06	24.82
M 1.1	56.52	17.03	24.96	55.36	17.03	24.22	56.21	17.18	25.15
M 1.2	55.12	17.45	25.02	56.22	16.51	23.90	55.51	17.46	25.47
M 1.2	56.15	16.78	24.62	56.35	17.02	24.61	56.36	16.85	24.53
M 2.0	50.97	17.82	23.99	51.48	17.70	24.26	50.25	18.69	24.86
M 2.0	51.61	18.14	24.41	52.96	17.72	24.91	50.96	18.12	24.39
M 2.1	50.34	17.77	23.73	51.59	18.00	23.94	51.50	17.82	24.07
M 2.1	50.82	18.35	25.01	53.78	17.99	25.26	51.48	17.94	24.21
M 2.2	50.58	17.63	23.78	50.97	17.82	22.97	51.79	18.56	25.33
M 2.2	51.18	17.95	24.27	51.09	18.45	24.93	50.70	18.20	24.46

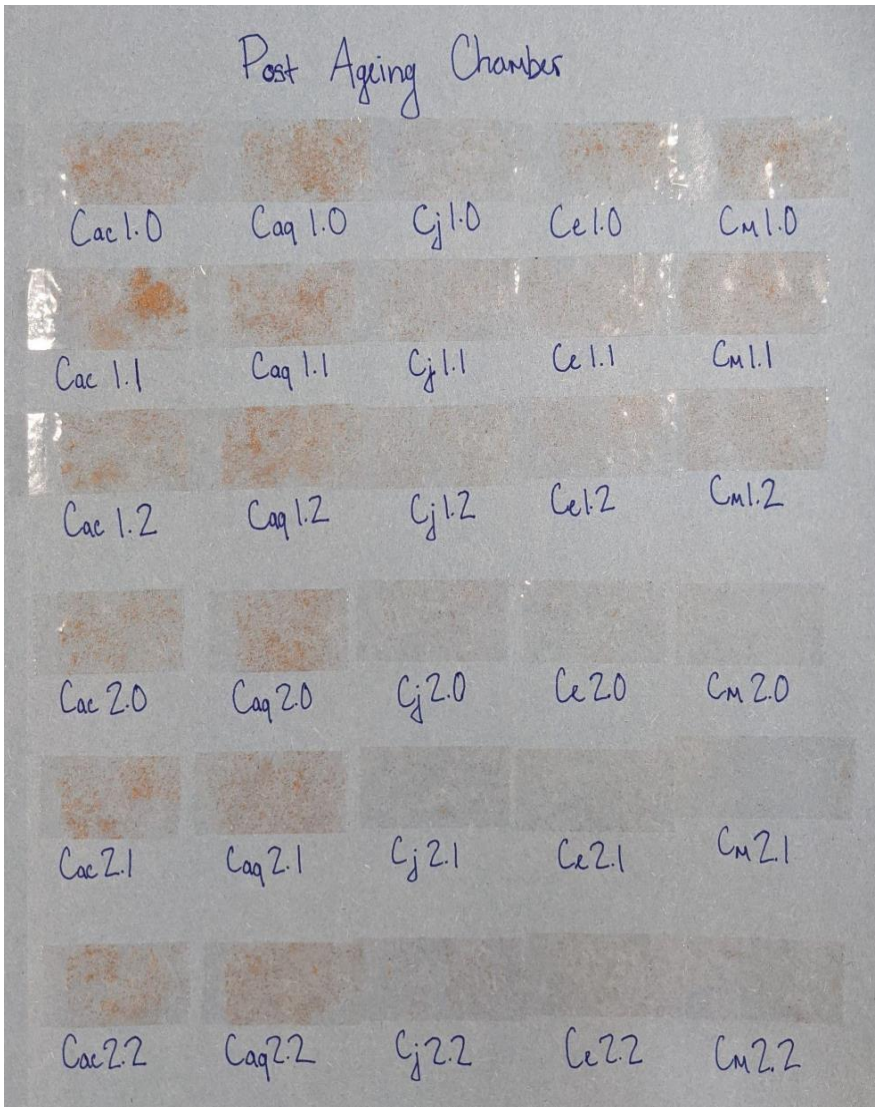
	PAG Control - L*a*b*			PAG Temperature - L*a*b*			PAG Relataive Humidity - L*a*b*		
	L*	a*	b*	L*	a*	b*	L*	a*	b*
Ac 1.0	54.38	16.72	23.59	55.53	17.07	24.19	55.53	17.07	24.19
Ac 1.0	53.30	16.95	23.49	54.96	16.83	23.82	54.96	16.83	23.82
Ac 1.1	53.95	16.69	23.75	54.88	17.28	24.30	54.88	17.28	24.30
Ac 1.1	54.62	16.67	23.30	54.75	17.30	24.26	54.75	17.30	24.26
