

## CHAPTER

## 23

## Analytical Chemistry

## Section-A

## JEE Advanced/ IIT-JEE

## A Fill in the Blanks

1. If metal ions of group III are precipitated by  $\text{NH}_4\text{Cl}$  and  $\text{NH}_4\text{OH}$  without prior oxidation by conc.  $\text{HNO}_3$  ..... is not completely precipitated. (1984 - 1 Mark)
2. The formula of the deep red liquid formed on warming dichromate with KCl in concentrated sulphuric acid is ..... (1993 - 1 Mark)

## B True / False

1. Addition of ammonium chloride to a solution containing ferric and magnesium ions is essential for selective precipitation of ferric hydroxide by aqueous ammonia. (1985 - 1/2 Mark)
2. From the acidic solution containing copper (+2) and zinc (+2) ions, copper can be selectively precipitated using sodium sulphide. (1987 - 1 Mark)

## C MCQs with One Correct Answer

1. The ion that cannot be precipitated by both  $\text{HCl}$  and  $\text{H}_2\text{S}$  is  
(a)  $\text{Pb}^{2+}$  (b)  $\text{Cu}^+$  (1982 - 1 Mark)  
(c)  $\text{Ag}^+$  (d)  $\text{Sn}^{2+}$
2. Which one among the following pairs of ions cannot be separated by  $\text{H}_2\text{S}$  in dilute hydrochloric acid? (1986 - 1 Mark)  
(a)  $\text{Bi}^{3+}$ ,  $\text{Sn}^{4+}$  (b)  $\text{Al}^{3+}$ ,  $\text{Hg}^{2+}$   
(c)  $\text{Zn}^{2+}$ ,  $\text{Cu}^{2+}$  (d)  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$
3. An aqueous solution contains  $\text{Hg}^{2+}$ ,  $\text{Hg}_2^{2+}$ ,  $\text{Pb}^{2+}$  and  $\text{Cd}^{2+}$ . The addition of  $\text{HCl}$  (6N) will precipitate : (1995S)  
(a)  $\text{Hg}_2\text{Cl}_2$  only (b)  $\text{PbCl}_2$  only  
(c)  $\text{PbCl}_2$  and  $\text{Hg}_2\text{Cl}_2$  (d)  $\text{PbCl}_2$  and  $\text{HgCl}_2$
4. Identify the correct order of solubility of  $\text{Na}_2\text{S}$ ,  $\text{CuS}$  and  $\text{ZnS}$  in aqueous medium (2002S)  
(a)  $\text{CuS} > \text{ZnS} > \text{Na}_2\text{S}$  (b)  $\text{ZnS} > \text{Na}_2\text{S} > \text{CuS}$   
(c)  $\text{Na}_2\text{S} > \text{CuS} > \text{ZnS}$  (d)  $\text{Na}_2\text{S} > \text{ZnS} > \text{CuS}$
5. An aqueous solution of a substance gives a white precipitate on treatment with dilute hydrochloric acid, which dissolves on heating. When hydrogen sulfide is passed through the hot acidic solution, a black precipitate is obtained. The substance is a  
(a)  $\text{Hg}_2^{2+}$  salt (b)  $\text{Cu}^{2+}$  salt  
(c)  $\text{Ag}^+$  salt (d)  $\text{Pb}^{2+}$  salt
6. A gas 'X' is passed through water to form a saturated solution. The aqueous solution on treatment with silver nitrate gives a white precipitate. The saturated aqueous solution also dissolves magnesium ribbon with evolution of a colourless gas 'Y'. Identify 'X' and 'Y'. (2002S)  
(a)  $\text{X} = \text{CO}_2$ ,  $\text{Y} = \text{Cl}_2$  (b)  $\text{X} = \text{Cl}_2$ ,  $\text{Y} = \text{CO}_2$   
