Mixture density

@wikipedia

The density of mixture can be calculated from its composition as composition:

(1) $$\rho = \frac{P}{RT} \cdot \sum_{\alpha} x_{\alpha} \cdot M_{\alpha}$$

where

x_{α}	mole fraction of α chemical component
M_{α}	molar mass of α chemical component
T	mixture temperature
P	mixture pressure
R	gas constant

The relative density then can be found as:

(2) $$\gamma = \left(\sum_{\alpha} x_{\alpha} \cdot M_{\alpha} \right) / M_{\text{ref}}$$

where M_{ref} is the molar mass of the reference fluid (usually, water or air depending on the context).

The (2) does not depend on mixture temperature and pressure explicitly but it does implicitly through the corresponding value of the reference fluid molar mass M_{ref}.

The usual practice is to calculate the fluid mixture density at STP and then use pressure-density correlations to predict its properties at various temperature and pressure.

Here is the list of the molar mass for popular pure petroleum hydrocarbons : Alkanes.

See Also

Natural Science / Chemistry / Chemical Substance / Mixture / Mixture composition

[Pure substance][Mole fraction]

[Alkanes]