

B. Types of Chemical Reactions

- Which of the following are combination reactions?
 - Reaction of hydrogen with nitrogen.
 - Reaction of quicklime with water.
 - Combustion of magnesium in air.
 - Hydrolysis of product of (III)

a I, II and III b I and II
c I, III and IV d All of these
- Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous CuSO_4 and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is (are) correct?
 - In beakers A and B, exothermic process has occurred.
 - In beakers A and B, endothermic process has occurred.
 - In beaker C exothermic process has occurred.
 - In beaker C endothermic process has occurred.

a Only I
b Only II
c I and IV
d II and III
- Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed?
 - It is an endothermic reaction.
 - It is an exothermic reaction.
 - The pH of the resulting solution will be more than seven.
 - The pH of the resulting solution will be less than seven.

a I and II
b II and III
c I and IV
d III and IV

- A precipitation reaction is one in which two soluble reactants form an insoluble product. The insoluble product is a solid which usually sinks to the bottom of the liquid.

The table shows the solubility of the compounds that form when some chemicals react. The compounds that are soluble are marked with a tick (\checkmark). The compounds that are insoluble are marked with a cross (\times).

	Carbonate	Chloride	Hydroxide	Nitrate	Sulphate
Barium	\times	\checkmark	\checkmark	\checkmark	\times
Lead	\times	\times	\times	\checkmark	\times
Mercury	\times	\times	\times	\checkmark	\checkmark
Potassium	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Sodium	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark

Which of the following word equations represents a precipitation reaction?

- Sodium nitrate + Barium chloride \rightarrow Sodium chloride + Barium nitrate
 - Mercury sulphate + Potassium nitrate \rightarrow Mercury nitrate + Potassium sulphate
 - Potassium sulphate + Barium hydroxide \rightarrow Potassium hydroxide + Barium sulphate
 - Potassium chloride + Sodium hydroxide \rightarrow Potassium hydroxide + Sodium chloride
- Choose the appropriate words for M, N, O and P to complete the following sentence:
When M is heated, silver and N are obtained. The reaction is used in O photography. It is an example of P decomposition.

	M	N	O	P
a	AgCl	Cl_2	Black and white	Photo
b	AgBr	Br_2	Black and white	Thermal
c	AgCl	Cl_2	Coloured	Photo
d	AgBr	Br_2	Black and white	Photo

- When silver chloride is kept in sunlight for a longer period, some shiny grey colour appears. This is because
 - of the decomposition of silver chloride to give metallic silver.
 - of the sublimation of silver chloride.
 - of oxidation of silver chloride.
 - of reduction of silver chloride.

The incorrect statement(s) is/are

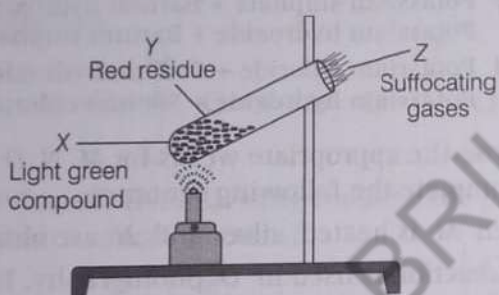
- I and III
- II and III
- II, III and IV
- II and IV

7. Match the reactions given in Column A with their types given in Column B and choose the correct option using the codes given below the columns.

Column A	Column B
(p) Reaction of lime water with carbon dioxide	I. Thermal decomposition
(q) Burning of coal	II. Photo decomposition
(r) Placing AgCl in sunlight	III. Displacement reaction
(s) Potassium chlorate	IV. Combination

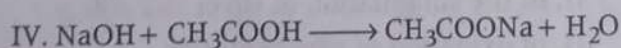
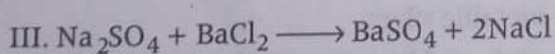
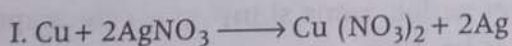
	p	q	r	s
a	III	I	II	IV
b	II	III	IV	I
c	III	IV	II	I
d	I	III	IV	II

8. Two gases 'Z' having suffocating order are obtained when a green solid 'X' is heated, alongwith a residue 'Y'. These gases are major air pollutants. When the vapours of the gases are collected and dissolved in water, the solution turns blue litmus red. The colour of the residue becomes red.



What would be X, Y and Z?

- a $\text{Pb}(\text{NO}_3)_2$ PbO_2 $\text{NO}_2, \text{N}_2\text{O}_4$
 b $\text{Fe}(\text{OH})_3$ FeO $\text{H}_2\text{O}, \text{H}_2\text{O}_2$
 c FeSO_4 Fe_2O_3 SO_2, SO_3
 d PbSO_4 Pb_2O_3 SO_2, SO_3
9. Consider the following reactions:



Predict the odd one.

