Klinkenberg Correction of Air Permeability

Liquid-equivalent (absolute) permeability from a single air permeability measurement at a mean pressure by the Jones–Klinkenberg relation, with slip factor.

Input parameters

Unit system: SI

Parameter	Value	Unit
Air (gas) permeability measured	0.80000	mD
Mean pressure of the measurement (absolute)	30.000	psi

Calculated results

Parameter	Value	Unit
Absolute (liquid-equivalent) permeability	0.62904	mD
Klinkenberg slip factor	8.1531	psi
Gas to liquid permeability ratio	1.2718	

Notes for this case

- Gas slips along pore walls, so air permeability exceeds liquid permeability, most of all in tight rock and at low mean pressure: k_g = k_L(1 + b/p_m). With several measurements, plot k_g against 1/p_m and extrapolate to 1/p_m = 0 instead.

Formula and method

$$k_g = k_L\left(1+\frac{b}{p_m}\right), \quad b = 6.9k_L^{-0.36} \;\Rightarrow\; 6.9k_L^{0.64} + p_m k_L - p_m k_g = 0 \quad (\mathrm{mD},\ \mathrm{psi})$$

Variables

k_g	Air (gas) permeability measured	m²
p_m	Mean pressure of the measurement (absolute)	Pa
k_L	Absolute (liquid-equivalent) permeability	m²
b	Klinkenberg slip factor	Pa
k_g/k_L	Gas to liquid permeability ratio	-

Method and standards

Klinkenberg gas slippage with Jones's slip factor.

Assumptions and limits

- Single-point estimate; Jones correlation.

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/reservoir-engineering/klinkenberg-permeability-correction

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.