Ac 1.2	52.71	17.12	23.37	53.85	17.20	23.99	53.85	17.20	23.99
Ac 1.2	54.02	16.64	23.15	54.40	16.57	23.37	54.40	16.57	23.37
Ac 2.0	52.73	17.09	23.46	52.08	17.73	24.03	52.08	17.73	24.03
Ac 2.0	53.60	17.07	23.59	52.77	17.39	24.08	52.77	17.39	24.08
Ac 2.1	52.18	16.87	23.17	52.74	17.63	24.51	52.75	17.62	24.52
Ac 2.1	52.92	16.83	23.34	52.49	17.78	24.33	52.49	17.78	24.33
Ac 2.2	52.15	17.01	23.08	52.00	17.73	24.28	52.00	17.73	24.28
Ac 2.2	53.06	17.22	23.65	52.26	17.69	24.24	52.26	17.69	24.24
Aq 1.0	55.38	16.90	24.68	55.64	17.32	25.37	55.64	17.32	25.37
Aq 1.0	56.24	16.83	24.86	56.28	17.13	25.14	56.28	17.13	25.14

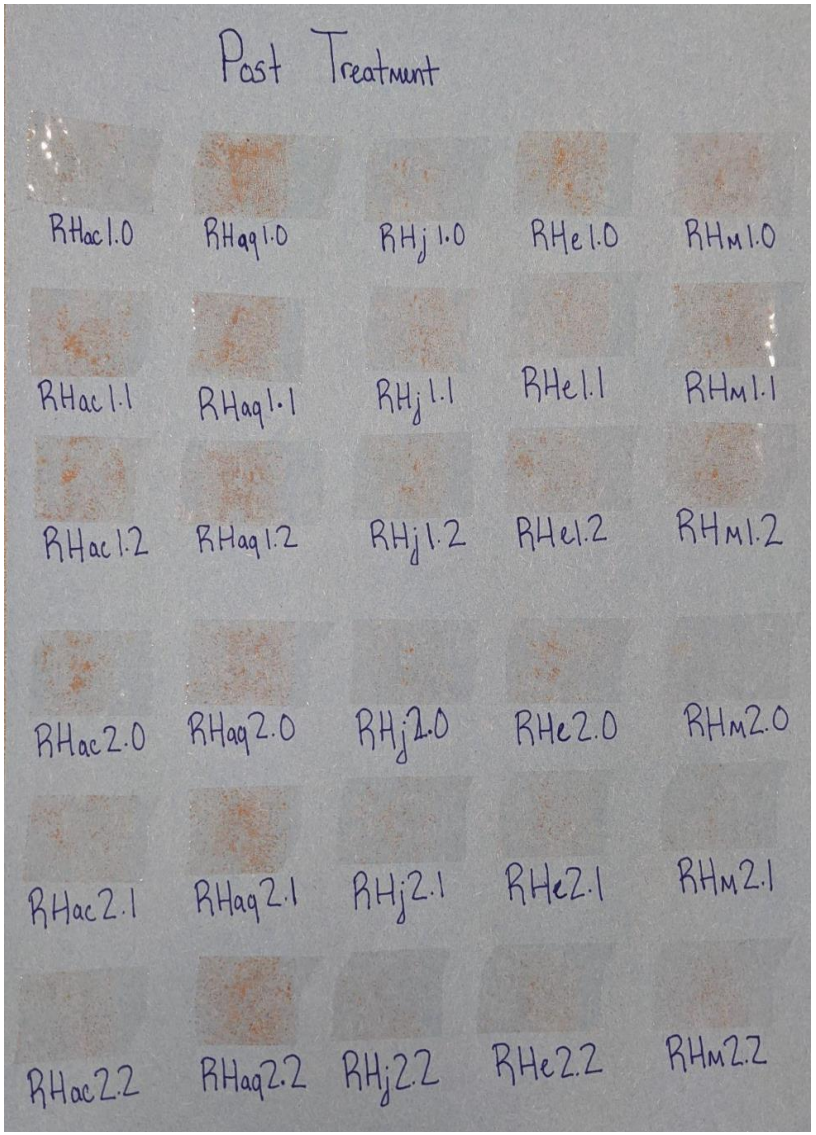
Aq 1.1	55.68	16.71	24.87	55.56	16.80	24.92	55.56	16.80	24.92
Aq 1.1	56.59	17.02	25.23	56.46	17.10	25.38	56.46	17.10	25.38
Aq 1.2	56.82	17.07	25.64	55.94	17.41	25.53	55.94	17.41	25.53
Aq 1.2	57.50	16.91	25.08	56.25	17.42	25.51	56.25	17.42	25.51