- a IV b III
 c II d I

10. When iron nails are kept in the solution of copper sulphate, what would be the observation(s)?

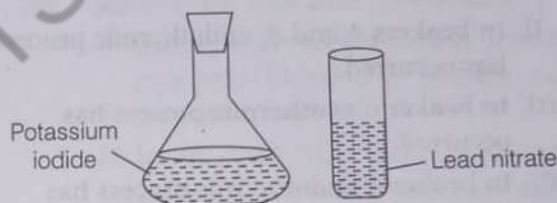
- I. The blue colour of the solution fades.
 II. Iron nails turn brown.
 III. The solution turns green.
 IV. Weight of iron nails decreases.

- a I and II
 b I and III
 c I, II and IV
 d All of the above

11. Which of the following match is correct?

- a $\text{AgNO}_3 + \text{KI} \longrightarrow \text{AgI} + \text{KNO}_3$ (Precipitation)
 b $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$ (Neutralisation)
 c $2\text{AgBr} \longrightarrow 2\text{Ag} + \text{Br}_2$ (Displacement)
 d $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$ (Oxidation)

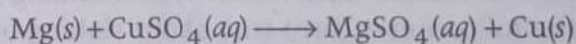
12. Sonu wanted to react potassium iodide solution with aqueous solution of lead nitrate to obtain a yellow precipitate of lead iodide. For this he made the following experimental set up.



But accidentally the lead nitrate solution fall down and more lead nitrate is not available in the laboratory. Could you suggest which of the following salt he can use for performing this activity?

- a Lead sulphate (insoluble)
 b Lead acetate
 c Ammonium nitrate
 d Potassium sulphate

13. Assertion (A) In a reaction,



Mg is a reductant but itself gets oxidised.

Reason (R) Oxidant is reduced by accepting electrons and reductant is oxidised by losing electrons.

- a Both A and R are true and R is the correct explanation of A
 b Both A and R are true, but R is not the correct explanation of A
 c A is true, but R is false
 d A is false, but R is true

14. In which reaction(s) neither oxidation nor reduction take(s) place?

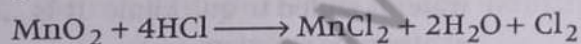
- I. Dissociation of ammonium chloride to ammonia and hydrogen chloride.
 - II. Dissociation of silver chloride into silver and chlorine gas.
 - III. Displacement of Ag from $[\text{Ag}(\text{CN})_2]^-$ complex by Zn.
- a Only I
b I and II
c II and III
d I, II and III

15. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears.

Which of the following is the correct explanation for the observation?

- a KMnO_4 is an oxidising agent and it oxidises FeSO_4
- b FeSO_4 acts as an oxidising agent and it oxidises KMnO_4
- c The colour disappears due to dilution, no reaction is involved
- d KMnO_4 is an unstable compound and decomposes in presence of FeSO_4 to a colourless compound

16. Consider the following reaction for the preparation of chlorine gas in the laboratory by treating manganese dioxide with chlorine gas.



The species reduces and the reducing agents in this reaction are respectively

- a MnO_2, HCl
- b $\text{MnO}_2, \text{MnO}_2$
- c HCl, HCl
- d HCl, MnO_2

17. *P* and *Q* are respectively highly reactive and less reactive metals. A compound of *P* called *X* is used for white washing. *Q* is a shiny brown metal and produce black solid *Y*, when heated in excess of air.

P and *Q* are respectively

- | | |
|----------|----------|
| <i>P</i> | <i>Q</i> |
| a Cu | Ca |
| b Mg | Cu |
| c Ca | Cu |
| d Ba | Cu |

18. A photochromic glass is a type of glass that darkens on exposure to bright light. It is made by coating the glass with a thin layer of silver chloride and copper (I) chloride. In the presence of bright light, the silver particles produced darken the glass, however when the light is less bright, the dark glass becomes clear again.

The oxidising agent in this reaction is

- a silver chloride
- b copper (II) chloride
- c silver metal
- d copper (I) chloride

19. Sort out the following reactions into Group A (i.e. Precipitation reactions) Group B (i.e. Redox reactions) and Group C (i.e. Neutralisation reactions)

1. $\text{H}_2\text{S} + \text{SO}_2 \longrightarrow \text{S} + \text{H}_2\text{O}$
2. $\text{NaCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{NaNO}_3$
3. $2\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
4. $\text{NH}_4\text{NO}_3 \xrightarrow{\Delta} \text{N}_2\text{O} + 2\text{H}_2\text{O}$
5. $\text{AgBr} \xrightarrow{h\nu} \text{Ag} + \text{Br}_2$
6. $\text{Zn} + \text{CuSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Cu}$
7. $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Cu}} \text{CH}_3\text{CHO} + \text{H}_2$
8. $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{HCl}$
9. $\text{HNO}_3 + \text{Ca}(\text{OH})_2 \longrightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$

