WELL-TESTING SYMPOSIUM

PURPOSE

CONVERSION TABLES

October 19-21, 1977

Horizon Room
Claremont Hotel
Berkeley, California

Sponsored by

Earth Sciences Division
Lawrence Berkeley Laboratory
University of California, Berkeley

DISCLAIMER

Organizing Committee
Well-Testing Symposium

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The purpose of the symposium is to advance the science of well testing through the exchange of ideas and the presentation of new information relating to well testing. The symposium will provide a forum for about 100 invited participants who have been directly involved in the fields of geothermal, hydrological, or oil and gas well testing. The emphasis will be on reviewing existing capabilities, identifying current limitations, and on generating new ideas for extending well-test capabilities.

The goal of the symposium is to bring together well-testing experts from the fields of geothermal energy, the oil and gas industries, and ground water hydrology. The invited participants from these three disciplines will be chosen to provide coverage of instrumentation, technique development, and well-test analysis. In addition to identifying problem areas where additional research and development are necessary, the aim is to unify the ideas and methods, where possible, in the three different disciplines.

CONVERSION TABLES

PERMEABILITY

$\rho_\omega = 1$ viscosity = 1 centipoise

	cm^2	m^2	ft^2	Darcy	cm/sec	ft/sec	ft/year	litres/ $sec \cdot m^2$	gpd[U.S.]/ft^2 (Meinzer)	Ebhlm*
cm^2	1	10^{-4}	1.076×10^{-3}	1.014×10^{8}	9.804×10^{4}	3.216×10^{3}	1.015×10^{11}	8.698×10^{5}	1.845×10^{9}	0.9
m^2	10^{4}	1	1.076×10^{1}	1.014×10^{12}	9.804×10^{8}	3.216×10^{7}	1.015×10^{15}	8.697×10^{9}	1.845×10^{13}	0.8
ft^2	9.294×10^{2}	9.294×10^{-2}	1	9.417×10^{10}	9.109×10^{7}	2.988×10^{6}	9.430×10^{13}	8.080×10^{8}	1.714×10^{12}	0.7
Darcy	9.862×10^{-9}	9.862×10^{-13}	1.062×10^{-11}	1	9.66×10^{-4}	3.173×10^{-5}	1.001×10^{3}	8.58×10^{-3}	1.82×10^{1}	0.6
cm/sec	1.020×10^{-5}	1.020×10^{-9}	1.097×10^{-8}	1.035×10^{3}	1	3.281×10^{-2}	1.035×10^{6}	9.985×10^{0}	2.118×10^{4}	0.5
ft/sec	3.109×10^{-4}	3.109×10^{-8}	3.347×10^{-7}	3.152×10^{4}	3.048×10^{1}	1	3.156×10^{7}	2.704×10^{2}	5.736×10^{5}	0.4
ft/year	9.852×10^{-12}	9.852×10^{-16}	1.060×10^{-14}	9.990×10^{-4}	9.662×10^{-7}	3.169×10^{-8}	1	8.570×10^{-6}	1.818×10^{-2}	0.3
litres/$sec \cdot m^2$	1.150×10^{-6}	1.150×10^{-10}	1.238×10^{-9}	1.166×10^{2}	1.001×10^{-1}	3.698×10^{-3}	1.167×10^{5}	1	2.121×10^{3}	0.2
gpd[U.S.]/ft^2 (Meinzer)	5.420×10^{-10}	5.420×10^{-14}	5.834×10^{-13}	5.494×10^{-2}	4.721×10^{-5}	1.743×10^{-6}	5.500×10^{1}	4.714×10^{-4}	1	0.1
Ebhlm*	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	1

*Standard Ethiopian buckets per hectare per lunar month.

Dimensions: k, Absolute Permeability $[L^2]$

K, Hydraulic Conductivity [L/t]

k/μ, Mobility $[L^3t/M]$

CONVERSION TABLES

COMPRESSIBILITY

$[Lt^2/M]$

	m^2/N $(Pascals)^{-1}$	m^2/kg_f	in^2/lb_f $(psi)^{-1}$	$Bars^{-1}$	Atm^{-1}	$(ft\ of\ water)^{-1}$ at 68°F	$(m\ of\ water)^{-1}$ at 68°F
m^2/N $(Pascals)^{-1}$	1	9.807	6.897×10^{3}	10^{5}	1.0133×10^{5}	2.984×10^{3}	9.794×10^{3}
m^2/kg_f	1.020×10^{-1}	1	7.031×10^{2}	1.0197×10^{4}	1.0332×10^{4}	3.042×10^{2}	9.980×10^{2}
$in.^2/lb_f$ $(psi)^{-1}$	1.450×10^{-4}	1.4223×10^{-3}	1	14.504	14.696	0.4327	1.419
$Bars^{-1}$	10^{-5}	9.8068×10^{-5}	6.895×10^{-2}	1	1.01325	2.984×10^{-2}	9.790×10^{-2}
Atm^{-1}	9.8692×10^{-6}	9.6787×10^{-5}	6.805×10^{-2}	0.98692	1	2.945×10^{-2}	9.662×10^{-2}
$(ft\ of\ water)^{-1}$ at 68°F	3.351×10^{-4}	3.287×10^{-3}	2.311	33.512	33.956	1	3.281
$(m\ of\ water)^{-1}$ at 68°F	$1.021\ 10^{-4}$	$1.002\ 10^{-3}$	.7044	10.214	10.349	0.3048	1

