

Concept: Properties of ammonia

- (i) Ammonia is a gas with high solubility in water
(ii) Ammonia has basic nature

Plan an experiment to show the above statements are correct

(Materials: conical flask, syringe, trough, cork, water and phenolphthalein)

Score (3) time (3 minute)

Concept : Equilibrium

- The reaction taking place in the manufacture of ammonia (Habor process) is

$$\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3 + \text{heat}$$

The graph given below deals with the rate of this reaction.

The graph plots the rate of reaction on the vertical axis against time on the horizontal axis. The curve begins at a high point labeled 'A', then drops sharply to a lower point labeled 'B'. From point 'B', the curve rises and levels off to a constant horizontal line, with point 'C' marking the start of this constant rate. A vertical line is drawn at a later time, labeled 'D', where the rate remains constant.

- Write the equations of the reactions indicated by the points A,B,C and D in the graph.
- $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$. Which of the following factors favour high production of ammonia by the above reaction?
 - Decrease in pressure
 - Increase in temperature
 - Decrease in the concentration of ammonia
 - Increase in pressure.

Score (4) time (5 minute)

Concept : Reaction between HCl and NH_3

- Experiment*

Place cotton dipped in NH_3 at one end and cotton dipped in HCl at other end of a glass tube

A diagram of a horizontal glass tube. At the left end, a cotton ball is labeled 'HCl'. At the right end, a cotton ball is labeled 'NH3'. In the center of the tube, a white ring of product has formed between the two cotton balls.

Observation

A white substance is formed in the tube. It disappears on heating.

- Make inferences from these observations. Write necessary equations.

Score (3) time (3 minute)

1

Concept : Preparation of ammonia

4. Heat a mixture of calcium hydroxide and ammonium chloride.

Ammonia gas is formed.

- (a) Write the equation of this chemical reaction.
(b) Suggest two methods to identify the ammonia gas produced.

Score (3) time (3 minutes)

Concept : Equilibrium

5. Ferric nitrate + potassium thiocyanate \rightleftharpoons ferric thiocyanate (blood red colour)+ potassium nitrate

The red solution obtained by doing this experiment is diluted and taken in different beakers and the following experiments are conducted. Identify the occasions when red colour intensifies. Explain your answer (2)

- (a) potassium nitrate is added.
(b) ferric nitrate is added. (1)
(c) potassium thiocyanate is added. (1)

Score (2) time (4 minute)

Concept : Equilibrium

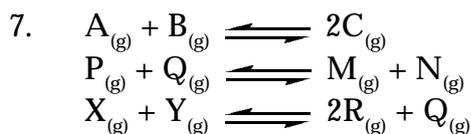
6. (a) What are the factors that can be changed to disturb the equilibrium of a system. (1)



What change in temperature should be made to get maximum amount of products in this reaction?

Score (2) time (2 minute)

Concept : Influence of pressure on equilibrium.



Which one of the above reversible reactions is influenced by change in pressure Why?

Score (2) time (2 minute)

Concept : Influence of temperature on equilibrium.

8. In a reversible reaction, forward reaction is exothermic. What change should be made in temperature to increase the rate of forward reaction?

Score (2) time (2 minute)

Concept : Equilibrium

9. The reaction in the manufacture of ammonia by Habor process is



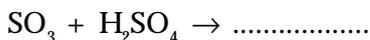
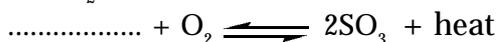
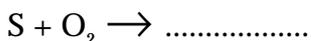
Explain the reason for adopting following conditions during the reaction.

- (a) Temperature is maintained at 500°C (2)
(b) Fe is used as catalyst (1)

Score (2) time (3 minute)

Concept : Manufacture of sulphuric acid

10. Complete the following sequence of reactions involved in the manufacture of sulphuric acid



Score (4) time (4 minute)

Concept : Sulphuric acid manufacture

11. Some conditions used in the manufacture of sulphuric acid are given below. Give explanation for them.

- (a) optimum temperature 450°C is used (1)
- (b) pressure is maintained at 1-2 atm. (1)
- (c) SO₃ is dissolved in 98% H₂SO₄ to make oleum rather than dissolving it in water to make H₂SO₄ (1)

Score (3) time (4 minute)

Concept : Properties of sulphuric acid

12. Two important properties of sulphuric acid are dehydrating and drying properties. Give one example each to prove these properties.

