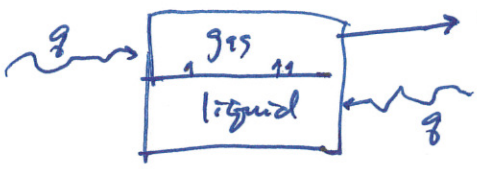

Cleantor Example

Liq. Phase

$$\frac{dn_L}{dt} = -\dot{n}_{out}$$

$$= -kA\left(\frac{P_{sat}(T_L)}{RT_L} - \frac{P}{RT_V}\right)$$

$$\frac{dn_L U_L}{dt} = q - \dot{n}_{out}\,\Delta H_{vap}(T_L)$$

$$\bar{U}_L\frac{dn_L}{dt} + n_L\frac{d\bar{U}_L}{dt} = q - \dot{n}_{out}\Delta H_{vap}$$

Gas Phase (from Liq.)

$$\frac{dn_V}{dt} = \dot{n}_{in} - \dot{n}_{out}$$

$\dot{n}_{out} = f(P, \text{area})$ for orifice

$$\frac{dn_V \bar{U}_V}{dt} = \dot{n}_{in}\bar{H}_V^{LT} - \dot{n}_{out}\bar{H}_V + q$$

$$q = Ah(T_S - T_{L,V})$$

Equations (4): $\frac{dT_L}{dt}, \frac{dT_V}{dt}, \frac{dn_L}{dt}, \frac{dn_V}{dt}$

Variables (4) T_L, T_V, n_L, n_V

> q can get P_{sat} or P from those

Simpler Example

$$\frac{dn}{dt} = -\dot{n}_{out}$$

$\dot{n}_{out} = f(P, \text{area})$ for orifice

$$\frac{dn\bar{U}}{dt} = -\dot{n}_{out}\bar{H} + q$$

$$\bar{u}\frac{dn}{dt} + nC_V\frac{dT}{dt} = -\dot{n}_{out}\bar{H} + q$$

$$nC_V\frac{dT}{dt} = \dot{n}_{out}(\bar{H} - \bar{u}) + q$$

$$nC_V\frac{dT}{dt} = -\dot{n}_{out}(PV) + q$$