

IdealGasMixtureProps

IdealGasMixtureProps is an EES Procedure that will determine the specific enthalpy, entropy, viscosity and thermal conductivity of a mixture of ideal gases.

Inputs:

- F\$ a string constant or string variable that contains the names of 1 or more (up to 20) names of ideal gases that are contained in the EES property library. The names of the gases are separated with a + sign, e.g., 'CH4+C3H8'
- T the temperature in the units EES is configured to work in.
- P the pressure in the units EES is configured to work in. (Pressure is used only for calculation of specific entropy)
- f[1..N] the mass or mole fractions of the gases represented by string F\$. The sum of the values of f must add to 1.0. Supply mass fractions if EES is configured to work with specific properties on a mass basis. Otherwise, supply mole fractions.

Outputs:

- MW The molar mass of the mixture in kg/kmol or lb_m/lbmol
- h the specific enthalpy of the mixture determined as the mole fraction-weighted average of the gases in the mixture. The units of h will be returned on a per unit mass basis if EES is configured to provide properties on a mass basis. Otherwise the units of h will be returned on a molar basis.
- s the specific entropy of the mixture determined as the mole fraction-weighted average of the gases in the mixture plus the entropy change of mixing the gases. The units of s will be returned on a per unit mass basis if EES is configured to provide properties on a mass basis. Otherwise the units of s will be returned on a molar basis.
- mu The viscosity of the gas mixture determined using the Wilke Approximation as described in Eq. 9-5.2 of Reid, Prausnitz, and Sherwood.
- k The thermal conductivity of the gas mixture determined using the Mason and Saxena modification, as described in Eq. 10-6.2. of Reid, Prausnitz, and Sherwood.

Reference:

Reid, Prausnitz, and Sherwood, 3rd edition, McGraw-Hill, (1977).

Example:

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$UnitSystem SI C kPa molar kJ
F$='CH4+C4H10'
T=20 [C]
P=101.3 [kPa]
N=2
y[1..N]=[0.697,0.303]
call IdealGasMixtureProps(F$,T,P,y[1..N]): MW, h, s, mu, k
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Unit Settings: SI C kPa kJ molar deg

F\$ = 'CH4+C4H10'

h = -90377 [kJ/kmol]

k = 0.02466 [W/m-K]

μ = 0.000009313 [kg/m-s]

MW = 28.79 [kg/kmol]

N = 2

P = 101.3 [kPa]

s = 227.9 [kJ/kmol-K]

T = 20 [C]