- | | | | |
|---|---------|---|---------------|
| a | Group A | — | 1, 3, 5, 6, 9 |
| | Group B | — | 2, 4, 5, 7 |
| | Group C | — | 3, 5, 6, 8 |
| b | Group A | — | 1, 2, 5, 6, 8 |
| | Group B | — | 1, 3, 6, 7, 9 |
| | Group C | — | 3, 8, 9 |
| c | Group A | — | 1, 2, 5, 6, 8 |
| | Group B | — | 1, 4, 5, 6, 7 |
| | Group C | — | 2, 3, 8, 9 |
| d | Group A | — | 1, 2, 5, 8 |
| | Group B | — | 1, 4, 5, 6, 7 |
| | Group C | — | 3, 5, 8, 9 |

20. Which of the underlined substances is a reducing agent in the following reactions?

- a Zn $\text{Pb}(\text{NO}_3)_2 \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{Pb}$
- b $2\text{KI} + \underline{\text{H}_2\text{O}_2} + \text{H}_2\text{SO}_4 \longrightarrow \text{I}_2 + \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- c $\text{MgCO}_3 + \underline{2\text{HNO}_3} \longrightarrow \text{Mg}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{CO}_2$
- d $\text{Mg} + \underline{\text{H}_2\text{SO}_4} \longrightarrow \text{MgSO}_4 + \text{H}_2$

21. Which of the following statements about the given reaction are correct?



- I. Iron metal is getting oxidised.
 II. Water is getting reduced.
 III. Water is acting as reducing agent.
 IV. Water is acting as oxidising agent.
- a I, II and III b III and IV
 c I, II and IV d II and IV

Direction (Q Nos. 22-24) Read the given passage and answer the following questions.

Black snake and pharaoh's serpent remain a very famous and enjoyable fireworks among the children since, a long period. These both are similar types of fireworks. After being lit, both fireworks begin to smoke and create ash resembling a snake *via* an intumescent reaction. They stay on the ground and do not emit sparks, flares, any form of projectiles or any sound but may release smoke. Introducing mercury (II) thiocyanate [$\text{Hg}(\text{SCN})_2$] to a strong heat source initiate a reaction producing a large coiling mass of serpent like solid. Wohler discovered this property in 1821 and by the 1860s, it was being used commercially in a firework called 'pharaoschlangen' (pharaoh snake) solid in Germany. This product was eventually banned after it was discovered that the toxic properties of the product had caused the death of several children (accidental mercury ingestion and inhalation of its fumes).

The fireworks such as black snake that is available nowadays gave less impressive result. The reaction is not as extreme because these type of firework usually consist of a mixture of sugar and baking soda or a mixture of linseed oil and naphthalenes instead of mercury (II) thiocyanate.

22. When mercury (II) thiocyanate is heated
- I. a decomposition reaction takes place.
 II. an endothermic reaction takes place.
 III. nitrogen and carbon disulphide gases are evolved.

The true statements are

- a I and II b II and III
 c I and III d I, II and III

23. The substance X which is generated when baking soda is heated, is tested by

- I. a lightening splinter. II. lime water.
 III. 'pop' sound.

The correct test(s) is/are

- a Only I b I and II
 c Only II d I and III

24. What are obtained, when a mixture of sugar and baking soda is heated, for creating a black snake?

- a Sodium bicarbonate and carbon dioxide
 b Carbon dioxide, hydrogen and water
 c Carbon dioxide and carbon
 d All of the above

25. Fill in the blanks with the help of words given in the box.

(i) absorption (ii) reduction (iii) thermal decomposition (iv) combination

- I. When two or more substances combine to give a single product, the reaction is called _____ reaction.
 II. Endothermic reactions are those which take place with the _____ of energy.
 III. If chlorine is removed from a substance and metal content is increased in it, the reaction is called _____.
 IV. When a crystal of ferrous sulphate is heated, it gives a residue alongwith the release of gaseous products. This reaction is an example of _____ reaction.

- | | I | II | III | IV |
|---|-------|------|-------|-------|
| a | (iv) | (i) | (ii) | (iii) |
| b | (iv) | (i) | (iii) | (ii) |
| c | (iv) | (ii) | (iii) | (i) |
| d | (iii) | (iv) | (ii) | (i) |

26. State 'T' for true and 'F' for false.

- I. Displacement reaction takes place when water is added to quicklime. It is an exothermic reaction.
 II. A precipitation reaction is one which involves separation of a solid substance but it never be a decomposition reaction.
 III. Combination and double decomposition reactions are just opposite to each other.
 IV. The reaction occurring between an acid and a base to give salt and water is called a neutralisation reaction. It is an example of double decomposition reaction.
 V. Combustion reactions are always exothermic in nature.

- | | I | II | III | IV | V |
|---|---|----|-----|----|---|
| a | F | T | T | F | F |
| b | F | T | F | F | T |
| c | F | T | F | T | T |
| d | T | T | F | T | T |