

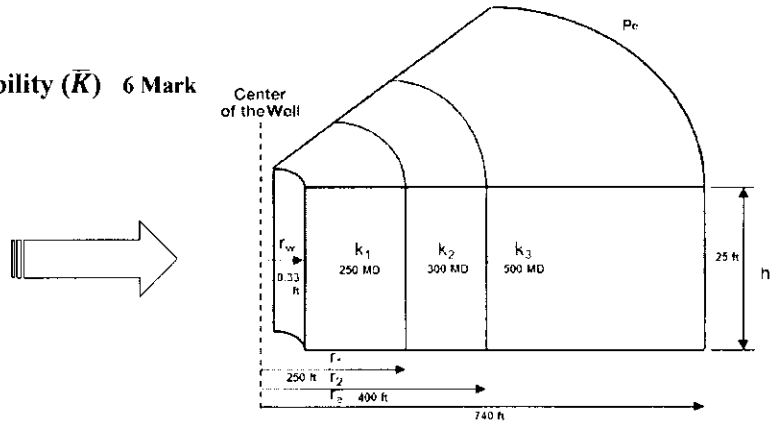
Q1) Complete

- I) The secondary Porosity:..... 3 Mark
 II) Residual porosity → 3 Mark
 III) The permeability is:..... 3 Mark
 IV) What is the assumption behind Darcy equation? 3 Mark

Q2) I) Compute the initial Water Saturation for the following field. 6 Mark

Bulk Volume = 15000 acres.ft Average porosity, $\phi=18\%$
 Initial oil in place = 13.66MMBBL and Formation Volume factor $\beta_o=1.15$ ResBbl/Bbl

II) Calculation of average permeability (\bar{K}) 6 Mark



Q3) The following permeability data were measured on sandstone: (15 Mark.)

Sw	0	10	20	30	40	50	60	70	80	90	100
Kro	1	1	1	0.94	0.8	0.44	0.16	0.05	0	0	0
Krw	0	0	0	0	0.04	0.11	0.2	0.3	0.44	0.68	1

a) Estimate the:

- 1) Initial Water Saturation.
- 2) Residual Oil Saturation.
- 3) Connect Water and Oil Saturation.

b) Absolute Permeability 222 Md at $S_o=40\%$ Calculate K_o .

c) Calculate the Mobility Ratio if $S_w = 45\%$, $\mu_w = 1cp$, $\mu_o = 3cp$, $k_{absolute} = 200$ Md

Q4) I) Given the following permeability data from a core analysis report, calculate the average permeability of the reservoir. (6 Mark)

Depth, ft	Permeability, md
3998-02	200
4002-04	130
4004-06	170
4006-08	180
4008-10	140

II) Dry sample Immersed in Mercury Pyenometer. ($\rho_{\text{mercury}} = 13.546 \text{ gm/cc}$) (6 Mark)

A= Weight dry sample In air = 20.0 gm

B= Weight of Pyenometer filled with mercury at 20°F =350gm

C= Weight Pyenometer filled with mercury and sample at 20°F 166.8 gm

Density of water $\rho_{\text{water}} = 1 \text{ gm/cm}^3$

Calculate: i) Bulk Volume.

ii) if the weight of water in pore space = 3.0 Gm, Estimate the Effective Porosity

Q5) I) Calculate the capillary pressure, for complete wetting if the surface tension between water and oil at 20°C = 30 dynes/cm and the radius of tube 0.2 cm ?

