

STUDY MATERIAL

TOPIC: HYDROGEN SULPHIDE

SUBJECT: PHYSICAL SCIENCE

CLASS: X

DATE: 28TH APRIL 2020

(iii) Multiple Choice Questions

Q.1. Which of the following oxidation states is applicable to sulphur in H_2S ?

- (A) -2 (B) +5 (C) +6 (D) + 3

Ans. (A) -2

Q.2. An example of non-linear molecule is :

- (A) H_2S (B) CO_2 (C) C_2H_2 (D) N_2O

Ans. (A) H_2S

Q.3. H_2S on incomplete combustion forms mainly

- (A) H_2O and S (B) H_2 and SO_2
(C) H_2S and S (D) H_2O and SO_2

Ans. (C) H_2S and S

Q.4. H_2S is a :

- (A) weak dibasic acid (B) strong dibasic acid
(C) weak monobasic acid (D) monobasic acid

Ans. (C) Weak dibasic acid

Q.5. When H_2S is passed through acidified $KMnO_4$ we get :

- (A) $KHSO_4$ (B) K_2SO_4 (C) MnO_2 (D) S

Ans. (D) S

Q.6. Which of the following turns lead acetate paper black ?

- (A) SO_2 (B) SO_3 (C) H_2S (D) H_2SO_4

Ans. (C) H_2S

Q.7. Sulphuretted hydrogen was discovered by :

- (A) Shele (B) Dalton (C) Lavoisier (D) Richter

Ans. (A) Shele

Q.8. H_2S is :

- (A) alkaline (B) neutral (C) acidic (D) amphoteric gas

Ans. (C) acidic

Q.9. When a strip of filter paper, soaked in colourless lead acetate solution, is held in the H_2S gas, the filter paper becomes

- (A) black (B) blue (C) pink (D) red

Ans. (A) black

Q.10. Molecular weight of H_2S is :

- (A) 32 (B) 34 (C) 36 (D) 38

Ans : (A) 34

Q.11. FeS reacts with

- (A) dil. H_2SO_4 (B) Conc. H_2SO_4
(C) Conc. HNO_3 to form H_2S (D) None of these

Ans. (A) dil H_2SO_4

Q.12. H_2S is passed through a solution of sodium hydroxide solution is added to it. The solution turns :

- (A) violet (B) black (C) green (D) red

Ans. (A) violet

Q.13. H_2S gas has a smell :

- (A) like rotten eggs (B) pungent
(C) smell like fish (D) none of these

Ans. (C) smell like fish

Q.14. H_2S is :

- (A) heavier (B) lighter
(C) slightly heavier than air (D) none of these

Ans. (C) smell like fish

Q.15. Aqueous solution of the gas turns blue litmus to red :

- (A) H_2S (B) NH_3 (C) O_2 (D) H_2

Ans. (A) H_2S

Q.16. H_2S can be collected in downward displacement of

- (A) hot water (B) cold water (C) Hg (D) none of these

Ans. (A) hot water

Q.17. The gas which is identified by its smell :

- (A) Nitrogen (B) Hydrogen
(C) Hydrogen sulphide (D) none of these

Ans. (C) Hydrogen sulphide

Q.18. The gas which has reducing property :

- (A) H_2S (B) CO_2 (C) NO_2 (D) none of these

Ans. (A) H_2S

Q.19. H_2S gas is passed through :

- (A) P_2O_5 (B) Anhydrous $CaCl_2$
(C) CaO (D) none of these

Ans. (A) P_2O_5

Q.20. The gas which is absorbed by NaOH :

(A) NH_3

(B) H_2S

(C) O_2

(D) none of these

Ans. (B) H_2S

B. Short Answer Type Questions

Marks for each 2

Q.1. Name the chemicals required for preparation of H_2S in laboratory. Write down the equation of reaction.