Aq 2.0	54.84	17.32	25.31	56.26	17.44	26.39	56.26	17.44	26.39
Aq 2.0	56.06	17.56	26.17	53.49	18.08	26.58	53.49	18.08	26.58
Aq 2.1	55.69	17.56	25.91	55.90	17.24	25.86	55.90	17.24	25.86
Aq 2.1	56.10	17.40	25.62	55.09	17.39	25.72	55.09	17.39	25.72
Aq 2.2	56.56	17.52	26.16	56.27	17.31	25.94	56.27	17.31	25.94
Aq 2.2	54.88	17.72	25.84	54.17	17.11	24.93	54.17	17.11	24.93
J 1.0	53.28	16.61	23.32	52.56	16.98	23.62	52.56	16.98	23.62
J 1.0	53.58	17.26	24.01	52.91	17.67	24.21	52.91	17.67	24.21
J 1.1	52.17	17.20	23.61	54.47	17.29	24.33	54.47	17.29	24.33
J 1.1	53.89	17.70	24.70	55.44	17.41	24.67	55.44	17.41	24.67
J 1.2	53.03	17.51	24.57	53.50	17.77	24.64	53.50	17.77	24.64
J 1.2	54.37	17.09	24.48	54.06	17.98	25.07	54.06	17.98	25.07
J 2.0	50.67	17.46	23.43	51.38	17.70	24.26	51.38	17.70	24.26
J 2.0	52.72	17.39	23.95	50.83	17.13	23.33	50.83	17.13	23.33
J 2.1	51.57	16.77	23.04	52.39	17.24	23.88	51.70	17.85	24.34
J 2.1	51.65	17.26	23.43	51.64	17.83	24.17	51.64	17.83	24.17
