

Homogeneous Equilibria

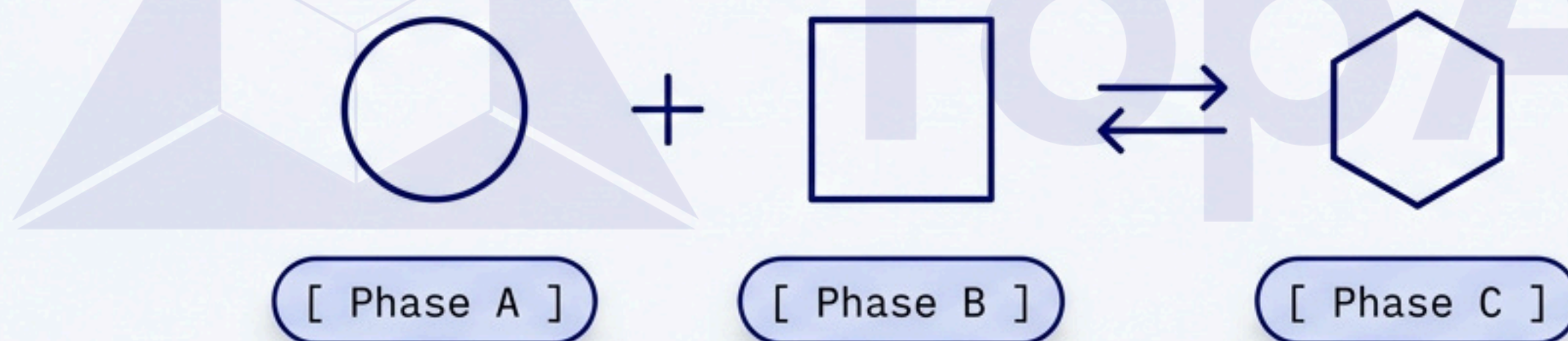
Mastering single-phase chemical systems and equilibrium expressions.



[Focus: Concept & Examples]

The 'One Phase' Rule

A homogeneous system is one where all reactants and products are in the exact same phase.

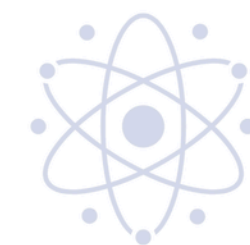


Exam Tip: The phase can be gaseous (g), liquid (l), or aqueous (aq)—as long as it remains completely uniform throughout the closed system.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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Key Highlights

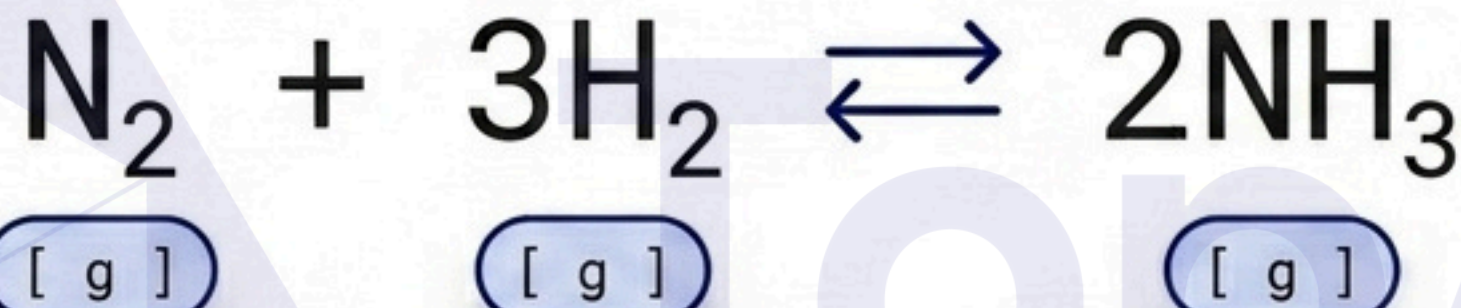
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Gas Phase Equilibrium

Reaction Card

[Uniform Gaseous Mixture]

*Synthesis of Ammonia (Haber Process)*

Equilibrium Expressions

$$K_c = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$$

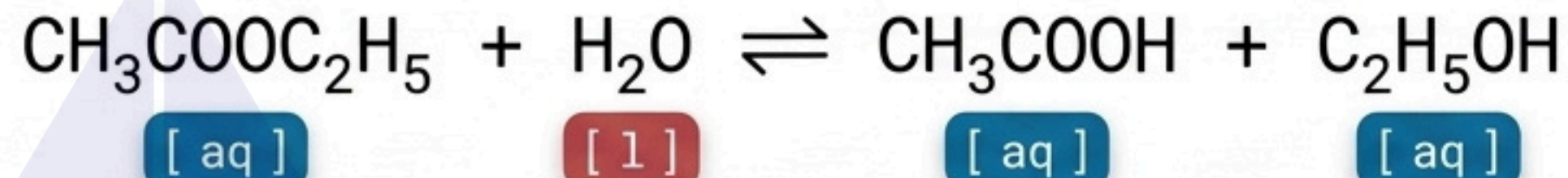
$$K_p = \frac{(p_{\text{NH}_3})^2}{p_{\text{N}_2} \cdot (p_{\text{H}_2})^3}$$

SOLUTION SYSTEMS

Aqueous Phase Equilibrium

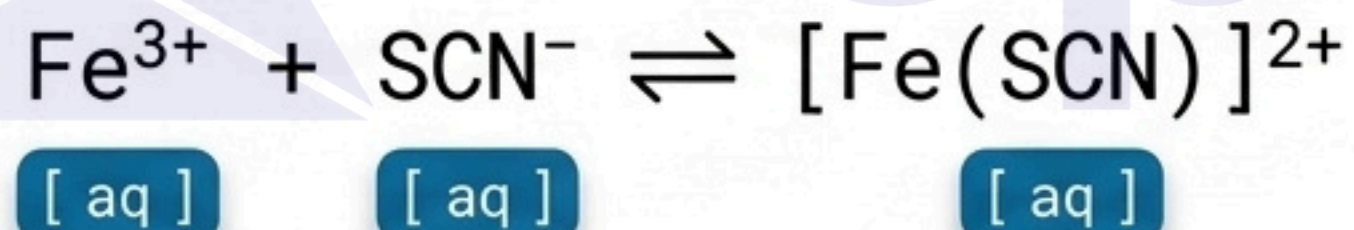


Ester Hydrolysis



Note: Even though water is a pure liquid (l) and the organics are aqueous (aq), they completely mix to form a single, uniform solution phase.

Iron-Thiocyanate Complex



Constant for Aqueous Ions (Reaction 2)

$$K_c = \frac{[\text{Fe}(\text{SCN})]^{2+}}{[\text{Fe}^{3+}][\text{SCN}^-]}$$

The Bottom Line

HOMOGENEOUS EQUILIBRIUM = ONE COMMON PHASE

Check the State.

Look for identical state symbols (g), (l), or (aq) across all components in the balanced equation.

Write the Expression.

Use molar concentrations (K_c) for aqueous/liquid solutions, or partial pressures (K_p) for gaseous systems.

Verify the System.

Ensure the reaction is occurring in a closed container at a constant temperature.

Mastery achieved: You are ready to calculate K_c and K_p for homogeneous systems.



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