Score (2) time (2 minute)

Concept : Reactions of H₂SO₄

13. A small amount of sodium carbonate is added to dilute sulphuric acid taken in a test tube. When the produced gas is passed through lime water it turns milky

- (a) Complete the equation - Na₂CO₃ + H₂SO₄ → Na₂SO₄ + + H₂O (1)
- (b) Which salt reacts with sulphuric acid to produce hydrochloric acid? (2)

Score (3) time (4 minute)

Concept : Properties of H₂SO₄

14. Aqueous solution of a salt is mixed with freshly prepared ferrous sulphate solution in a test tube and to this, conc. sulphuric acid is added through the sides of the test tube when a brown ring is formed at the junction of liquid mixture.

- (a) Which ion is present in the salt? (1)
(chloride, carbonate, nitrate)
- (b) Suggest an experiment to identify sulphates. (1)

Score (2) time (3 minute)

Concept : Dissociation of ammonium chloride

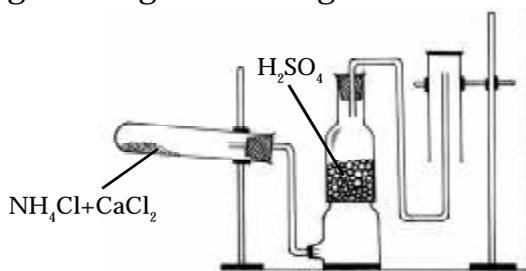
15. A substance is heated in a test tube. Dense white fumes are produced when a glass rod dipped in conc. HCl is introduced at the mouth of the test tube. When red litmus is introduced it turns blue and then red.

- (a) What was the substance heated? (1)
- (b) What are the products formed? (1)
- (c) Write down the equations of the reactions. (1)

Score (3) time (5 minute)

Concept : Laboratory method of preparation of ammonia

16. Following is the figure showing the laboratory method of preparation of ammonia.

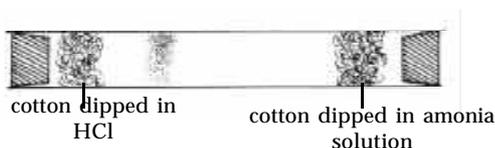


Point out the mistakes and correct them (need not draw the figure). Explain the reason

Score (2) time (2 minutes)

Concept : Reaction of ammonia

17. Arrange materials as shown in figure

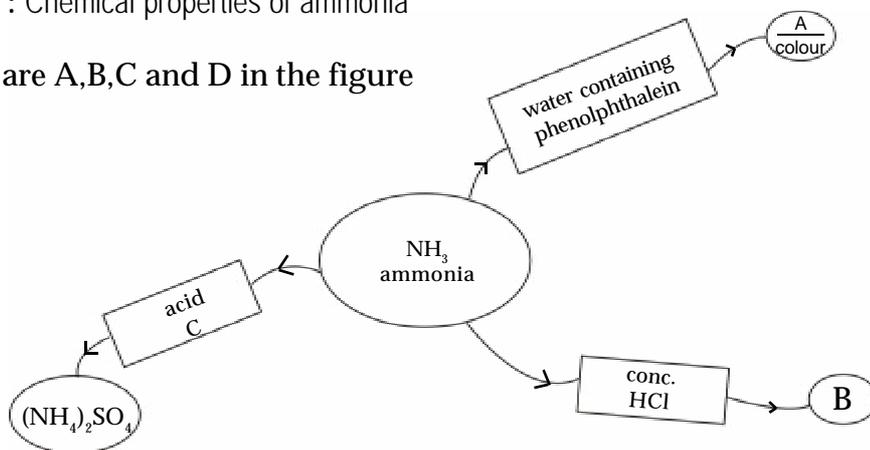


- Write your observation (1)
- What is the product formed? (1)
- Write the equation of the chemical reaction (1)

Score (3) time (3 minute)

Concept : Chemical properties of ammonia

18. What are A,B,C and D in the figure



Score (3) time (3 minute)

Concept : Reversible reaction



- How many moles of reactants and products are present in the reaction? (1)
- What change should be made in pressure to get more product in the system? Write reason. (2)

Score (3) time (4 minute)

Concept : Detection of salts

20. Examine the following table and match them.

A	B	C
Nitrate	Barium chloride	White precipitate
Chloride	$\text{FeSO}_4, \text{H}_2\text{SO}_4$	White precipitate
Sulphate	Silver nitrate	Brown ring test

Score (3) time (3 minute)

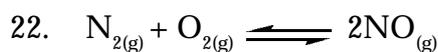
Concept : Chemical properties of H_2SO_4

21. When a liquid substance is added to blue copper sulphate crystals in a watch glass, the blue colour disappears. On adding water to it, the blue colour returns.

