KCE
ThermoFluidProperties

Property Library for Mixtures of Water/Lithium Bromide

LibWaLi

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Property Functions

Functional Dependence	Function Name	Call from Fortran program	Property or Function	Unit of the result
$c_p = f(p,t,\xi)$	cp_ptxi_WaLi	CP_PTXI_WALI(P,T,XI)	Specific isobaric heat capacity	kJ/(kg K)
$c'_p = f(p_s,t_s,\xi')$	cpl_pstsxil_WaLi	CPL_WALI(PS,TS,XIL)	Specific isobaric heat capacity of saturated liquid	kJ/(kg K)
$c''_p = f(p_s,t_s,\xi')$	cpv_pstsxil_WaLi	CPV_WALI(PS,TS,XIL)	Specific isobaric heat capacity of saturated steam	kJ/(kg K)
$\eta = f(p,t,\xi)$	eta_ptxi_WaLi	ETA_PTXI_WALI(P,T,XI)	Dynamic viscosity	Pa s
$\eta' = f(p_s,t_s,\xi')$	etal_pstsxil_WaLi	ETAL_WALI(PS,TS,XIL)	Dynamic viscosity of saturated liquid	Pa s
$\eta'' = f(p_s,t_s,\xi')$	etav_pstsxil_WaLi	ETAV_WALI(PS,TS,XIL)	Dynamic viscosity of saturated steam	Pa s
$h = f(p,t,\xi)$	h_ptxi_WaLi	H_PTXI_WALI(P,T,XI)	Specific enthalpy	kJ/kg
$h' = f(p_s,t_s,\xi')$	hl_pstsxil_WaLi	HL_WALI(PS,TS,XIL)	Specific enthalpy of saturated liquid	kJ/kg
$h'' = f(p_s,t_s,\xi')$	hv_pstsxil_WaLi	HV_WALI(PS,TS,XIL)	Specific enthalpy of saturated steam	kJ/kg
$h_{sol} = f(\xi)$	hsol_xi_WaLi	HSOL_XI_WALI(XI)	Specific enthalpy at the crystallization barrier	kJ/kg
$\lambda = f(p,t,\xi)$	lam_ptxi_WaLi	LAM_PTXI_WALI(P,T,XI)	Thermal conductivity	W/(m K)
$\lambda' = f(p_s,t_s,\xi')$	laml_pstsxil_WaLi	LAML_WALI(PS,TS,XIL)	Thermal conductivity of saturated liquid	W/(m K)
$\lambda'' = f(p_s,t_s,\xi')$	lamv_pstsxil_WaLi	LAMV_WALI(PS,TS,XIL)	Thermal conductivity of saturated steam	W/(m K)
$\nu = f(p,t,\xi)$	ny_ptxi_WaLi	NY_PTXI_WALI(P,T,XI)	Kinematic viscosity	m^2/s
$\nu' = f(p_s,t_s,\xi')$	nyl_pstsxil_WaLi	NYL_WALI(PS,TS,XIL)	Kinematic viscosity of saturated liquid	m^2/s
$\nu'' = f(p_s,t_s,\xi')$	nyv_pstsxil_WaLi	NYV_WALI(PS,TS,XIL)	Kinematic viscosity of saturated steam	m^2/s
$Pr = f(p,t,\xi)$	Pr_ptxi_WaLi	PR_PTXI_WALI(P,T,XI)	*Prandtl*-Number	-
$Pr' = f(p_s,t_s,\xi')$	Prl_pstsxil_WaLi	PRL_WALI(PS,TS,XIL)	*Prandtl*-Number of saturated liquid	-
$Pr'' = f(p_s,t_s,\xi')$	Prv_pstsxil_WaLi	PRV_WALI(PS,TS,XIL)	*Prandtl*-Number of saturated steam	-
$p_s = f(t_s,\xi')$	ps_tsxil_WaLi	PS_TSXIL_WALI(TS,XIL)	Vapor pressure	bar
$p_{sol} = f(t)$	psol_t_WaLi	PSOL_T_WALI(T)	Pressure at the crystallization barrier	bar
$Region = f(p,t,\xi)$	region_ptxi_WaLi	REGION_PTXI_WALI(P,T,XI)	Phase region from pressure, temperature and mass fraction of H_2O	-
$Region = f(p,h,\xi)$	region_phxi_WaLi	REGION_PHXI_WALI(P,H,XI)	Phase region from pressure, enthalpy and mass fraction of H_2O	-
$Region = f(p,s,\xi)$	region_psxi_WaLi	REGION_PSXI_WALI(P,S,XI)	Phase region from pressure, entropy and mass fraction of H_2O	-
$s = f(p,t,\xi)$	s_ptxi_WaLi	S_PTXI_WALI(P,T,XI)	Specific entropy	kJ/(kg K)
$s' = f(p_s,t_s,\xi')$	sl_pstsxil_WaLi	SL_WALI(PS,TS,XIL)	Specific entropy of saturated liquid	kJ/(kg K)

