ECE 309 M.M. Yovanovich

Quality of Mixtures of Saturated Liquid and Its Vapor

The quality of mixture is defined as the **fraction** of the **total mass** which is saturated **vapor**:

$$\boxed{x = \frac{\text{mass of vapor}}{\text{total mass of mixture}} = \frac{M_g}{M_g + M_f}}$$

$x = 0$ denotes 0% vapor and 100% liquid, while $x = 1$ denotes 100% vapor and 0% liquid; $0 \le x \le 1$; properties (v, u, h, s) of a mixture given x are obtained from:

$$v = (1 - x)v_f + xv_g = v_f + xv_{fg}$$

$$u = (1 - x)u_f + xu_g = u_f + xu_{fg}$$

$$h = (1 - x)h_f + xh_g = h_f + xh_{fg}$$

$$s = (1 - x)s_f + xs_g = s_f + xs_{fg}$$

Other properties of a liquid-vapor mixture are obtained in the same manner.