Property Library for Methanol

LibCH3OH

Prof. Hans-Joachim Kretzschmar
Dr. Sebastian Herrmann
Dr. Matthias Kunick
Ines Jaehne
M. Hempel

Property Functions of the "Methanol LibCH3OH" Library

Functional dependence	Function name	Function call from Fortran	Property or function	Unit of calculated value
c_p = f(p,t,x)	cp_ptx_CH3OH	CP_PTX_CH3OH(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
h = f(p,t,x)	h_ptx_CH3OH	H_PTX_CH3OH(P,T,X)	Specific enthalpy	kJ/kg
κ = f(p,t,x)	ka_ptx_CH3OH	KA_PTX_CH3OH(P,T,X)	Isentropic exponent	-
p_{mel} = f(t)	pmel_t_CH3OH	PMEL_T_CH3OH(T)	Melting pressure from temperature	bar
p_s = f(t)	ps_t_CH3OH	PS_T_CH3OH(T)	Vapor pressure from temperature	bar
s = f(p,t,x)	s_ptx_CH3OH	S_PTX_CH3OH(P,T,X)	Specific entropy	kJ/(kg K)
t = f(p,h)	t_ph_CH3OH	T_PH_CH3OH(P,H)	Backward function: temperature from pressure and enthalpy	°C
t = f(p,s)	t_ps_CH3OH	T_PS_CH3OH(P,S)	Backward function: temperature from pressure and entropy	°C
t_{mel} = f(p)	tmel_p_CH3OH	TMEL_P_CH3OH(P)	Melting temperature from pressure	°C
t_s = f(p)	ts_p_CH3OH	TS_P_CH3OH(P)	Saturation temperature from	°C
v = f(p,t,x)	v_ptx_CH3OH	V_PTX_CH3OH(P,T,X)	Specific volume	m³/kg
w = f(p,t,x)	w_ptx_CH3OH	W_PTX_CH3OH(P,T,X)	Speed of sound	m²/s
x = f(p,h)	x_ph_CH3OH	X_PH_CH3OH(P,H)	Backward function: vapor fraction from pressure and enthalpy	kg/kg
x = f(p,s)	x_ps_CH3OH	X_PS_CH3OH(P,S)	Backward function: vapor fraction from pressure and entropy	kg/kg

Units: t in °C

p in bar

x in kg saturated vapor / kg wet steam

Range of validity: **Reference state:**

Temperature range: from t_{mel}(p) up to 620 °C at $p \geq p_t$ = 1.864*10–6 bar h = –1189.0680819098 kJ/kg   and

Pressure range: from 0.05 bar up to 8000 bar s = –3.52437307719933 kJ/(kg K)

at p = 1.01325 bar and t = 25 °C

Details on the vapor fraction *x* and on the calculation of wet steam

The wet steam region is calculated automatically by the subprograms. For this purpose the following fixed details on the vapor fraction *x* are to be considered:

<u>Single-phase region</u>

If the state point to be calculated is located in the single-phase region (liquid or superheated steam) x = –1 must be entered as a pro-forma value.

<u>Wet-steam region</u>

If the state point to be calculated is located in the wet steam region, a value for *x* between 0 and 1 (x = 0 for saturated liquid, x = 1 for saturated steam) must be entered. In this case, the backward functions result in the appropriate value between 0 and 1 for *x*. When calculating wet steam either the given value for *t* <u>and</u> p = -1 or the given value for *p* <u>and</u> t = -1 and in both cases the value for *x* between 0 and 1 must be entered.

If *p* <u>and</u> *t* <u>and</u> *x* are entered as given values, the program considers *p* and *t* to be appropriate to represent the vapor pressure curve. If this is not the case the calculation for the property of the chosen function results in –1.

Wet steam region: Temperature ranges from t_t = –97.54 °C to t_c = 240.23 °C

Pressure ranges from p_t = 1.864*10–6 bar to p_c = 82.1585 bar

Please note.

If the calculation results in –1000 values have been entered outside the range of validity. For further information on each function and its range of validity see the software documentation in chapter 3.