J 2.2	51.35	17.33	23.34	50.41	16.68	22.83	50.41	16.68	22.83
J 2.2	52.46	17.47	23.90	52.23	16.98	23.50	52.23	16.98	23.50
E 1.0	50.82	18.54	25.42	56.47	16.87	24.29	56.47	16.87	24.29
E 1.0	55.16	16.75	24.08	55.83	17.33	24.99	55.83	17.33	24.99
E 1.1	52.74	18.06	25.43	54.13	17.83	25.17	54.13	17.83	25.17
E 1.1	55.81	17.29	24.94	56.46	17.16	24.65	56.46	17.16	24.65
E 1.2	50.87	17.86	24.79	54.35	16.74	23.89	54.35	16.74	23.89
E 1.2	55.39	17.09	24.92	54.97	17.51	25.07	54.97	17.51	25.07
E 2.0	50.98	18.68	25.61	51.63	17.50	24.57	51.63	17.50	24.57
E 2.0	52.35	18.70	26.15	51.80	17.39	24.36	51.80	17.39	24.36

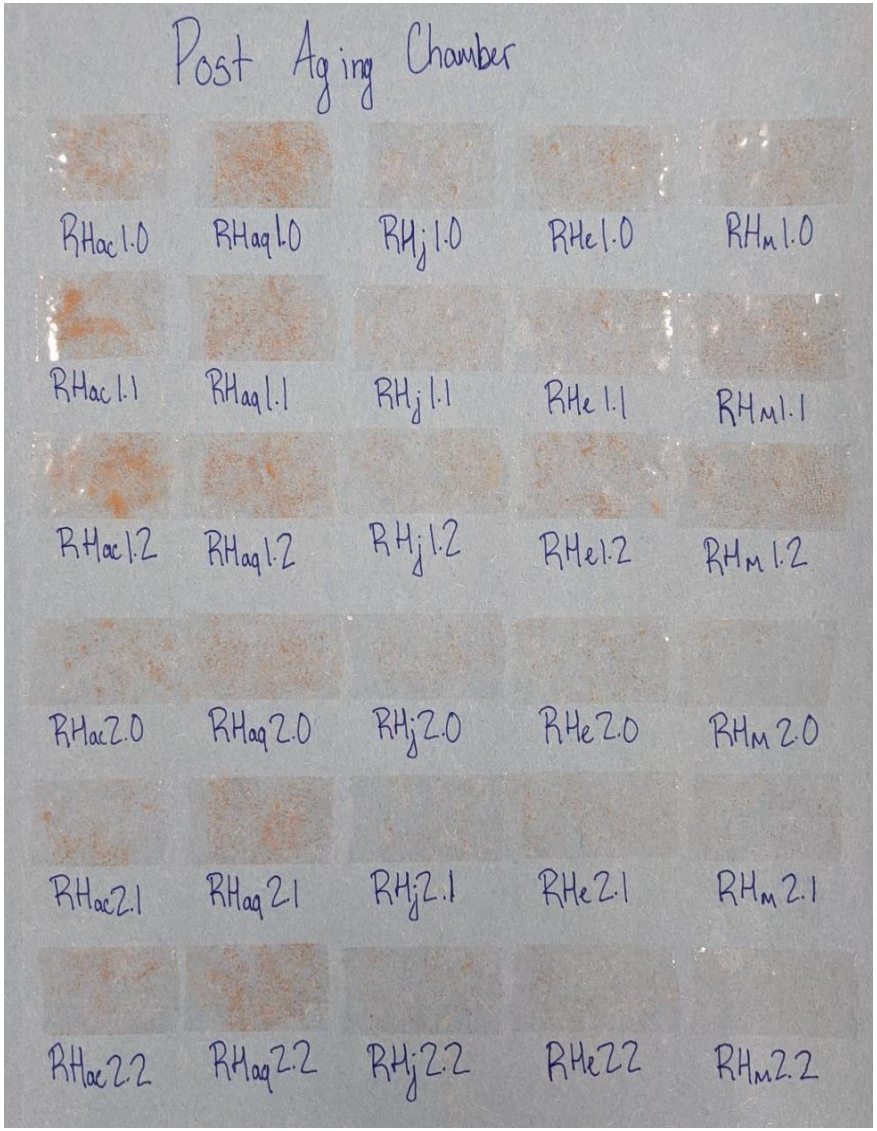
E 2.1	50.29	17.40	25.98	51.02	18.61	25.91	51.02	18.61	25.91
E 2.1	51.60	18.83	26.10	49.48	18.99	25.82	49.48	18.99	25.82
E 2.2	53.02	17.73	25.18	50.19	18.92	26.09	50.19	18.92	26.09
E 2.2	49.40	19.16	25.93	48.99	19.02	25.53	48.99	19.02	25.53
