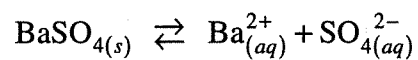


Solubility Scholarship Questions

1. Consider the following equilibrium:



Identify a soluble salt that could be added to the above equilibrium resulting in more solid barium sulphate forming. Explain why more solid forms. (2 marks)

2. A precipitate of magnesium carbonate begins to form when 60.0 mL of magnesium chloride solution of unknown concentration is added to 40.0 mL of 0.0030 M sodium carbonate. Calculate the **initial** concentration of MgCl_2 . (4 marks)

3. A saturated solution of magnesium hydroxide is used to treat acid indigestion.
- a) Calculate the pH of the saturated solution. (4 marks)

4. Use calculations to determine whether a precipitate will form when 75.0 mL of 0.020 M BaCl_2 is added to 125.0 mL of 0.010 M K_2SO_4 . (3 marks)

5. A positive ion exists in an aqueous solution. All attempts to remove the ion from solution by precipitation have failed! Give one example of such an ion and explain this difficulty. (2 marks)

6. A student mixes several solutions of $\text{Ba}(\text{NO}_3)_2$ and NaF until a precipitate begins to form.

The following data were recorded:

	Equilibrium $[\text{Ba}^{2+}]$	Equilibrium $[\text{F}^-]$
Experiment #1	0.036	0.026
Experiment #2	0.074	0.018
Experiment #3	0.050	?

Calculate the $[\text{F}^-]$ present in experiment #3. (4 marks)

7. When 1.0 M NaCl is added to a saturated solution of AgCl, a white precipitate forms. Write the equation of the equilibrium involved, and use this equation to explain the above observation. (3 marks)

8. A solution of Ba(NO₃)₂ is added to a solution of Na₂CO₃, resulting in the formation of a white precipitate that dissolves in HNO₃.

a) Write a net ionic equation to represent the formation of the white precipitate. (1 mark)

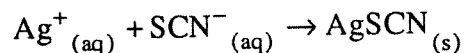
b) Explain why the precipitate dissolves in HNO₃. (1 mark)

9. A student adds Ag⁺ to a solution containing 0.1 M Cl⁻ and 0.1 M CO₃²⁻. Determine the colour of the first precipitate to form, given the following data:

Compound	Colour	K _{sp}
AgCl	white	1.8×10^{-10}
Ag ₂ CO ₃	yellow	6.2×10^{-12}

Justify your answer with appropriate calculations. (4 marks)

10. In an experiment designed to determine the K_{sp} of Ag_2SO_4 , a chemist pipettes 25.00 mL of a saturated solution of Ag_2SO_4 into an Erlenmeyer flask and titrates with 0.102 M KSCN. The reaction is as follows:



The endpoint is reached after 15.15 mL of the 0.102 M KSCN has been added. Using these data, calculate the K_{sp} for Ag_2SO_4 . (5 marks)

11. In an experiment, 0.1 M $AgNO_3$ is added to 0.1 M $NaCl$, resulting in the formation of a white precipitate. When 0.1 M NaI is added to this mixture, the white precipitate dissolves and a yellow precipitate forms.

a) Write the formula for each of the following: (1 mark)

(i) the white precipitate: _____

(ii) the yellow precipitate: _____

b) Write a net ionic equation to represent the formation of the more soluble precipitate. (1 mark)

12. Calculate the maximum mass of Ag_2CrO_4 that can dissolve in 4.0 L of water. The K_{sp} of Ag_2CrO_4 is 1.4×10^{-17} . (4 marks)