✡ This only works if CO_2 is limiting reactant

Heterogeneous Chemical Equilibria (Constant Volume)

- First find K_a

$$K_a = \left[\exp\left(\frac{-\Delta G^\circ_R}{RT}\right)\right]\exp\left[\frac{-\Delta H^\circ}{R}\left(\frac{1}{T}-\frac{1}{T_R}\right)\right]$$

$$K_a = P$$

- Since we are assuming CO_2 is an ideal gas, we can find the # of moles of CO_2 from the ideal gas law

$$n_{co_2} = \frac{PV}{RT}$$

- This is the # of moles of CO_2 at equilibrium. Using this & the amount of CO_2 initially in the container, we can find extent of reaction

$$\xi = \frac{n_i - n_{io}}{\nu_i} = \frac{(PV/RT) - n_{co_2 o}}{1}$$

- Using the extent of reaction, you can find the equilibrium compositions of the other species

Equilibrium Compositions

$$n_{cao} = n_{cao(o)} + \xi$$
$$n_{caco_3} = n_{caco_3(o)} - \xi$$

- Using the solid species densities, you can find their volumes

ξ M.W.