

4. A solution which contains only one of the following cations: Ca^{2+} , Cu^{+} , or Sr^{2+} is tested with various reagents and the following results are obtained:

Reagent	Results
0.2M Na_2SO_4	no precipitate
0.2M NaBr	precipitate
0.2M NaNO_3	no precipitate

Which cation does the solution contain? Cu^{+} (1 mark)

5. A solution contains Fe^{3+} , Ca^{2+} , Cu^{+} , and Be^{2+} . What compounds (give correct formula for each compound) could be added, and in what order, to separate these ions. Answer this question by filling in the following chart: (8 marks)

First compound - NaCl (Br, I) (Na_2SO_4)

Net-ionic equation for the precipitation reaction: $\text{Cu}^{+} + \text{Cl}^{-} \rightarrow \text{CuCl(s)}$ ($\text{Ca}^{2+} + \text{SO}_4^{2-} \rightarrow \text{CaSO}_4$)

Second compound - Na_2SO_4 (NaI) (Na_2S)

Net-ionic equation for the precipitation reaction: $\text{Ca}^{2+} + \text{SO}_4^{2-} \rightarrow \text{CaSO}_4$ (CuI , Fe_2S_3)

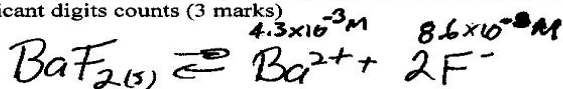
Third compound - Na_2S

Net-ionic equation for the precipitation reaction: $2\text{Fe}^{3+} + 3\text{S}^{2-} \rightarrow \text{Fe}_2\text{S}_3(\text{s})$

Fourth compound - Na_3PO_4 (NaOH) (Na_2CO_3) (Na_2SO_3)

Net-ionic equation for the precipitation reaction: $3\text{Be}^{2+} + 2\text{PO}_4^{3-} \rightarrow \text{Be}_3(\text{PO}_4)_2(\text{s})$

6. A saturated solution of BaF_2 has a $[\text{F}^{-}]$ of $8.6 \times 10^{-3}\text{M}$ at a certain temperature. Calculate the K_{sp} at this temperature. Show all your steps in a logical manner. Correct use of units and significant digits counts (3 marks)



$K_{\text{sp}} = [\text{Ba}^{2+}][\text{F}^{-}]^2$

$(4.3 \times 10^{-3})(8.6 \times 10^{-3})^2 = 3.18 \times 10^{-7}$

Answer $K_{\text{sp}} = 3.2 \times 10^{-7}$