Dranchuk and Abou-Kassem's (1975) Z-factor correlation @model = DAK

Implicit Z-factor correlation @model for the natural gas in the wide range of pseudo-reduced temperature $1.0 < T_{pr} \leq 3.0$ and pseudo-reduced pressure $0.2 \leq P_{pr} \leq 30$

and also a specific range of $0.7 < T_{pr} \leq 1.0$ and $P_{pr} < 1.0$:

(1) $Z = \frac{0.27\, P_{pr}}{y\, T_{pr}}$	(2) $1 + T_1\, y + T_2\, y^2 + T_3\, y^5 + T_4\, y^2\,(1 + A_{11}\, y^2)\, \exp(-A_{11}\, y^2) - \frac{T_5}{y} = 0$			
	(3) $T_1 = A_1 + \frac{A_2}{T_{pr}} + \frac{A_3}{T_{pr}^3} + \frac{A_4}{T_{pr}^4} + \frac{A_5}{T_{pr}^5}$	(4) $T_2 = A_6 + \frac{A_7}{T_{pr}} + \frac{A_8}{T_{pr}^2}$	(5) $T_3 = -A_9 \cdot \left[\frac{A_7}{T_{pr}} + \frac{A_8}{T_{pr}^2} \right]$	( )

where

Z	Z-factor				
T	fluid temperature	$T_{pr} = T/T_{pc}$	pseudo-reduced temperature (or reduced temperature T_r in case of pure substances)	T_{pc}	pseudo-critical temperature (or critical temperature T_c in case of pure substances)
P	fluid pressure	$P_{pr} = P/P_{pc}$	pseudo-reduced pressure (or reduced pressure P_r in case of pure substances)	P_{pc}	pseudo-critical pressure (or critical pressure P_c in case of pure substances)

and

$A_1 = 0.3265$	$A_2 = -1.070$	$A_3 = -0.5339$	$A_4 = 0.01569$	$A_5 = -0.05165$	$A_6 = 0.5475$
$A_7 = -0.7361$	$A_8 = 0.1844$	$A_9 = 0.1056$	$A_{10} = 0.6134$	$A_{11} = 0.7210$	

See also

Natural Science / Physics /Thermodynamics / Z-factor / Z-factor Correlations @model

Reference

Dranchuk, P.M., and H. Abou-Kassem. "Calculation of Z Factors For Natural Gases Using Equations of State." J Can Pet Technol 14 (1975): doi.org/10.2118/75-03-03