CONVERSION TABLES

TEMPERATURE

°C to °F

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
0	32	100	212	200	392	300	572	400	752
5	41	105	221	205	401	305	581	405	761
10	50	110	230	210	410	310	590	410	770
15	59	115	239	215	419	315	599	415	779
20	68	120	248	220	428	320	608	420	788
25	77	125	257	225	437	325	617	425	797
30	86	130	266	230	446	330	626	430	806
35	95	135	275	235	455	335	635	435	815
40	104	140	284	240	464	340	644	440	824
45	113	145	293	245	473	345	653	445	833
50	122	150	302	250	482	350	662	450	842
55	131	155	311	255	491	355	671	455	851
60	140	160	320	260	500	360	680	460	860
65	149	165	329	265	509	365	689	465	869
70	158	170	338	270	518	370	698	470	878
75	167	175	347	275	527	375	707	475	887
80	176	180	356	280	536	380	716	480	896
85	185	185	365	285	545	385	725	485	905
90	194	190	374	290	554	390	734	490	914
95	203	195	383	295	563	395	743	495	923

CONVERSION TABLES

VOLUME
$[L^3]$

	m^3	litre	bbl	Gallon (U.S.)	Gallon (Imp.)	ft^3
m^3	1	10^3	6.289	2.642×10^2	2.20×10^2	35.315
litre	10^{-3}	1	6.289×10^{-3}	0.2642	0.220	3.5315×10^{-2}
bbl	.1590	1.590×10^2	1	42.0	34.97	5.6146
gallons (U.S.)	3.7854×10^{-3}	3.7854	2.381×10^{-2}	1	0.8327	0.13368
gallons (IMP)	4.546×10^{-3}	4.546	2.860×10^{-2}	1.2009	1	0.16054
ft^3	2.832×10^{-2}	28.32	0.178	7.481	6.229	1

CONVERSION TABLES

FLOW RATE $[L^3/t]$ or $[M/t]$

	m^3/sec	litres/min	bbl/day	gallons/min (U.S.)	gallons/min (Imp.)	ft^3/sec	klb/hr (ρ_w=1.0)	klb/hr (ρ_w=.9)
m^3/sec	1	6×10^{4}	5.434×10^{5}	1.585×10^{4}	1.320×10^{4}	35.315	7.94×10^{3}	7.15×10^{3}
litres/min	1.667×10^{-5}	1.	9.058	0.2642	0.220	5.885×10^{-4}	1.32×10^{-1}	1.19×10^{-1}
bbl/day	1.840×10^{-6}	1.10×10^{-1}	1	2.917×10^{-2}	2.428×10^{-2}	6.498×10^{-5}	1.46×10^{-2}	1.31×10^{-2}
gallons/min (U.S.)	6.31×10^{-5}	3.785	34.28	1	0.8327	2.2280×10^{-3}	0.50	0.45
gallons/min (Imp.)	7.58×10^{-5}	4.546	41.19	1.2009	1	2.676×10^{-3}	0.601	0.541
ft^3/sec	2.8317×10^{-2}	1.699×10^{3}	1.539×10^{4}	4.488×10^{2}	3.737×10^{2}	1	2.25×10^{2}	2.03×10^{2}
klb/hr ρ_w=1.0	1.26×10^{-4}	7.56	68.5	2.00	1.66	4.45×10^{-3}	1	0.900
klb/hr ρ_w=0.9	1.40×10^{-4}	8.42	76.2	2.22	1.85	4.93×10^{-3}	1.11	1

CONVERSION TABLES

PRESSURE

$[M/Lt^2]$

	N/m^2 (Pascals)	kg_f/m^2	lb_f/in^2 (psi)	Bars	Atm	ft of water (at 68°F)	m of water (at 68°F)
N/m^2 (Pascals)	1	1.020×10^{-1}	1.450×10^{-4}	10^{-5}	9.8692×10^{-6}	3.351×10^{-4}	1.021×10^{-4}
kg_f/m^2	9.804	1	1.4223×10^{-3}	9.8068×10^{-5}	9.6787×10^{-5}	3.287×10^{-3}	1.002×10^{-3}
lb_f/in^2 (psi)	6.895×10^{3}	7.031×10^{2}	1	6.895×10^{-2}	6.805×10^{-2}	2.311	0.7042
Bars	10^{5}	1.0197×10^{4}	14.504	1	0.98692	33.512	10.214
Atm	1.0133×10^{5}	1.0332×10^{4}	14.696	1.01325	1	33.956	10.349
ft of water (at 68°F)	2.984×10^{3}	3.042×10^{2}	0.4328	2.984×10^{-2}	2.945×10^{-2}	1	0.3048
m of water (at 68°F)	9.794×10^{3}	9.980×10^{2}	1.419	9.790×10^{-2}	9.662×10^{-2}	3.281	1

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