

Soave-Redlich-Kwong (SRK) EOS @model

@wikipedia

One of the cubic equations of real gas state defining the [Compressibility factor](#) $Z(p,T)$ as a function of [Gas pressure](#) p and [Gas temperature](#) T :

(1) $Z^3 - Z^2 + (A - B - B^2) Z - AB = 0$			
(2) $A = \frac{a \alpha p}{R^2 T^2}$	(3) $B = \frac{b p}{R T}$	(4) $a = 0.45747 \cdot \frac{R^2 T_c^2}{p_c}$	(5) $b = 0.08664 \cdot \frac{R T_c}{p_c}$
(6) $\alpha = \left(1 + \kappa (1 - T_r^{0.5})\right)^2$		(7) $\kappa = 0.48508 + 1.55171 \omega - 0.15613 \omega^2$	

where

Z	Compressibility factor	p_c	critical pressure
p	Gas pressure	T_c	critical temperature
T	Gas temperature	$T_r = T/T_c$	reduced temperature
R	Gas constant	ω	Acentric factor

Once [compressibility Z-factor](#) $Z(p,T)$ is known the [gas density](#) ρ can be calculated as:

(8)
$$\rho(p,T) = \frac{1}{Z(p,T)} \cdot \frac{M}{R} \cdot \frac{p}{T}$$

where

M	Gas molar mass
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See also

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[[Real Gas](#)]