CHEMISTRY

BOOKS - MTG IIT JEE FOUNDATION

CHEMICAL REACTIONS AND EQUATIONS

Illustrations

1. Write balanced chemical equations for each of the following reactions :

When solid mercury (II) oxide is heated, liquid mercury and oxygen gas are produced.

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2. Write balanced chemical equations for each of the following reactions :

Liquid hydrogen peroxide decomposes to form water and oxygen gas.

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3. Write balanced chemical equations for these equations :

Phosphorus burns in oxygen to form phosphorus pentoxide.

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4. Write balanced chemical equations for these equations :

Silver is precipitated out when a copper strip is dipped in silver nitrate solution. The solution turns blue due to the formation of copper (II) nitrate.

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5. Write balanced chemical equations for these equations :

Magnesium ribbon is burnt in a jar containing nitrogen gas when a white powder of magnesium nitride is obtained.

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6. Write balanced chemical equations for these equations :

Marble (calcium carbonate) is dissolved in hydrochloric acid to give calcium chloride, water and carbon dioxide.

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7. Write balanced chemical equations for these equations :

Sodium hydroxide reacts with sulphuric acid to form sodium sulphate and water.

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8. Write balanced chemical equations for these equations :

Aluminium sulphate reacts with sodium hydroxide to form a precipitate of aluminium hydroxide while the solution after the reaction is found to contain sodium sulphate.

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9. Write balanced chemical equations for these equations :

Burning of benzene (C_6H_6) in oxygen to give carbon dioxide and water.

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10. Balance the following chemical equations :

$CS_2 + O_2 \rightarrow CO_2 + SO_2$

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11. Balance the following chemical equations :

$Mg + CO_2 \xrightarrow{\Delta} MgO + C$

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12. Balance the following chemical equations :

$CaC_2 + H_2O \rightarrow Ca(OH)_2 + C_2H_2$

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13. Balance the following chemical equations :

$Al + HCl \rightarrow AlCl_3 + H_2$

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14. Balance the following chemical equations :

$H_2S + O_2 \rightarrow SO_2 + H_2O$

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15. Balance the following chemical equations :

$Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + H_2O$

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16. Balance the following chemical equations :

$BaCl_2 + Al_2(SO_4)_3 \rightarrow AlCl_3 + BaSO_4 \downarrow$

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17. Balance the following chemical equations :

$Fe + H_2O \rightarrow Fe_2O_3 + H_2$

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18. Write the balanced equations for the following chemical reactions.

Hydrogen + chlorine $\rightarrow$ hydrogen chloride

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19. Write the chemical equations for the following reactions :

Magnesium oxide + Carbon $\rightarrow$ Magnesium + Carbon monoxide

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20. Write the chemical equations for the following reactions :

Phosphorus pentachloride + Water $\rightarrow$ Phosphoric acid + Hydrogen chloride

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21. Write the chemical equations for the following reactions :

Sulphur dioxide + Oxygen $\rightarrow$ Sulphur trioxide

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22. Write the chemical equations for the following reactions :

Sodium + Water $\rightarrow$ Sodium hydroxide + Hydrogen

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23. Write the balanced chemical equations with state symbols for the following reactions :

Iron fillings react with steam to produce iron (III) oxide and hydrogen gas.

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24. Write the balanced chemical equations with state symbols for the following reactions :

Ethane burns in oxygen to form carbon dioxide and water (gas).

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25. Write a balanced chemical equation with state symbols for the following reactions :

Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

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26. What information is conveyed by the following equation ?

$$CaCO_3(s) \xrightarrow{\text{Heat}} CaO(s) + CO_2(g)$$

(Given : atomic mass of Ca = 40, C = 12, O = 16)

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27. Give two examples of thermal decomposition.

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28. Give few examples of decomposition reactions by electrical energy.

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29. Give few examples of displacement reaction.

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30. Explain the reactions between metals and acids as examples of displacement reactions.

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31. Give examples of the displacement reactions in which a more active non-metal displaces less active non-metal from its compound.

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32. Name the substance which gets oxidised, the substance which gets reduced, the oxidising agent and the reducing agent in the following reactions :

$3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

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33. Name the substance which gets oxidised, the substance which gets reduced, the oxidising agent and the reducing agent in the following reactions :

$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

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34. Name the substance which gets oxidised, the substance which gets reduced, the oxidising agent and the reducing agent in the following reactions :

$2Na + Cl_2 \rightarrow 2NaCl$

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35. Name the substance which gets oxidised, the substance which gets reduced, the oxidising agent and the reducing agent in the following reactions :

$Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$

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36. In terms of electronic concept, show that the chemical reaction taking place between zinc and copper sulphate dissolved in water is a redox reaction.

