Analytical Chemistry

Question 1: Give a test to distinguish between

1. Sodium carbonate and sodium sulphate
2. Potassium chloride and potassium nitrate
3. Copper carbonate and copper sulphate
4. Lead chloride and lead sulphate
5. Iron (II) sulphate and iron (III) sulphate
6. Calcium sulphate and zinc sulphate
7. Zinc sulphate and aluminium sulphate
8. Ammonium sulphate and ammonium chloride
9. Hydrated copper sulphate and anhydrous copper sulphate
10. Ammonium chloride and sodium chloride

Question 2: Identify the following from the given list [Copper nitrate, Iron (II) sulphate, Iron (III) chloride, Zinc chloride, Magnesium sulphate, Lead nitrate]

1. Which two solutions will give white ppt when treated with dilute hydrochloric acid followed by barium chloride solution?
2. Which two solutions will give a white ppt when treated with dil HNO_3 and $AgNO_3$ solution?
3. Which solution will gave a white ppt when HCl or H_2SO_4 is added to it?
4. Which solution will become inky blue on addition of excess ammonia?
5. Which solution will give a white precipitate with excess ammonium hydroxide solution?

Question 3: Substance 'A' is water-soluble and gives a curdy white ppt, B with silver nitrate solution. B is soluble in ammonium hydroxide but insoluble in dil HNO_3. Substance 'A' reacts with ammonium hydroxide solution to give a white precipitate C, which is soluble in conc. Ammonia. Another solution of D is added to barium nitrate solution. A white ppt E is formed, which is insoluble in dil HCl or $_{HNO3}$. A dirty green ppt F is formed on addition of ammonium hydroxide to a solution of D and the precipitate is insoluble in excess ammonia. The third sample G is a coloured salt, which on heating decomposes leaving a black residue; H. on addition of copper turning and concentrated H_2SO_4 to G produce a coloured acidic gas, J. A solution of G is added to NaOH solution until in excess, a pale blue ppt, I is obtained, which is insoluble in excess of sodium hydroxide, A solution of G is then added to NH_4OH solution in excess to give an inky blue solution K, A solution of G is warmed and hydrogen sulphide gas is passed through it, A black ppt L is formed, identify all A-L elements. And write a balanced chemical equation for all the above reactions.

Question 4: Fill in the blanks in the following table:

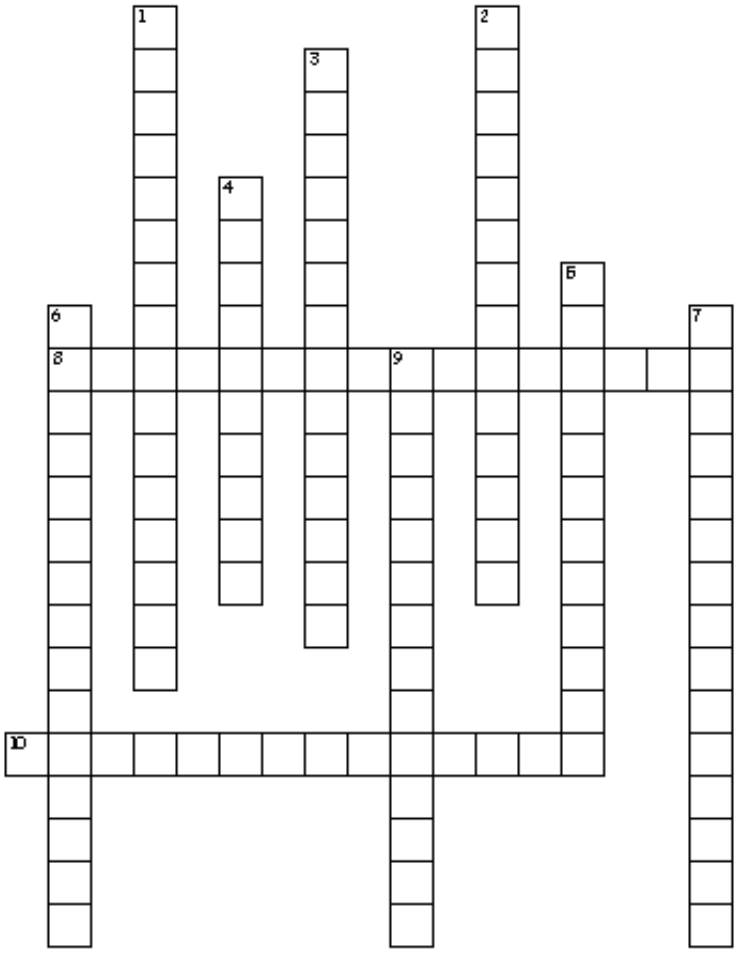
Test	Observation	Inference
To a solution A, barium chloride solution and dil HCl is added		A contains SO_4^{2-} ion
To a solution B, sodium hydroxide solution was added		Contains Fe^{3+} ion
To a solution C ammonium hydroxide is added in excess		Contains Cu^{2+} ion
To a solution D silver nitrate solution with dil HNO_3 is added		Contains Cl^- ion

Question 5: Identify the following cations:
Sodium hydroxide solution is added to solution A. A white ppt is formed which is insoluble in excess sodium hydroxide solution. When ammonium hydroxide is added to solution B, a pale blue precipitate appears, this pale blue ppt disappears with excess of NH_4OH is added to for form a inky blue solution. Solution C produces a dirty green ppt on addition of sodium hydroxide where as solution D produces a yellowish brown ppt.

Question 6: Name the following

1. Two compounds, which produces a white ppt on addition of dil HCl solution.
2. Two compounds which produces a white ppt when NaOH is added in small amount but dissolves in it when added in excess
3. Two compounds which does not produce coloured ppt on addition of aqueous ammonium hydroxide
4. Name three samples, which produces a brown acidic gas on addition of copper turning and concentrated H_2SO_4 and produces coloured ppt on addition of aqueous sodium hydroxide solution.
5. Name two solutions that produce white ppt with small amount of NaOH but dissolve in excess but only one shows similar action with NH_4OH not the other.

Question 7: Fill in the crossword with the given clue below



Across
8. This chloride produces two gases on heating, one of which is acidic another is basic
10. A chloride sample imparts a golden yellow flame on Bunsen flame

Down
1. This metal nitrate produces a lilac flame
2. This metal chloride produces a brown gelatinous ppt on addition of sodium hydroxide
3. A metal sulphate produces a pale blue ppt with small amount of aqueous ammonia
4. This lead salt produces a brown gas when copper turning with concentrated sulphuric acid is added
5. This nitrate precipitate a chalky white ppt when sulphuric acid is added and has apple green flame
6. This metal chloride produces a chalky white ppt on addition of dil sulphuric acid and imparts an reddish flame in flame test.
7. This metal sulphate produces a dirty green ppt on addition of sodium hydroxide
9. The copper salt produces a white ppt when dil silver nitrate and hydrochloric acid is added to it