3Mark

II) A cylindrical core sample of a well consolidated sand is completely saturated with a synthetic brine of 50,000 ppm salinity. At 200°F the resistance of the core is 1000 ohms. The core is 3 ½ in. in diameter and the resistivity rock 100% saturated with salt water 2.0 ohm-meters

- Compute its porosity by both the Archie and Humble equation:

6 Mark

والله ولي التوفيق

A. M. Aishobaky

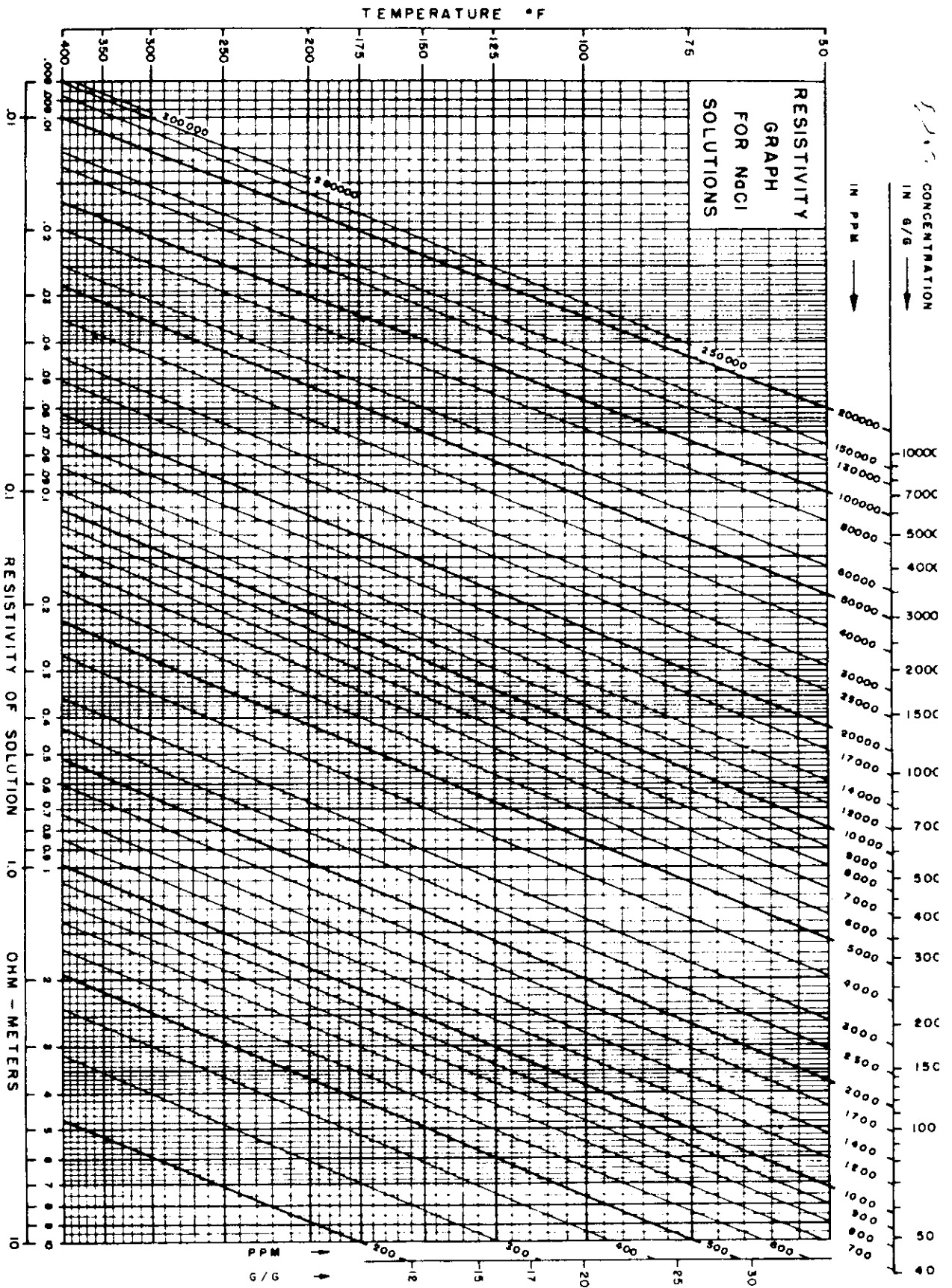


Fig. 11.3. Resistivity of water as a function of salinity and temperature. Salinities are in terms of NaCl concentration. Courtesy Schlumberger Well Surveying Corporation.