KCE

ThermoFluidProperties

Property Library for Toluene

LibC7H8

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Property Functions

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
$a = f(p,t,x)$	a_ptx_C7H8	A_PTX_C7H8(P,T,X)	Thermal diffusivity	m²/s
$c_p = f(p,t,x)$	cp_ptx_C7H8	CP_PTX_C7H8(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = f(p,t,x)$	cv_ptx_C7H8	CV_PTX_C7H8(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\eta = f(p,t,x)$	eta_ptx_C7H8	ETA_PTX_C7H8(P,T,X)	Dynamic viscosity	Pa . s
$h = f(p,t,x)$	h_ptx_C7H8	H_PTX_C7H8(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = f(p,t,x)$	ka_ptx_C7H8	KA_PTX_C7H8(P,T,X)	Isentropic exponent	-
$\lambda = f(p,t,x)$	lam_ptx_C7H8	LAM_PTX_C7H8(P,T,X)	Thermal conductivity	W/(m . K)
$\nu = f(p,t,x)$	ny_ptx_C7H8	NY_PTX_C7H8(P,T,X)	Kinematic viscosity	m²/s
$Pr = f(p,t,x)$	pr_ptx_C7H8	PR_PTX_C7H8(P,T,X)	*Prandtl*-number	-
$p_s = f(t)$	ps_t_C7H8	PS_T_C7H8(T)	Vapor pressure from temperature	bar
$\rho = f(p,t,x)$	rho_ptx_C7H8	RHO_PTX_C7H8(P,T,X)	Density	kg/m^3
$s = f(p,t,x)$	s_ptx_C7H8	S_PTX_C7H8(P,T,X)	Specific entropy	kJ/(kg K)
$\sigma = f(t)$	sigma_t_C7H8	SIGMA_T_C7H8(T)	Surface tension from temperature	N/m
$t = f(p,h)$	t_ph_C7H8	T_PH_C7H8(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = f(p,s)$	t_ps_C7H8	T_PS_C7H8(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_s = f(p)$	ts_p_C7H8	TS_P_C7H8(P)	Saturation temperature from pressure	°C
$u = f(p,t,x)$	u_ptx_C7H8	U_PTX_C7H8(P,T,X)	Specific internal energy	kJ/kg
$v = f(p,t,x)$	v_ptx_C7H8	V_PTX_C7H8(P,T,X)	Specific volume	m³/kg
$w = f(p,t,x)$	w_ptx_C7H8	W_PTX_C7H8(P,T,X)	Isentropic speed of sound	m/s

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
$x = f(p,h)$	x_ph_C7H8	X_PH_C7H8(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
$x = f(p,s)$	x_ps_C7H8	X_PS_C7H8(P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg

Units: *t* in °C

p in bar

x in (kg saturated steam)/(kg wet steam)

Range of validity

Temperature range: from - 95.15 °C to 426.85 °C

Pressure range: from 3.93935×10^{-7} bar to 5000 bar

Reference state

$h = 0$ kJ/kg and $s = 0$ kJ/(kg K) at $p = 1{,}01325$ bar on the saturated liquid line (x = 0)

Details on the vapor fraction *x*

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:

Single-phase region

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.

Wet-steam region

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* and p = -1000 or the given value for *p* and t = -1000 and in both cases the value for *x* between 0 and 1 must be entered.

If *p* and *t* and *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_{min} = - 95.15 °C to t_c = 318.6 °C

Pressure ranges from p_{min} = 3.93935 x 10^{-7} bar to p_c = 41.2639 bar

Note:

If the input values are located outside the range of validity, the calculated function will always result in –1000. Please find more exact details on every function and its corresponding range of validity in the enclosed software documentation in Chapter 3.