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$s'' = f(p_s,t_s,\xi')$	sv_pstsxil_WaLi	SV_WALI(PS,TS,XIL)	Specific entropy of saturated steam	kJ/(kg K)
$t = f(p,h,\xi)$	t_phxi_WaLi	T_PHXI_WALI(P,H,XI)	Backward function: Temperature from pressure, enthalpy and mass fraction of H_2O	°C
$t = f(p,s,\xi)$	t_psxi_WaLi	T_PSXI_WALI(P,S,XI)	Backward function: Temperature from pressure, entropy and mass fraction of H_2O	°C
$t_s = f(p_s,\xi')$	ts_psxil_WaLi	TS_PSXIL_WALI(PS,XIL)	Saturation temperature	°C
$t_{sol} = f(p)$	tsol_p_WaLi	TSOL_P_WALI(P)	Temperature at the crystallization barrier	°C
$v = f(p,t,\xi)$	v_ptxi_WaLi	V_PTXI_WALI(P,T,XI)	Specific volume	m^3/kg
$v' = f(p_s,t_s,\xi')$	vl_pstsxil_WaLi	VL_WALI(PS,TS,XIL)	Specific volume of saturated liquid	m^3/kg
$v'' = f(p_s,t_s,\xi')$	vv_pstsxil_WaLi	VV_WALI(PS,TS,XIL)	Specific volume of saturated steam	m^3/kg
$\xi' = f(p_s,t_s)$	xil_psts_WaLi	XIL_PSTS_WALI(PS,TS)	Mass fraction H_2O of saturated liquid	kg/kg
$\xi_{sol} = f(p)$	xisol_p_WaLi	XISOL_P_WALI(P)	Mass fraction H_2O at the crystallization barrier	kg/kg
$\xi'' = f(p_s,t_s)$	xiv_psts_WaLi	XIV_PSTS_WALI(PS,TS)	Mass fraction H_2O of saturated steam	kg/kg

Units:

t	in °C
p	in bar
ξ	in (kg H_2O)/(kg mixture)

Important hints for the calculation of wet steam

The wet steam region is calculated automatically by the subprograms, which are valid within the entire range of state.

It is necessary to define two parameters for the functions of saturated liquids (...′) and saturated steam (...″).

- either t_s and ξ'
- or p_s and ξ'
- or p_s and t_s

and –1 must be entered as a pro-forma value for the value which is not given. When p_s, t_s, and ξ' are entered, the program will consider p_s, t_s, and ξ' to be appropriate to represent the saturation curve p_s. If this is not the case the calculation for the quantity of the chosen function to be calculated results in –1000.

Range of validity

Temperature range:	from 0 °C to 210 °C
Pressure range:	from 0.00074 bar to 10 bar
Composition range:	from 0.3 to 1.0 (kg H_2O)/(kg mixture)

Reference state

Water:	Triple point for saturated liquid
	h_{H2O} = 0.000611783 kJ/kg and
	s_{H2O} = 0
	at p_{tr} = 0.00611657 bar and t_{tr} = 0.01 °C
Mixture of water/lithium bromide:	saturated liquid
	$h_{0.5}$ = −0.0209415 kJ/kg and
	$s_{0.5}$ = −0,0000780433 kJ/(kg K)
	at t = 0 °C and ξ = 0.5 kg H_2O / kg

Note.

If the calculation results in –1000, the values entered represent a state point outside the range of validity of LibWaLi. For further information on each function and its range of validity see Chapter 3. The same information may also be accessed via the online help pages.