(c)  $\text{X} = \text{Cl}_2$ ,  $\text{Y} = \text{H}_2$  (d)  $\text{X} = \text{H}_2$ ,  $\text{Y} = \text{Cl}_2$
7.  $[\text{X}] + \text{H}_2\text{SO}_4 \longrightarrow [\text{Y}]$  a colourless gas with irritating smell,  $[\text{Y}] + \text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4 \longrightarrow$  green solution.  $[\text{X}]$  and  $[\text{Y}]$  are: (2003S)  
(a)  $\text{SO}_3^{2-}$ ,  $\text{SO}_2$  (b)  $\text{Cl}^-$ ,  $\text{HCl}$   
(c)  $\text{S}^{2-}$ ,  $\text{H}_2\text{S}$  (d)  $\text{CO}_3^{2-}$ ,  $\text{CO}_2$
8. A solution which is  $10^{-3}$  M each in  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Zn}^{2+}$  and  $\text{Hg}^{2+}$  is treated with  $10^{-16}$  M sulphide ion. If  $K_{\text{sp}}$  of  $\text{MnS}$ ,  $\text{FeS}$ ,  $\text{ZnS}$  and  $\text{HgS}$  are  $10^{-15}$ ,  $10^{-23}$ ,  $10^{-20}$  and  $10^{-54}$  respectively, which one will precipitate first? (2003S)  
(a)  $\text{FeS}$  (b)  $\text{MgS}$  (c)  $\text{HgS}$  (d)  $\text{ZnS}$
9. A metal nitrate reacts with  $\text{KI}$  to give a black precipitate which on addition of excess of  $\text{KI}$  is converted into orange colour solution. The cation of the metal nitrate is (2005S)  
(a)  $\text{Hg}^{2+}$  (b)  $\text{Bi}^{3+}$  (c)  $\text{Pb}^{2+}$  (d)  $\text{Cu}^+$
10. A solution when diluted with  $\text{H}_2\text{O}$  and boiled, gives a white precipitate. On addition of excess  $\text{NH}_4\text{Cl}/\text{NH}_4\text{OH}$ , the volume of precipitate decreases leaving behind a white gelatinous precipitate. Identify the precipitate which dissolves in  $\text{NH}_4\text{OH}/\text{NH}_4\text{Cl}$  (2006 - 3M, -1)  
(a)  $\text{Al}(\text{OH})_3$  (b)  $\text{Zn}(\text{OH})_2$   
(c)  $\text{Ca}(\text{OH})_2$  (d)  $\text{Mg}(\text{OH})_2$
11. A solution of a metal ion when treated with  $\text{KI}$  gives a red precipitate which dissolves in excess  $\text{KI}$  to give a colourless solution. Moreover, the solution of metal ion on treatment with a solution of cobalt (II) thiocyanate gives rise to a deep blue crystalline precipitate. The metal ion is (2007)  
(a)  $\text{Pb}^{2+}$  (b)  $\text{Hg}^{2+}$  (c)  $\text{Cu}^{2+}$  (d)  $\text{Co}^{2+}$
12. Passing  $\text{H}_2\text{S}$  gas into a mixture of  $\text{Mn}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$  and  $\text{Hg}^{2+}$  ions in an acidified aqueous solution precipitates (2011)  
(a)  $\text{CuS}$  and  $\text{HgS}$  (b)  $\text{MnS}$  and  $\text{CuS}$   
(c)  $\text{MnS}$  and  $\text{NiS}$  (d)  $\text{NiS}$  and  $\text{HgS}$
13. Upon treatment with ammoniacal  $\text{H}_2\text{S}$ , the metal ion that precipitates as a sulfide is (JEE Adv. 2013)  
(a)  $\text{Fe}(\text{III})$  (b)  $\text{Al}(\text{III})$  (c)  $\text{Mg}(\text{II})$  (d)  $\text{Zn}(\text{II})$