Ans. Chemicals required for preparation of H_2S in laboratory :

Ferrous sulphide (FeS) and dilute sulphuric acid (H_2SO_4)

Equation : $\text{FeS} + \text{H}_2\text{SO}_4 = \text{FeSO}_4 + \text{H}_2\text{S}\uparrow$

Q.2. Is HCl acid suitable for preparation of H_2S ? Give reason.

Ans. HCl acid is not suitable for preparation of H_2S .

Cause : HCl acid is not chosen due to volatile nature of HCl. During the preparation, HCl vapour that may be formed will accompany the evolved H_2S and will make it impure.

Q.3. Is HNO_3 acid suitable for preparation of H_2S ? Give reason.

Ans. HNO_3 acid is not suitable for preparation of H_2S .

Nitric acid cannot be used in the preparation, because it is an oxidising agent and H_2S is a reducing agent. Nitric acid will oxidise H_2S to sulphur and will thus hamper the reaction.

Q.4. Mention one identifying test for H_2S .

Ans. Identification of H_2S : Hydrogen sulphide is passed through a solution of sodium hydroxide solution and then sodium nitroprusside solution is added to it. The solution turns violet.

Equation : $2\text{NaOH} + \text{H}_2\text{S} = \text{Na}_2\text{S} + 2\text{H}_2\text{O}$

$\text{Na}_2\text{S} + \text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}] = \text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$
(violet)

Q.5. How does H_2S react with conc. HNO_3 ?

Ans. Reaction of H_2S with conc HNO_3 :

H_2S reduces conc. HNO_3 to brown nitrogen dioxide (NO_2) and is itself oxidised to sulphur.

Equation : $\text{H}_2\text{S} + 2\text{HNO}_3 = 2\text{NO}_2\uparrow + \text{S}\downarrow + 2\text{H}_2\text{O}$

Q.6. How does H_2S react with conc. H_2SO_4 ?

Ans. Reaction of H_2S with conc. H_2SO_4 : H_2S reduces conc. H_2SO_4 to SO_2 and is itself oxidised to sulphur.

Equation : $\text{H}_2\text{S} + \text{H}_2\text{SO}_4 = \text{SO}_2\uparrow + \text{S}\downarrow + 2\text{H}_2\text{O}$

Q.7. Write down the reaction of H_2S with NaOH.

Ans. Reaction of H_2S with NaOH : H_2S reacting with NaOH produces acid salt in the first step and normal salt in the second step along with water in both the steps.

Equations : $\text{NaOH} + \text{H}_2\text{S} = \text{NaHS} + \text{H}_2\text{O}$
(Acid salt)

$2\text{NaOH} + \text{H}_2\text{S} = \text{Na}_2\text{S} + 2\text{H}_2\text{O}$

(Normal salt)

Q.8. Which substance is used for drying H₂S and why ?

Ans. Drying of H₂S gas : The most suitable drying agent for H₂S is the acidic oxide P₂O₅, that does not react with H₂S which is also of acidic nature.

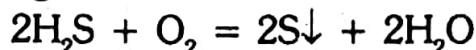
Q.9. What is the density of H₂S and state about its solubility in water at ordinary temperature and in hot water.

Ans. Density of H₂S : Density of the gas is 1.53 g/L at NTP.

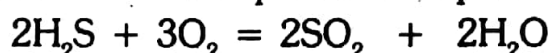
Solubility of H₂S in water : It is moderately soluble in water at ordinary temperature but insoluble in hot water.

Q.10. What happens when H₂S is burnt in small and excess supply of oxygen ?

Ans. H₂S is burnt in small supply of oxygen : During burning of H₂S if the supply of oxygen is low, the gas burns with a blue flame and deposits sulphur.

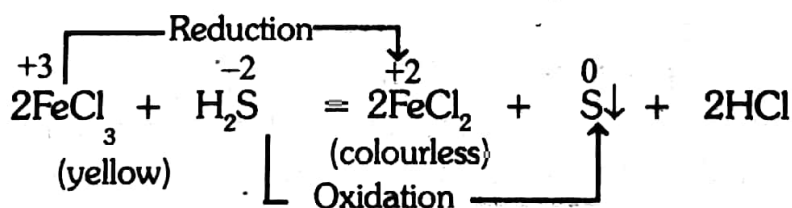


H₂S is burnt in excess supply of oxygen : In an excessive supply of oxygen the gas burns with a blue flame and produces sulphur dioxide and water.



