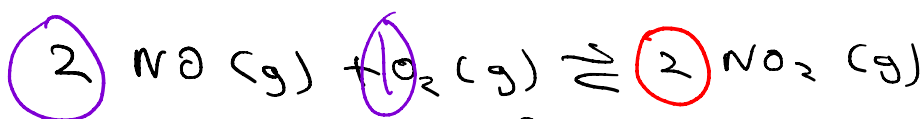


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## Quiz 2 Topics

- Reaction coordinate diagram
- Reaction progress diagram
- Equilibrium - 3 definitions
- $K$  and  $Q$
- Is  $Q = K$ ?
- Writing equilibrium constants
  - $K = \frac{[C]^c [D]^d}{[A]^a [B]^b}$
  - no activity
  - pure solids or liquids
- $K_c$  vs  $K_p$
- no ICE
- no  $K_a$



$$K_p = \frac{P_{\text{NO}_2}^2}{P_{\text{NO}}^2 \cdot P_{\text{O}_2}}$$

$$PV = nRT \quad nRT = PV$$

$$\left(\frac{n}{V}\right) = \frac{P}{RT} = [X]$$

$$K_c = \frac{[\text{NO}_2]^2}{[\text{NO}]^2 [\text{O}_2]} = \frac{\left(P_{\text{NO}_2} \cdot \frac{1}{RT}\right)^2}{\left(P_{\text{NO}} \cdot \frac{1}{RT}\right)^2 \left(P_{\text{O}_2} \cdot \frac{1}{RT}\right)}$$

$$= \frac{\left(\frac{P_{\text{NO}_2}}{P_{\text{NO}}^2 \cdot P_{\text{O}_2}}\right)}{\left(\frac{1}{RT}\right)^2 \left(\frac{1}{RT}\right)}$$

$$K_c = K_p \cdot \frac{(\frac{1}{RT})^{\textcircled{2}} \text{ moles of product}}{(\frac{1}{RT})^{\textcircled{3}} \text{ moles of reactant}}$$

$$K_c = K_p \cdot (\frac{1}{RT})^{2-3} = K_p \cdot (\frac{1}{RT})^{-1}$$

$$= K_p \cdot RT$$

In general:

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$$K_c = K_p \cdot (V/RT)^{\Delta n}$$

$$K_p = K_c \cdot (RT)^{\Delta n}$$



difference in moles of products  
and moles of reactants

$$\Delta n = n_{\text{products}} - n_{\text{reactants}}$$