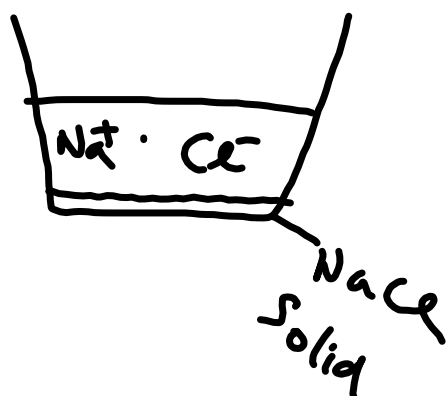


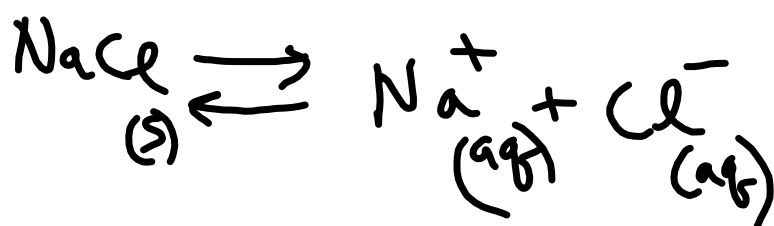
Le Chatelier's Principle-Problems

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a.	<u>Stress</u>	<u>Shift</u>	<u>Consequence</u>
	↑ $[NH_3]$	products	NO ↑
	↑ $[O_2]$		
	↓ temp		
	↓ press.		
	↓ H_2O		
	↓ NO		

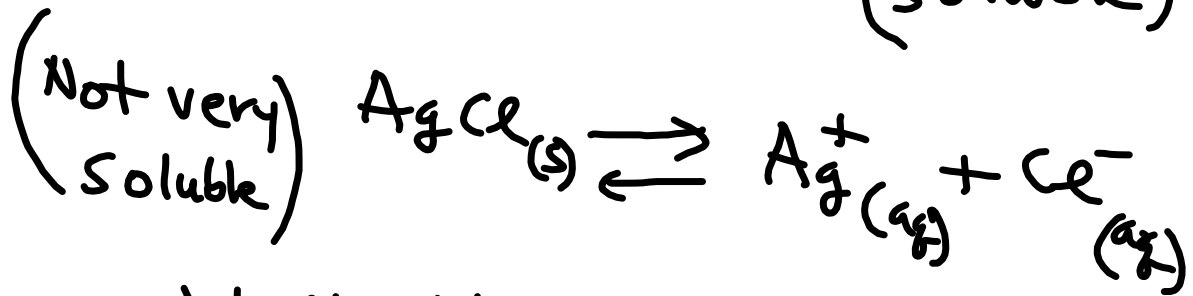
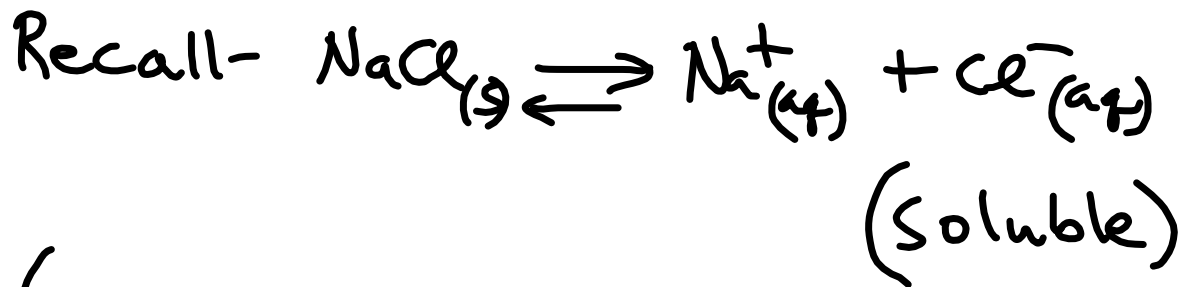
Solubility Equilibrium- Ksp

Saturated
NaCl solution



- Stress - $\uparrow [\text{Cl}^-]$ by adding HCl
- Shift to reduce Cl^- by moving to reactants
 - $\text{NaCl}_{(s)}$ produced

The Ksp Expression



Write the Keq expression-

$$K_{eq} = \frac{[\text{Ag}^+][\text{Cl}^-]}{[\text{AgCl}]}$$

$\xrightarrow{\text{Constant}}$
 $\xleftarrow{\text{Solid } [\text{AgCl}] \text{ is constant}}$

$$K_{eq} \times [\text{AgCl}] = [\text{Ag}^+][\text{Cl}^-]$$

$\xrightarrow{\text{New constant}}$

$$K_{sp} = [\text{Ag}^+][\text{Cl}^-]$$

$\xrightarrow{\text{Solubility Product Constant } (K_{sp})}$
 $\xleftarrow{1.8 \times 10^{-10}}$

Ksp Problems

A. Given solubility \rightarrow find K_{sp}

B. Given K_{sp} \rightarrow find solubility

A. A substance XY has a solubility of 1.4×10^{-5} mol/L. Calculate K_{sp}

$$XY(s) \rightleftharpoons X^+(aq) + Y^-(aq)$$

		$X^+(aq)$	$Y^-(aq)$
I	}	0	0
C		1.4×10^{-5}	1.4×10^{-5}
E		1.4×10^{-5}	1.4×10^{-5}

$$\begin{aligned}
 K_{sp} &= [X^+][Y^-] \\
 &= (1.4 \times 10^{-5})(1.4 \times 10^{-5}) \\
 &= 1.96 \times 10^{-10}
 \end{aligned}$$

B. Find the solubility of all ions in a saturated solution of AgCl . ($K_{sp} = 1.8 \times 10^{-10}$)

$$\text{AgCl}_{(s)} \rightleftharpoons \text{Ag}^+_{(aq)} + \text{Cl}^-_{(aq)}$$

		$\text{Ag}^+_{(aq)}$	$+$	$\text{Cl}^-_{(aq)}$
l	}	0		0
c		x		x
e		x		x

$$K_{sp} = [\text{Ag}^+] [\text{Cl}^-]$$

$$1.8 \times 10^{-10} = x \cdot x$$

$$\sqrt{1.8 \times 10^{-10}} = \sqrt{x^2}$$

$$1.3 \times 10^{-5} = x = [\text{Ag}^+] = [\text{Cl}^-]$$

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