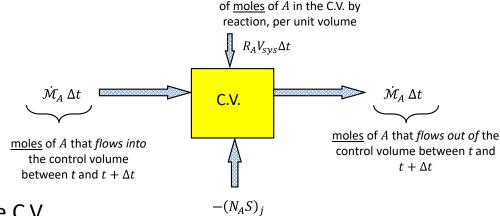


accumulation = net flow in + production + introduction

$$\frac{d}{dt}(\mathcal{M}_{A,Sys}) = -\Delta \dot{\mathcal{M}}_A + R_A V_{Sys} - \sum_j (N_A S)_j$$



 R_A = net rate of production

 $\mathcal{M}_{A,SyS} = c_A V_{SyS} = \text{total moles of } A \text{ in the C.V.}$

$$\Delta \dot{\mathcal{M}}_A = \sum_{j,outs} \dot{\mathcal{M}}_{A,j} - \sum_{j,ins} \dot{\mathcal{M}}_{A,j} = \text{bulk out}$$

 $R_A = \text{net rate of production of moles of } A \text{ in the}$ C.V. by reaction, per unit volume

 V_{SVS} = system volume

 $N_{A_j} = K\Delta c_{df} = \text{molar flux of } A \text{ out through the } j^{th} \text{ C.S.}$

introduction of <u>moles</u> of A into the C.V. by mass transfer across the j^{th} bounding control surface S_i (C.S.)

$$S_{sys} = \sum_{j} S_{j}$$

 Δ is "out"- "in"

C.S. = control surface

C.V. = control volume

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