Total Entropy of Steam

Entropy of Water

The change of entropy can be expressed as:

$$dS = \log_e(T_1/T) \qquad (1)$$

where

T = absolute temperature (K)

The entropy of water above freezing point can be expressed as:

$$dS = \log_e(T_1/273) \qquad (2)$$

Entropy of Evaporation

Change of Entropy during evaporation

$$dS = dL/T \qquad (3)$$

where

L = latent heat (J)

Entropy of wet steam

The entropy of wet steam can be expresses as:

$$dS = \log_e(T_1/273) + \zeta(L_1/T_1) \qquad (4)$$

where

ζ = dryness fraction

Entropy of superheated steam

Change of entropy during super-heating can be expressed as

$$dS = c_p \log_e(T/T_1) \qquad (5)$$

where

c_p= specific heat capacity at constant pressure for steam (kJ/kgK)

The entropy of superheated steam can be expressed as:

$$dS = \log_e(T_1/273) + L_1/T_1 + c_p \log_e(T_s/T_1) \hspace{3cm} (6)$$

where

T_s = absolute temperature of superheated steam

T_1 = absolute temperature of evaporation