**D MCQs with One or More Than One Correct**

- The reagents,  $\text{NH}_4\text{Cl}$  and aqueous  $\text{NH}_3$  will precipitate  
 (a)  $\text{Ca}^{2+}$  (b)  $\text{Al}^{3+}$  (1991 - 1 Mark)  
 (c)  $\text{Bi}^{3+}$  (d)  $\text{Mg}^{2+}$   
 (e)  $\text{Zn}^{2+}$
- Which of the following statement(s) is (are) correct when a mixture of  $\text{NaCl}$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  is gently warmed with conc.  $\text{H}_2\text{SO}_4$ ? (1998 - 2 Marks)  
 (a) A deep red vapour is evolved  
 (b) The vapours when passed into  $\text{NaOH}$  solution gives a yellow solution of  $\text{Na}_2\text{CrO}_4$   
 (c) Chlorine gas is evolved  
 (d) Chromyl chloride is formed
- Which of the following statement(s) is (are) correct with reference to the ferrous and ferric ions? (1998 - 2 Marks)  
 (a)  $\text{Fe}^{3+}$  gives brown colour with potassium ferricyanide.  
 (b)  $\text{Fe}^{2+}$  gives blue precipitate with potassium ferricyanide.  
 (c)  $\text{Fe}^{3+}$  gives red colour with potassium thiocyanate.  
 (d)  $\text{Fe}^{2+}$  gives brown colour with ammonium thiocyanate.
- The pair(s) of ions where BOTH the ions are precipitated upon passing  $\text{H}_2\text{S}$  gas in presence of dilute  $\text{HCl}$ , is(are) (JEE Adv. 2015)  
 (a)  $\text{Ba}^{2+}, \text{Zn}^{2+}$  (b)  $\text{Bi}^{3+}, \text{Fe}^{3+}$   
 (c)  $\text{Cu}^{2+}, \text{Pb}^{2+}$  (d)  $\text{Hg}^{2+}, \text{Bi}^{3+}$
- The reagent(s) that can selectively precipitate  $\text{S}^{2-}$  from a mixture of  $\text{S}^{2-}$  and  $\text{SO}_4^{2-}$  in aqueous solution is(are) (JEE Adv. 2016)  
 (a)  $\text{CuCl}_2$  (b)  $\text{BaCl}_2$   
 (c)  $\text{Pb}(\text{OOCCH}_3)_2$  (d)  $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$

**E Subjective Problems**

- Account for the following. Limit your answer to two sentences:  
 The precipitation of second group sulphides in qualitative analysis is carried out with hydrogen sulphide in presence of hydrochloric acid and not nitric acid. (1979)
- Compound A is a light green crystalline solid. It gives the following tests: (1980)  
 (i) It dissolves in dilute sulphuric acid. No gas is produced.  
 (ii) A drop of  $\text{KMnO}_4$  is added to the above solution. The pink colour disappears.  
 (iii) Compound A is heated strongly. Gases B and C, with pungent smell, come out. A brown residue D is left behind.  
 (iv) The gas mixture (B) and (C) is passed into a dichromate solution. The solution turns green.  
 (v) The green solution from step (iv) gives a white precipitate E with a solution of barium nitrate.  
 (vi) Residue D from step (iii) is heated on charcoal in a reducing flame. It gives a magnetic substance.  
 Name the compounds A, B, C, D and E
- When 16.8 g of white solid X were heated, 4.4 g of acid gas A that turned lime water milky was driven off together with 1.8 g of a gas B which condensed to a colourless liquid. The solid that remained, Y, dissolved in water to give an alkaline

solution, which with excess barium chloride solution gave a white precipitate Z. The precipitate effervesced with acid giving off carbon dioxide. Identify A, B and Y and write down the equation for the thermal decomposition of X.

(1984 - 4 Marks)

- A mixture of two salts was treated as follows : (1987 - 5 Marks)  
 (i) The mixture was heated with manganese dioxide and concentrated sulphuric acid when yellowish green gas was liberated.  
 (ii) The mixture on heating with sodium hydroxide solution gave a gas which turned red litmus blue.  
 (iii) Its solution in water gave blue precipitate with potassium ferricyanide and red colouration with ammonium thiocyanate.  
 (iv) The mixture was boiled with potassium hydroxide and the liberated gas was bubbled through an alkaline solution of  $\text{K}_2\text{HgI}_4$  to give brown precipitate.  
 Identify the two salts. Give ionic equations for reactions involved in the tests (i), (ii) and (iii).
- A hydrated metallic salt A, light green in colour, on careful heating gives a white anhydrous residue B. B is soluble in water and its aqueous solution reacts with  $\text{NO}$  to give a dark brown compound C. B on strong heating gives a brown residue D and a mixture of two gases E and F. The gaseous mixture when passed through acidified permanganate, discharges the pink colour and when passed through acidified  $\text{BaCl}_2$  solution gave a white precipitate. Identify A, B, C, D, E and F. (1988 - 3 Marks)
- When 20.02 g of a white solid X is heated 4.4 g of an acid gas A and 1.8 g of a neutral gas B are evolved, leaving behind a solid residue Y of weight 13.8 g. A turns lime water milky and B condenses into a liquid which changes anhydrous copper sulphate blue. The aqueous solution of Y is alkaline to litmus and gives 19.7 g of white precipitate Z with barium chloride solution. Z gives carbon dioxide with an acid. Identify A, B, X, Y and Z. (1989 - 5 Marks)
- The gas liberated on heating a mixture of two salts with  $\text{NaOH}$ , gives a reddish brown precipitate with an alkaline solution of  $\text{K}_2[\text{HgI}_4]$ . The aqueous solution of the mixture on treatment with  $\text{BaCl}_2$  gives a white precipitate which is sparingly soluble in conc.  $\text{HCl}$ . On heating the mixture with  $\text{K}_2\text{Cr}_2\text{O}_7$  and conc.  $\text{H}_2\text{SO}_4$ , red vapours of A are produced. The aqueous solution of the mixture gives a deep blue colouration B with potassium ferricyanide solution. Identify the radicals in the given mixture and write the balanced equations for the formation of A and B. (1991 - 4 Marks)
- A light bluish green crystalline compound responds to the following tests :  
 (i) Its aqueous solution gives a brown precipitate or colour with alkaline  $\text{K}_2[\text{HgI}_4]$  solution.  
 (ii) Its aqueous solution gives a blue colour with  $\text{K}_3[\text{Fe}(\text{CN})_6]$  solution.  
 (iii) Its solution in hydrochloric acid gives a white precipitate with  $\text{BaCl}_2$  solution.  
 Identify the ions present and suggest the formula of the compound. (1992 - 4 Marks)