- (a) Which is the substance added? (1)
(b) What is the reason for the loss of blue colour of copper sulphate? (1)
(c) Which property of added substance is revealed here? (1)

Score (3) time (3 minute)

Concept : Influence of pressure on reversible reaction

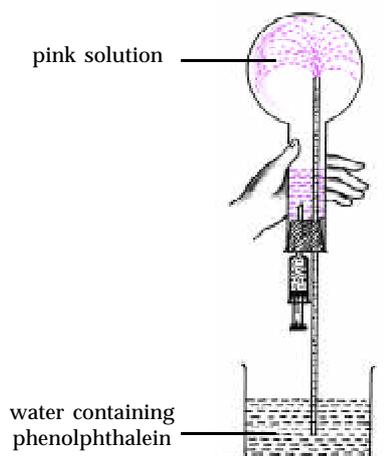


What is the influence of pressure in the above reaction? Justify your answer.

Score (2) time (2 minute)

Concept : Properties of ammonia gas

23. What are the two important properties of ammonia revealed by the experiment shown below?



Score (2) time (2 minute)

Concept : Factors affecting reversible reaction

24. One of the steps in the reaction for the manufacture of sulphuric acid is given below.



How do the following factors influence above system at equilibrium.

- (a) increase in the concentration of oxygen (1)
- (b) decrease in pressure (1)
- (c) the optimum temperature of the reaction is 450°C . Why is the optimum temperature maintained during the reaction? (2)

Score (4) time (4 minute)

Concept : Manufacture of H_2SO_4

25. Sulphuric acid (H_2SO_4) is known as ‘ the king of chemicals’

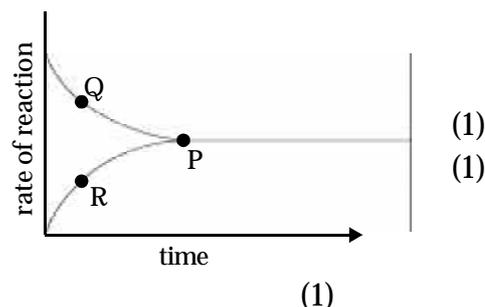
- (a) By which name the method of manufacture of sulphuric acid is known? (1)
- (b) H_2SO_4 can be prepared by dissolving SO_3 in water. However this is not adopted in the manufacture of H_2SO_4 . What is the reason? (2)

Score (3) time (4 minute)

Concept : Reversible reaction and equilibrium state

26. The following graph represents a reversible reaction

- (a) Which part of the graph indicates forward reaction? (1)
- (b) Which part indicates backward reaction? (1)
- (c) What is the significance of the point P?

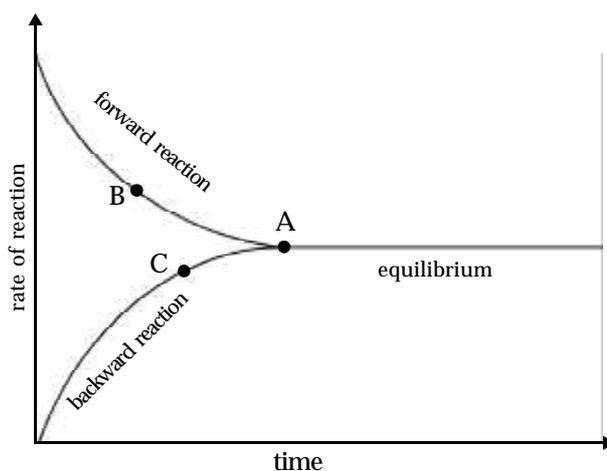


Score (3) time (3 minute)

Concept : Reversible reaction and equilibrium state

27. Analyse the following graph and answer the questions.

- (a) rate of the forward reaction as time passes on (decreases, increases) (1)
- (b) the rate of backward reaction as time passes on (decreases, increases) (1)
- (c) What is the specialty of point A with respect to the rates of forward and backward reactions? (1)



Score (3) time (4 minute)