

**Chemistry 1210**  
**Equilibrium and Solubility Product**

**Name:** \_\_\_\_\_ **Partner:** \_\_\_\_\_

**Date:** \_\_\_\_\_

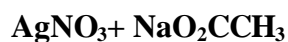
**OBJECTIVE:** To study the general properties of solubility equilibria and to measure the solubility products ( $K_{sp}$ ) of magnesium hydroxide and silver acetate.

**PROCEDURE:** As in the Chemistry 1210 lab manual, pages 68-71.

**PART 1:**

**A) General properties of solubility equilibria.**

Solubility of various silver salts.



Balanced chemical equation	
Net ionic equation	
Observations	

**1st saturated solution +  $\text{NH}_4\text{SCN}$**

Balanced chemical equation	
Net ionic equation	
Observations	

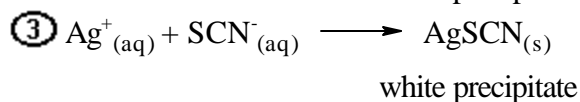
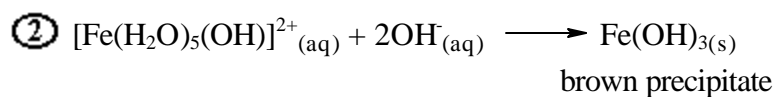
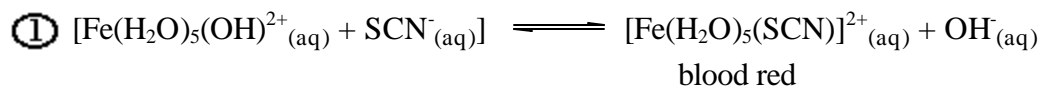
**2nd saturated solution +  $\text{Na}_2\text{S}$**

Balanced chemical equation	
Net ionic equation	
Observations	

Based on your experimental observations from part one, list the silver salts in order of decreasing solubility (most soluble to least soluble).

(i)	
(ii)	
(iii)	
(iv)	

**B) FeSCN<sup>2+</sup> equilibrium system :**



i) **FeSCN<sup>2+</sup> + NaOH**

Observations

Solution before addition of NaOH:

Solution after addition of NaOH:

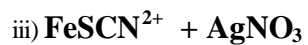
Explanation:

ii) **FeSCN<sup>2+</sup> + NH<sub>4</sub>SCN**

Observations of solution before addition of NH<sub>4</sub>SCN:

Solution after addition of NH<sub>4</sub>SCN:

Explanation:



Observations of solution before addition of  $\text{AgNO}_3$ :

Solution after addition of  $\text{AgNO}_3$ :

Explanation:

### PART 2:

#### Determination of the $\Delta H^\circ$ for $\text{Co}^{2+}/\text{Cl}^-/\text{CoCl}_4^{2-}$ Equilibrium

Observations:

Data		Calculations		
Solution Temp ( $^\circ\text{C}$ )	Absorbance	T( $^\circ\text{K}$ )	1/T( $^\circ\text{K}^{-1}$ )	ln(Absorbance)

From attached graph of  $\ln(\text{Absorbance})$  vs  $1/T$  :

Show calculations for  $\Delta H$  below. Is this reaction (as written on page 69 of the lab manual) exo- or endothermic?

Slope	
$\Delta H$	

**PART 3:**  
**Solubility product of magnesium hydroxide**

	Measured	Calculated
pH of saturated solution of $\text{Mg}(\text{OH})_2$		
Temperature of solution ( $^{\circ}\text{C}$ )		

Calculations:

[OH]	
$[\text{Mg}^{2+}]$	
Calculated $K_{\text{sp}}$	
Literature value (include temperature and quote source)	

Discussion:

Compare the observed pH and  $K_{\text{sp}}$  for magnesium hydroxide with the expected values. Explain any significant differences in the values.

**PART 4:****Solubility product of silver acetate**

Recorded cell voltage	
Temperature of solution	
Calculated $K_{sp}$	
Literature Value (include temperature and quote source)	

Calculations:

Diagram of silver acetate concentration cell: