

SALT ANALYSIS

1. Given below are two statements :
Statement I : Colourless cupric metaborate is reduced to cuprous metaborate in a luminous flame.

Statement II : Cuprous metaborate is obtained by heating boric anhydride and copper sulphate in a non-luminous flame.

In the light of the above statements, choose the most appropriate answer from the options given below.

- (1) Statement I is true but Statement II is false
- (2) Both Statement I and Statement II are false
- (3) Statement I is false but Statement II is true
- (4) Both Statement I and Statement II are true

2. Which of the following compound is added to the sodium extract before addition of silver nitrate for testing of halogens?

- (1) Nitric acid (2) Ammonia
- (3) Hydrochloric acid (4) Sodium hydroxide

3. On treating a compound with warm dil. H₂SO₄, gas X is evolved which turns K₂Cr₂O₇ paper acidified with dil. H₂SO₄ to a green compound Y. X and Y respectively are -

- (1) X = SO₂, Y = Cr₂O₃
- (2) X = SO₃, Y = Cr₂O₃
- (3) X = SO₂, Y = Cr₂(SO₄)₃
- (4) X = SO₃, Y = Cr₂(SO₄)₃

4. Match List-I with List-II

List-I Test/Reagents/Observation(s)	List-II Species detected
(a) Lassaigne's Test	(i) Carbon
(b) Cu(II) oxide	(ii) Sulphur
(c) Silver nitrate	(iii) N, S, P, and halogen
(d) The sodium fusion extract gives black precipitate with acetic acid and lead acetate	(iv) Halogen Specifically

The correct match is :

- (1) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
- (2) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)
- (3) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
- (4) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)

5. Reagent, 1-naphthylamine and sulphanilic acid in acetic acid is used for the detection of

- (1) N₂O (2) NO₃⁻ (3) NO (4) NO₂⁻

6. An inorganic Compound 'X' on treatment with concentrated H₂SO₄ produces brown fumes and gives dark brown ring with FeSO₄ in presence of concentrated H₂SO₄. Also Compound 'X' gives precipitate 'Y', when its solution in dilute HCl is treated with H₂S gas. The precipitate 'Y' on treatment with concentrated HNO₃ followed by excess of NH₄OH further gives deep blue coloured solution, Compound 'X' is:

- (1) Co(NO₃)₂ (2) Pb(NO₂)₂
- (3) Cu(NO₃)₂ (4) Pb(NO₃)₂

7. When silver nitrate solution is added to potassium iodide solution then the sol produced is :

- (1) AgI / I⁻ (2) AgI / Ag⁺
- (3) KI / NO₃⁻ (4) AgNO₃ / NO₃⁻

8. Which one of the following set of elements can be detected using sodium fusion extract ?

- (1) Sulfur, Nitrogen, Phosphorous, Halogens
- (2) Phosphorous, Oxygen, Nitrogen, Halogens
- (3) Nitrogen, Phosphorous, Carbon, Sulfur
- (4) Halogens, Nitrogen, Oxygen, Sulfur

9. To an aqueous solution containing ions such as Al³⁺, Zn²⁺, Ca²⁺, Fe³⁺, Ni²⁺, Ba²⁺ and Cu²⁺ was added conc. HCl, followed by H₂S.

The total number of cations precipitated during this reaction is/are :

- (1) 1 (2) 3
- (3) 4 (4) 2

10. What are the products formed in sequence when excess of CO₂ is passed in slaked lime?

- (1) Ca(HCO₃)₂, CaCO₃
- (2) CaCO₃, Ca(HCO₃)₂
- (3) CaO, Ca(HCO₃)₂
- (4) CaO, CaCO₃

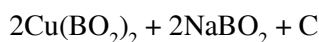
11. Acidic ferric chloride solution on treatment with excess of potassium ferrocyanide gives a Prussian blue coloured colloidal species. It is:
- (1) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ (2) $\text{K}_5\text{Fe}[\text{Fe}(\text{CN})_6]_2$
 (3) $\text{HFe}[\text{Fe}(\text{CN})_6]$ (4) $\text{KFe}[\text{Fe}(\text{CN})_6]$
12. Consider the sulphides HgS , PbS , CuS , Sb_2S_3 , As_2S_3 and CdS . Number of these sulphides soluble in 50% HNO_3 is _____.
13. The deposition of X and Y on ground surfaces is referred as wet and dry depositions, respectively. X and Y are :
- (1) X = Ammonium salts, Y = CO_2
 (2) X = SO_2 , Y = Ammonium salts
 (3) X = Ammonium salts, Y = SO_2
 (4) X = CO_2 , Y = SO_2
14. Match List-I with List-II :
- | List-I
(Metal Ion) | List-II
(Group in Qualitative
analysis) |
|-----------------------|---|
| (a) Mn^{2+} | (i) Group - III |
| (b) As^{3+} | (ii) Group - IIA |
| (c) Cu^{2+} | (iii) Group - IV |
| (d) Al^{3+} | (iv) Group - IIB |
- Choose the **most appropriate** answer from the options given below :
- (1) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
 (2) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
 (3) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)
 (4) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
15. The potassium ferrocyanide solution gives a Prussian blue colour, when added to :
- (1) CoCl_3 (2) FeCl_2 (3) CoCl_2 (4) FeCl_3

SOLUTION

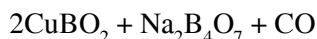
1. Official Ans. by NTA (2)

Sol.

