

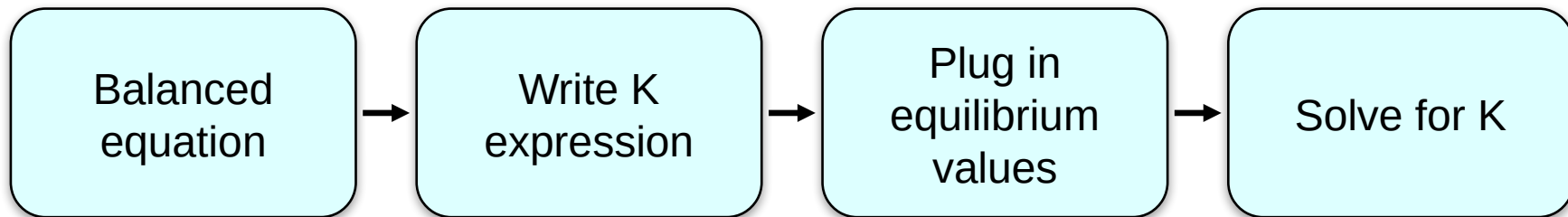
Calculating the Equilibrium Constant

Essential Question

How do we find K from lab data?

From Data to K

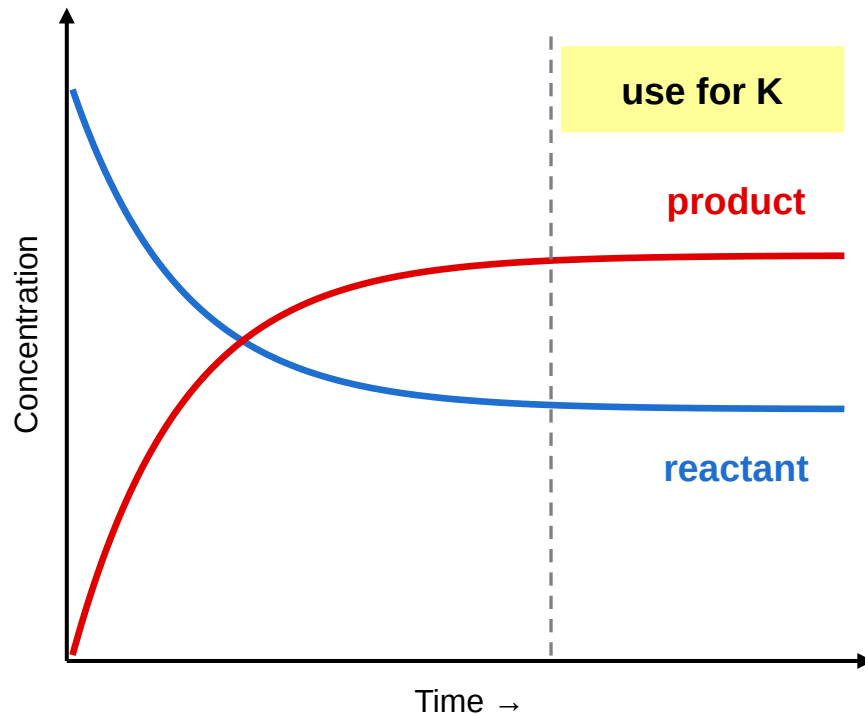
- Measure amounts at equilibrium
- Plug them into the K expression



Calculating the Equilibrium Constant

Use Equilibrium Values Only

- Values after the curves flatten
→ K
- Values before equilibrium → Q



K_c Needs Molarity

- Convert moles to mol/L first
- K_p uses pressures (atm)

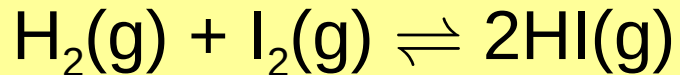
$$M = \frac{\text{mol}}{\text{L}}$$

0.50 mol in 2.0 L
→ 0.25 M

Calculating the Equilibrium Constant

Example: K_c from Concentrations

At equilibrium, a flask contains these concentrations. Calculate K_c .



$[\text{H}_2]$	$[\text{I}_2]$	$[\text{HI}]$
0.0222 M	0.0222 M	0.156 M

Calculating the Equilibrium Constant

Example: Starting with Moles

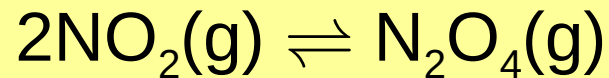
A 2.00 L flask at equilibrium contains 0.180 mol PCl_5 , 0.0400 mol PCl_3 , and 0.0400 mol Cl_2 . Calculate K_c .



Calculating the Equilibrium Constant

Example: K_p from Pressures

At equilibrium, $P_{\text{NO}_2} = 0.250 \text{ atm}$ and $P_{\text{N}_2\text{O}_4} = 0.420 \text{ atm}$. Calculate K_p .



Example: A Solid Is Present

A sealed container holds 5.0 g $\text{CaCO}_3(\text{s})$ at equilibrium.

$P_{\text{CO}_2} = 0.220 \text{ atm}$. Calculate K_p .



Big Ideas

- K comes from measured equilibrium values
- K_c : molarity. K_p : pressure
- Convert moles to M first
- Leave out solids and liquids