M 1.0	54.47	16.69	23.93	56.94	16.96	24.63	56.94	16.96	24.63
M 1.0	56.56	16.77	24.42	57.30	17.07	24.86	57.30	17.07	24.86
M 1.1	55.34	16.85	24.38	56.83	17.04	24.66	56.83	17.04	24.66
M 1.1	56.42	16.59	24.16	57.43	16.86	24.51	57.43	16.86	24.51
M 1.2	54.94	17.18	24.40	56.22	17.28	25.14	56.22	17.28	25.14
M 1.2	55.62	16.45	23.90	57.42	16.72	24.32	57.42	16.72	24.32
M 2.0	51.15	17.83	23.79	49.98	18.27	24.49	49.98	18.27	24.49
M 2.0	51.90	18.04	24.26	51.64	18.15	24.78	51.64	18.15	24.78
M 2.1	50.55	17.44	23.12	51.11	17.65	24.04	51.11	17.65	24.04
M 2.1	51.11	17.99	24.59	51.59	17.64	24.28	51.59	17.64	24.28
M 2.2	50.55	17.30	23.13	51.43	18.29	24.98	51.43	18.29	24.98
M 2.2	51.46	7.86	24.29	50.24	17.92	24.22	50.24	17.92	24.22

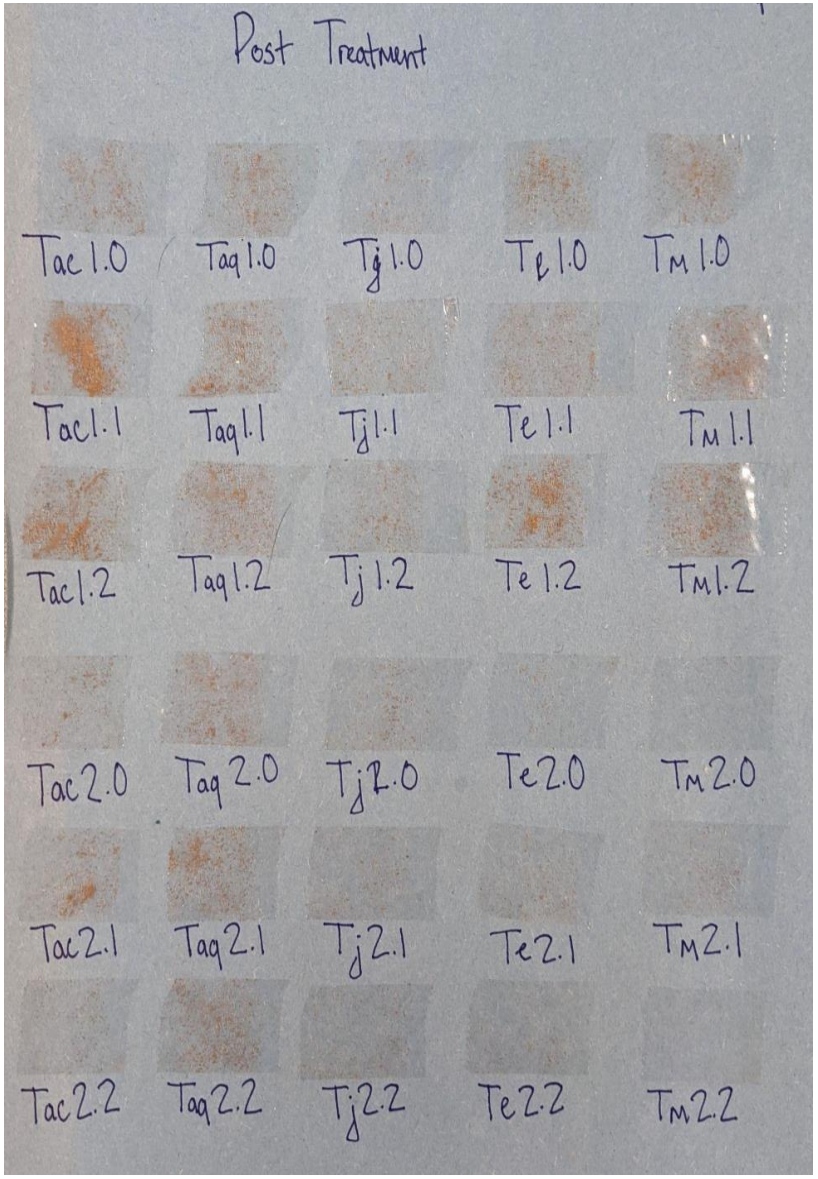
11.9. Strength Adhesion Tape Test Comparisons

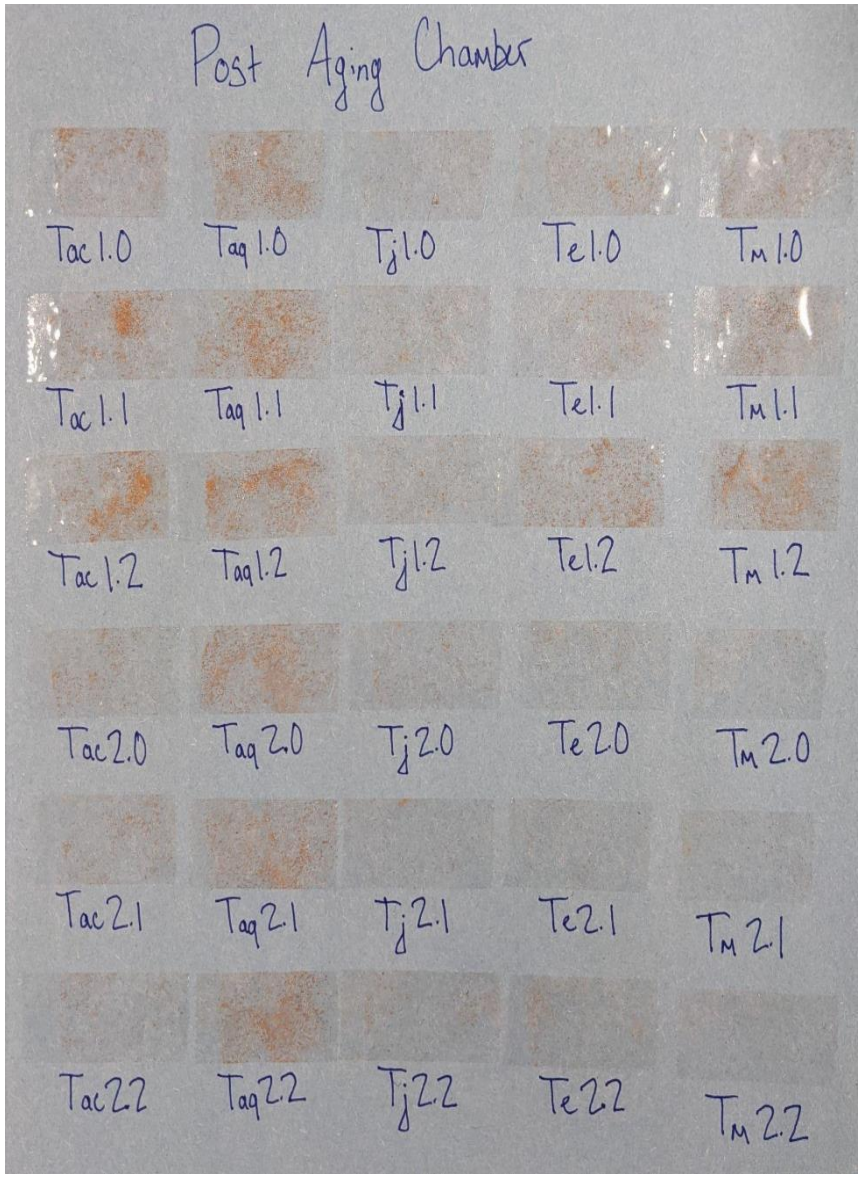





Post Treatment
RHac1.0
RHaq1.0
RHj1.0
RHe1.0
RHM1.0
RHac1.1
RHaq1.1
RHj1.1
RHe1.1
RHM1.1
