

CO₂ Minimum Miscibility Pressure

The minimum miscibility pressure of pure CO₂ in crude oils can be calculated using the correlation of Yuan et al (2005) which was developed using experimental slim-tube MMP measurements. The correlation given is as follows:

$$MMP = a_1 + a_2M_{C_{7+}} + a_3C_M + \left[a_4 + a_5M_{C_{7+}} + \frac{a_6C_M}{(M_{C_{7+}})^2} \right] T + (a_7 + a_8M_{C_{7+}} + a_9(M_{C_{7+}})^2 + a_{10}C_M) T^2$$

(MMP1)

Where:

MMP = Minimum miscibility pressure of pure CO₂ in oil, psia

M_{C₇₊} = molecular weight of the C₇₊ fraction

C_M = the percentage of intermediate hydrocarbon components (C₂ to C₅)

T = Temperature, °F

The correlating coefficients are given as:

$$a_1 = -1436.4$$

$$a_2 = 6.612$$

$$a_3 = -44.979$$

$$a_4 = 2.139$$

$$a_5 = 0.11667$$

$$a_6 = 8166.1$$

$$a_7 = -0.12258$$

$$a_8 = 1.2883 \times 10^{-3}$$

$$a_9 = -4.0152 \times 10^{-6}$$

$$a_{10} = -9.2577 \times 10^{-4}$$

Reference:

Yuan H. et al, "Simplified Method for Calculation of Minimum Miscibility Pressure or Enrichment", SPE 77381, 2005, Society of Petroleum Engineers