9. An orange solid (A) on heating gave a green residue (B), a colourless gas (C) and water vapour. The dry gas (C) on passing over heated Mg gave a white solid (D). (D) on reaction with water gave a gas (E) which formed dense white fumes with HCl. Identify (A) to (E) and give reactions involved. (1993 - 3 Marks)
10. A is a binary compound of a univalent metal, 1.422 g of A reacts completely with 0.321 g of sulphur in an evacuated and sealed tube to give 1.743 g of a white crystalline solid B, that forms a hydrated double salt, C with  $\text{Al}_2(\text{SO}_4)_3$ . Identify A, B and C (1994 - 5 Marks)
11. A scarlet compound A is treated with conc.  $\text{HNO}_3$  to give a chocolate brown precipitate B. The precipitate is filtered and the filtrate is neutralised with NaOH. Addition of KI to the resulting solution gives a yellow precipitate C. The precipitate B on warming with conc.  $\text{HNO}_3$  in the presence of  $\text{Mn}(\text{NO}_3)_2$  produces a pink-coloured solution due to the formation of D. Identify A, B, C and D. Write the reaction sequence. (1995 - 4 Marks)
12. Calcium burns in nitrogen to produce a white powder which dissolves in sufficient water to produce a gas (A) and an alkaline solution. The solution on exposure to air produces a thin solid layer of (B) on the surface. Identify the compounds A and B. (1996 - 2 Marks)
13. A colourless inorganic salt (A) decomposes completely at about  $250^\circ\text{C}$  to give only two products, (B) and (C), leaving no residue. The oxide (C) is a liquid at room temperature and neutral to moist litmus paper while the gas (B) is a neutral oxide. White phosphorus burns in excess of (B) to produce a strong white dehydrating agent. Write balanced equations for the reactions involved in the above process. (1996 - 3 Marks)
14. During the qualitative analysis of a mixture containing  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$  ions,  $\text{H}_2\text{S}$  gas is passed through an acidified solution containing these ions in order to test  $\text{Cu}^{2+}$  alone. Explain briefly. (1998 - 2 Marks)
15. A white solid is either  $\text{Na}_2\text{O}$  or  $\text{Na}_2\text{O}_2$ . A piece of red litmus paper turns white when it is dipped into a freshly made aqueous solution of the white solid. (1999 - 4 Marks)
- (i) Identify the substance and explain with balanced equation.
- (ii) Explain what would happen to the red litmus if the white solid were the other compound.
16. An aqueous solution containing one mole of  $\text{HgI}_2$  and two moles of NaI is orange in colour. On addition of excess NaI the solution becomes colourless. The orange colour reappears on subsequent addition of NaOCl. Explain with equations. (1999 - 3 Marks)
17. An aqueous blue coloured solution of a transition metal sulphate reacts with  $\text{H}_2\text{S}$  in acidic medium to give a black precipitate A, which is insoluble in warm aqueous solution of KOH. The blue solution on treatment with KI in weakly acidic medium, turns yellow and produces a white precipitate B. Identify the transition metal ion. Write the chemical reactions involved in the formation of A and B. (2000 - 4 Marks)
18. Write the chemical reactions associated with the 'borax bead test' of cobalt (II) oxide. (2000 - 3 Marks)
19. A white substance (A) reacts with dilute  $\text{H}_2\text{SO}_4$  to produce a colourless gas (B) and a colourless solution (C). The reaction between (B) and acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  solution produces a green solution and a slightly coloured precipitate (D). The substance (D) burns in air to produce a gas (E) which reacts with (B) to yield (D) and a colourless liquid. Anhydrous copper sulphate is turned blue on addition of this colourless liquid. Addition of aqueous  $\text{NH}_3$  or NaOH to (C) produces first a precipitate, which dissolves in the excess of the respective reagent to produce a clear solution in each case. Identify (A), (B), (C), (D) and (E). Write the equations of the reactions involved. (2001 - 10 Marks)
20. When a white crystalline compound X is heated with  $\text{K}_2\text{Cr}_2\text{O}_7$  and concentrated  $\text{H}_2\text{SO}_4$ , a reddish brown gas A is evolved. On passing A into caustic soda solution, a yellow coloured solution of B is obtained. Neutralizing the solution B with acetic acid and on subsequent addition of lead acetate, a yellow precipitate C is obtained. When X is heated with NaOH solution, a colourless gas is evolved and on passing this gas into  $\text{K}_2\text{HgI}_4$  solution, a reddish brown precipitate D is formed. Identify A, B, C, D and X. Write the equations of reactions involved. (2002 - 5 Marks)
21. A mixture consists of A (yellow solid) and B (colourless solid) which gives lilac colour in flame.
- (a) Mixture gives black precipitate C on passing  $\text{H}_2\text{S}_{(\text{g})}$  through its aqueous solution.
- (b) C is soluble in aqua-regia and on evaporation of aqua-regia and adding  $\text{SnCl}_2$  gives greyish black precipitate D.
- The salt solution with  $\text{NH}_4\text{OH}$  gives a brown precipitate.
- (i) The sodium carbonate extract of the salt with  $\text{CCl}_4/\text{FeCl}_3$  gives a violet layer.
- (ii) The sodium carbonate extract gives yellow precipitate with  $\text{AgNO}_3$  solution which is insoluble in  $\text{NH}_3$ . Identify A and B, and the precipitates C and D. (2003 - 4 Marks)