RHac1.2
RHaq1.2
RHj1.2
RHe1.2
RHM1.2
RHac2.0
RHaq2.0
RHj2.0
RHe2.0
RHM2.0
RHac2.1
RHaq2.1
RHj2.1
RHe2.1
RHM2.1
RHac2.2
RHaq2.2
RHj2.2
RHe2.2
RHM2.2


Post Aging Chamber
RHac1.0
RHaq1.0
RHj1.0
RHe1.0
RHM1.0
RHac1.1
RHaq1.1
RHj1.1
RHe1.1
RHM1.1
RHac1.2
RHaq1.2
RHj1.2
RHe1.2
RHM1.2
RHac2.0
RHaq2.0
RHj2.0
RHe2.0
RHM2.0
RHac2.1
RHaq2.1
RHj2.1
RHe2.1
RHM2.1
RHac2.2
RHaq2.2
RHj2.2
RHe2.2
RHM2.2


Post Treatment
Tac 1.0
Taq 1.0
Tj 1.0
Te 1.0
TM 1.0
Tac 1.1
Taq 1.1
Tj 1.1
Te 1.1
TM 1.1
Tac 1.2
Taq 1.2
Tj 1.2
Te 1.2
TM 1.2
Tac 2.0
Taq 2.0
Tj 2.0
Te 2.0
TM 2.0
Tac 2.1
Taq 2.1
Tj 2.1
Te 2.1
TM 2.1
Tac 2.2
Taq 2.2
Tj 2.2
Te 2.2
TM 2.2


Post Aging Chamber
Tac 1.0
Taq 1.0
Tj 1.0
Te 1.0
TM 1.0
Tac 1.1
Taq 1.1
Tj 1.1
Te 1.1
TM 1.1
Tac 1.2
Taq 1.2
Tj 1.2
Te 1.2
TM 1.2
Tac 2.0
Taq 2.0
Tj 2.0
Te 2.0
TM 2.0
Tac 2.1
Taq 2.1
Tj 2.1
Te 2.1
TM 2.1
Tac 2.2
Taq 2.2
Tj 2.2
Te 2.2
TM 2.2

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