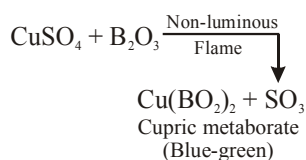
- (i) Blue cupric metaborate is reduced to colourless cuprous metaborate in a luminous flame



↓ Luminous flame



- (ii) Cupric metaborate is obtained by heating boric anhydride and copper sulphate in a non luminous flame.



2. Official Ans. by NTA (1)

Sol. For testing of halogens, Nitric acid is added to the sodium extract because if CN^- or S^{2-} are present then they will be oxidised and removed before the test of halides.

3. Official Ans. by NTA (3)

Sol. $\text{SO}_2 + \text{dil H}_2\text{SO}_4 \longrightarrow \text{SO}_3(\text{g})$



4. Official Ans. by NTA (3)

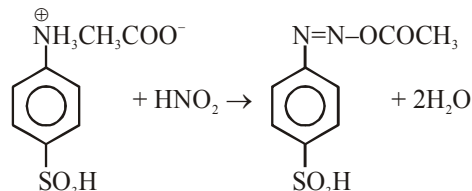
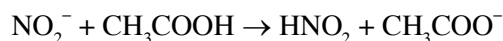
Sol. Match list :-

(a) Lassaigne's Test	(iii) N, S, P and Halogen
(b) Cu(II) Oxide	(i) Carbon
(c) AgNO_3	(iv) Halogen specifically.
(d) Sodium fusion extract given black precipitate with acetic acid and lead acetate ($\text{CH}_3\text{COOH}/(\text{CH}_3\text{COO})_2\text{Pb}$)	(ii) Sulphur

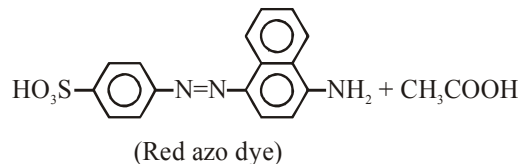
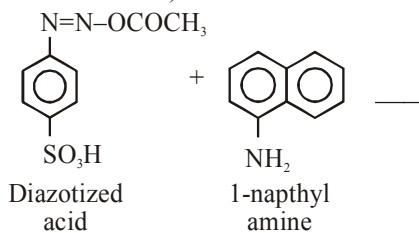
Option-(a)-(iii) ; (b)-(i) ; (c)-(iv) ; (d)-(ii)

5. Official Ans. by NTA (4)

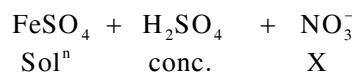
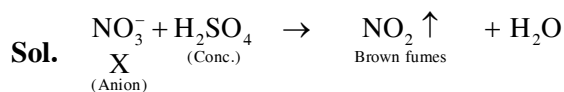
Sol. For detection of NO_2^- , the following test is used.



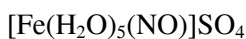
(Sulphanilic acid solution)



6. Official Ans. by NTA (3)



↓



(Dark brown ring)

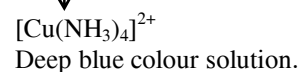
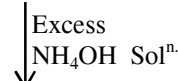
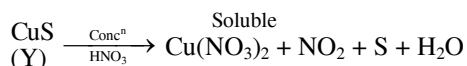


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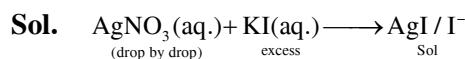


(Black ppt)

(Y)



7. Official Ans. by NTA (1)



8. Official Ans. by NTA (1)

Sol. By sodium fusion extract we can detect sulphur, nitrogen, Phosphorous and halogens, because they are converted in to their ionic form with sodium metal.

9. Official Ans. by NTA (1)

Sol. Al^{3+} and Fe^{3+} sulphides hydrolyse in water.
 Ni^{2+} and Zn^{2+} require basic medium with H_2S to form ppt
 Ca^{2+} and Ba^{2+} sulphides are soluble hence we will receive only CuS ppt.

10. Official Ans. by NTA (2)

Sol. $\text{Ca}(\text{OH})_2 + \text{CO}_2 \longrightarrow \text{CaCO}_3\downarrow + \text{H}_2\text{O}$
 $\text{CaCO}_3\downarrow + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{HCO}_3)_2$

11. Official Ans. by NTA (4)

Sol. $\text{FeCl}_3 + \text{K}_4[\text{Fe}(\text{CN})_6]$ (excess)
 \downarrow
 $\text{K Fe}[\text{Fe}(\text{CN})_6]$
 Colloidal species

12. Official Ans. by NTA (4)

Sol. Pbs, CuS, As_2S_3 , CdS are soluble in 50% HNO_3
 HgS , Sb_2S_3 are insoluble in 50% HNO_3
 So Answer is 4.

13. Official Ans. by NTA (3)

Sol. Oxides of nitrogen and sulphur are acidic and settle down on ground as dry deposition.
 Ammonium salts in rain drops result in wet deposition

14. Official Ans. by NTA (2)

Sol. $\text{Mn}^{2+} \rightarrow$ III group
 $\text{As}^{3+} \rightarrow$ II B group
 $\text{Cu}^{2+} \rightarrow$ II A group
 $\text{Al}^{3+} \rightarrow$ IV group

15. Official Ans. by NTA (4)

Sol. $\text{FeCl}_3 + \text{K}_4[\text{Fe}(\text{CN})_6] \rightarrow \text{Fe}_4[\text{Fe}(\text{CN})_6]_3$
 Prussian blue