## G

## Comprehension Based Questions

## PASSAGE-1

*p*-Amino-*N*, *N*-dimethylaniline is added to a strongly acidic solution of X. The resulting solution is treated with a few drops of aqueous solution of Y to yield blue coloration due to the formation of methylene blue. Treatment of the aqueous solution of Y with the reagent potassium hexacyanoferrate(II) leads to the formation of an intense blue precipitate. The precipitate dissolves on excess addition of the reagent. Similarly, treatment of the solution of Y with the solution of potassium hexacyanoferrate (III) leads to a brown coloration due to the formation of Z. (2009)

- The compound X is
 

(a) $\text{NaNO}_3$	(b) NaCl
(c) $\text{Na}_2\text{SO}_4$	(d) $\text{Na}_2\text{S}$
- The compound Y is
 

(a) $\text{MgCl}_2$	(b) $\text{FeCl}_2$
(c) $\text{FeCl}_3$	(d) $\text{ZnCl}_2$
- The compound Z is
 

(a) $\text{Mg}_2[\text{Fe}(\text{CN})_6]$	(b) $\text{Fe}[\text{Fe}(\text{CN})_6]$
(c) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$	(d) $\text{K}_2\text{Zn}_3[\text{Fe}(\text{CN})_6]_2$

## PASSAGE-2

An aqueous solution of a mixture of two inorganic salts, when treated with dilute HCl, gave a precipitate (P) and a filtrate (Q). The precipitate P was found to dissolve in hot water. The filtrate (Q) remained unchanged, when treated with  $\text{H}_2\text{S}$  in a dilute mineral acid medium. However, it gave a precipitate (R) with  $\text{H}_2\text{S}$  in an ammoniacal medium. The precipitate R gave a coloured solution (S), when treated with  $\text{H}_2\text{O}_2$  in an aqueous NaOH medium.

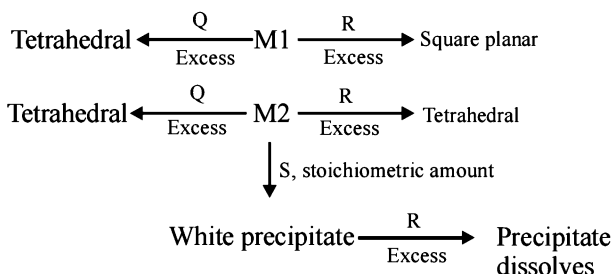
(JEE Adv. 2013-II)

4. The precipitate P contains  
 (a)  $\text{Pb}^{2+}$  (b)  $\text{Hg}_2^{2+}$   
 (c)  $\text{Ag}^+$  (d)  $\text{Hg}^{2+}$
5. The coloured solution S contains  
 (a)  $\text{Fe}_2(\text{SO}_4)_3$  (b)  $\text{CuSO}_4$   
 (c)  $\text{ZnSO}_4$  (d)  $\text{Na}_2\text{CrO}_4$

## PASSAGE-3

An aqueous solution of metal ion M1 reacts separately with reagents Q and R in excess to give tetrahedral and square planar complexes, respectively. An aqueous solution of another metal ion M2 always forms tetrahedral complexes with these reagents. Aqueous solution of M2 on reaction with reagent S gives white precipitate which dissolves in excess of S. The reactions are summarized in the scheme given below:

Scheme:



6. M1, Q and R, respectively are (JEE Adv. 2014)  
 (a)  $\text{Zn}^{2+}$ , KCN and HCl (b)  $\text{Ni}^{2+}$ , HCl and KCN  
 (c)  $\text{Cd}^{2+}$ , KCN and HCl (d)  $\text{Co}^{2+}$ , HCl and KCN

7. Reagent S is (JEE Adv. 2014)  
 (a)  $\text{K}_4[\text{Fe}(\text{CN})_6]$  (b)  $\text{Na}_2\text{HPO}_4$   
 (c)  $\text{K}_2\text{CrO}_4$  (d) KOH