Q.11. Show that H₂S is a reducing agent.

Ans. Reducing property of H₂S : Hydrogen sulphide is a very good reducing agent. H₂S reduces acidified yellow solution of ferric chloride to colourless ferrous chloride.



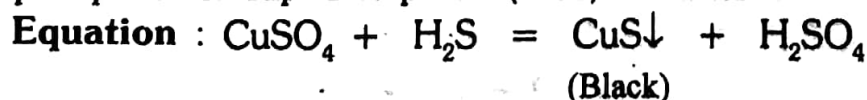
Q.12. What happens when H₂S is passed through acidified solution of FeCl₃?

Ans. Yellow ferric chloride solution is reduced by H₂S giving rise colourless ferrous chloride and H₂S itself on oxidation gives a precipitate of sulphur.



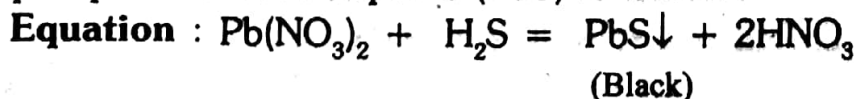
Q.13. What happens when H₂S is passed through acidified solution of CuSO₄?

Ans. If H₂S is passed through acidified blue coloured solution of CuSO₄ then black precipitate of cupric sulphide (CuS) is formed.



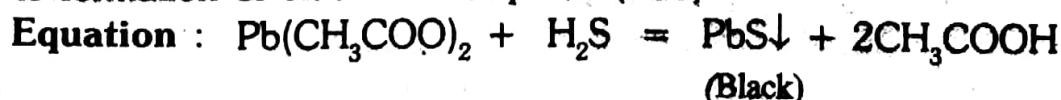
Q.14. What happens when H₂S is passed through acidified solution of Pb(NO₃)₂?

Ans. If H₂S is passed through acidified colourless solution of Pb(NO₃)₂ then black precipitate of lead sulphide (PbS) is formed.



Q.15. What happens when H₂S comes in contact with a paper soaked in lead acetate ?

Ans. A paper soaked in lead acetate [Pb(CH₃COO)₂] turns black with H₂S gas due to formation of black lead sulphide (PbS)



Q.16. Mention the uses of hydrogen sulphide.

Ans. Uses of hydrogen sulphide :

- (i) H_2S is used as a reagent in the separation of metal ions in group analysis.
- (ii) H_2S is sometimes used as a reducing agent.

C. Broad answer type questions

Marks for each 3

Q.1. Describe laboratory method of preparation of H_2S with the points : (i) chemicals required (ii) condition (iii) equation of reaction (iv) drying agent (v) collection

Ans. (i) **Chemicals required** : Ferrous sulphide (FeS) and dilute sulphuric acid (H_2SO_4)

(ii) **Condition** : Hydrogen sulphide is prepared in the laboratory by the action of dil. H_2SO_4 on pieces of ferrous sulphide (FeS) at ordinary temperature.

(iii) **Equation of reaction** : $FeS + H_2SO_4 = FeSO_4 + H_2S\uparrow$

(iv) **Drying agent** : The gas is passed through P_2O_5 to dry it.

(v) **Collection** : Because the gas is heavier than air it is collected over the upward displacement of air.

Q.2. What precautions should be taken during preparation and handling of H_2S ?

Ans. **Precautions taken during preparation of H_2S** : Hydrogen sulphide is a poisonous gas and is harmful at concentrations above 0.1% by volume in air. So, due precautions should be taken not to inhale the gas not to allow its prolonged contact with skin during handling.

During preparation of the gas caution must be taken so that excessive gas does not spread in the atmosphere of laboratory. To do this, sulphuric acid should be added in the wolfe's bottle in small quantities and in steps.