## H Assertion &amp; Reason Type Questions

1. Read the following statement and explanation and answer as per the options given below : (1989 - 2 Marks)  
**Assertion** : A very dilute acidic solution of  $\text{Cd}^{2+}$  and  $\text{Ni}^{2+}$  gives yellow precipitate of CdS on passing hydrogen sulphide.  
**Statement** : Solubility product of CdS is more than that of NiS.  
 (a) If both assertion and statement are correct and statement is an explanation of assertion.  
 (b) If assertion is correct and statement is wrong, statement is not an explanation of assertion.  
 (c) If assertion is wrong and statement is correct, statement is not an explanation of assertion.  
 (d) If both assertion and statement are wrong and statement is not explanation of assertion.
2. Read the following statement and explanation and answer as per the options given below : (1998 - 2 Marks)  
**Assertion** : Sulphate is estimated as  $\text{BaSO}_4$  and not as  $\text{MgSO}_4$ .  
**Reason** : Ionic radius of  $\text{Mg}^{2+}$  is smaller than that of  $\text{Ba}^{2+}$ .  
 (a) If both *assertion* and *reason* are correct, and *reason* is the correct explanation of the *assertion*.  
 (b) If both *assertion* and *reason* are correct, but *reason* is not the correct explanation of the *assertion*.  
 (c) If *assertion* is correct but *reason* is incorrect.  
 (d) If *assertion* is incorrect but *reason* is correct.

## I Integer Value Correct Type

1. Among PbS, CuS, HgS, MnS,  $\text{Ag}_2\text{S}$ , NiS, CoS,  $\text{Bi}_2\text{S}_3$  and  $\text{SnS}_2$ , the total number of BLACK coloured sulphides is (JEE Adv. 2014)

## Section-B

## JEE Main / AIEEE

1. When  $\text{H}_2\text{S}$  is passed through  $\text{Hg}_2\text{S}$  we get [2002]  
 (a) HgS (b)  $\text{HgS} + \text{Hg}_2\text{S}$   
 (c)  $\text{Hg}_2\text{S} + \text{Hg}$  (d) None of these.
2. How do we differentiate between  $\text{Fe}^{3+}$  and  $\text{Cr}^{3+}$  in group III? [2002]  
 (a) by taking excess of  $\text{NH}_4\text{OH}$  solution  
 (b) by increasing  $\text{NH}_4^+$  ion concentration  
 (c) by decreasing  $\text{OH}^-$  ion concentration  
 (d) both (b) and (c)
3. Which one of the following statements is correct ?  
 (a) From a mixed precipitate of AgCl and AgI, ammonia solution dissolves only AgCl [2003]  
 (b) Ferric ions give a deep green precipitate on adding potassium ferrocyanide solution  
 (c) On boiling a solution having  $\text{K}^+$ ,  $\text{Ca}^{2+}$  and  $\text{HCO}_3^-$  ions we get a precipitate of  $\text{K}_2\text{Ca}(\text{CO}_3)_2$   
 (d) Manganese salts give a violet borax bead test in the reducing flame
4. The compound formed in the positive test for nitrogen with the Lassaigne solution of an organic compound is [2004]  
 (a)  $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$  (b)  $\text{Na}_3[\text{Fe}(\text{CN})_6]$   
 (c)  $\text{Fe}(\text{CN})_3$  (d)  $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$
5. The equation which is balanced and represents the correct product(s) is: [JEE M 2014]  
 (a)  $\text{Li}_2\text{O} + 2\text{KCl} \rightarrow 2\text{LiCl} + \text{K}_2\text{O}$   
 (b)  $[\text{CoCl}(\text{NH}_3)_5]^+ + 5\text{H}^+ \rightarrow \text{Co}^{2+} + 5\text{NH}_4^+ + \text{Cl}^-$   
 (c)  $[\text{Mg}(\text{H}_2\text{O})_6]^{2+} + (\text{EDTA})^{4-} \xrightarrow{\text{excess NaOH}} [\text{Mg}(\text{EDTA})]^{2+} + 6\text{H}_2\text{O}$   
 (d)  $\text{CuSO}_4 + 4\text{KCN} \rightarrow \text{K}_2[\text{Cu}(\text{CN})_4] + \text{K}_2\text{SO}_4$