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37. What is the relationship between oxidation and oxidising agent in a redox reaction? Write an example of a redox reaction showing the relationship between oxidation and the oxidising agent.

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38. The marble statues often slowly get corroded when kept in open for a long time. Assign a suitable explanation.

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Solved Examples

1. When you mix solutions of lead (II) nitrate and potassium iodide,

What is the colour of the precipitate formed? Name the compound of the precipitate.

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2. When you mix solutions of lead (II) nitrate and potassium iodide,

Write a balanced chemical equation for the reaction.

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3. When you mix solutions of lead (II) nitrate and potassium iodide,

Is this a double displacement reaction?

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4. With the help of an activity show that iron is more reactive than copper.

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5. A silver spoon is kept immersed in an aqueous copper sulphate solution. What change will take place?

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6. Two test tubes contain solutions of potassium iodide (KI) and potassium bromide (KBr) arbitrarily.

How will you find which solution contains which salt ?

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7. Which of the following combinations would result in a displacement reaction? Write appropriate equations for the reactions that occur.

(a) $I_{2(s)} + NaBr_{(aq)} \rightarrow$

(b) $Cl_{2(g)} + NaI_{(aq)} \rightarrow$

(c) $Br_{2(l)} + NaCl_{(aq)} \rightarrow$

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8. Why does blue colour of copper sulphate solution start fading when a zinc rod is dipped in it?

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9. Name the substance oxidised and substance reduced in the following reactions :

$PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

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10. Can a displacement reaction be a redox reaction? Explain with the help of an example.

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11. A solution of Na_2CO_3 is mixed with a solution of $CaCl_2$. Predict what happens.

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12. A house wife wanted her house to be white washed. She bought 10 kg of quick lime from the market and dissolved in 30 litres of water. She noticed that water started boiling even when it was not being heated. Give reason for her observation. Write the corresponding equation and name the product formed.

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13. Write the chemical equation to represent the neutralisation reaction between an acid and a base.

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14. Rusting of an iron nail is a reaction.

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15. How will you test for the gas which is liberated when hydrochloric acid reacts with an active metal?

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16. A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.

(a) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved.

(b) Name the black substance formed and give its chemical formula.

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17. A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.

(a) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved.

(b) Name the black substance formed and give its chemical formula.

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18. A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.

(a) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved.

(b) Name the black substance formed and give its chemical formula.

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Ncert Section

1. Why should a magnesium ribbon be cleaned before burning in air?

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2. Write the balanced equations for the following chemical reactions.

Hydrogen + chlorine $\rightarrow$ hydrogen chloride

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3. Write the balanced equations for the following chemical reactions.

Barium chloride + aluminium sulphate $\rightarrow$ barium sulphate + aluminium chloride

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4. Write the balanced equations for the following chemical reactions.

Sodium + water $\rightarrow$ sodium hydroxide + hydrogen

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5. Write a balanced chemical equation with state symbols for the following reactions :

Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride.

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6. Write a balanced chemical equation with state symbols for the following reactions :

Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

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7. A solution of the substance X is used for whitewashing.

Name the substance X and write its formula.

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8. A solution of the substance X is used for whitewashing.

Write the reaction of the substance X with water.

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9. Why is the amount of gas collected in one of the test tubes in Activity 1.7 double of the amount collected in the other? Name this gas.

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10. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

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11. Give an example of a double displacement reaction (only) reaction with complete balanced equation).

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12. Identify the substances that are oxidized and the substances that are reduced in the following reactions :

$4Na_{(s)} + O_{2(g)} \rightarrow 2Na_2O_{(s)}$

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13. Identify the substances that are oxidised and the substances that are reduced in the following reactions.

(i) $4Na(s) + O_2(g) \rightarrow 2NaO(s)$

(ii) $CuO(g) + H_2(g) \rightarrow Cu(s) + H_2O(l)$

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14. Which of the statements about the reaction below are incorrect?

$2PbO(s) + C(s) \rightarrow 2Pb(s) + CO_2(g)$

(a) Lead is getting reduced.

(b) Carbon dioxide is getting oxidised.

(c) Carbon is getting oxidised.

(d) Lead oxide is getting reduced.

A. (i) and (ii)

B. (i) and (iii)

C. (i), (ii) and (iii)

D. all of these

Answer: A

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15. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$

The above reaction is an example of a

A. combination reaction

B. double displacement reaction

C. decomposition reaction

D. displacement reaction.

Answer: D

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16. What happens when dilute hydrochloric acid is added to iron fillings?

Tick the correct answer.

A. Hydrogen gas and iron chloride are produced.

B. Chlorine gas and iron hydroxide are produced.

C. No reaction takes place.

D. Iron salt and water are produced.

Answer: A

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17. What is a balanced chemical equation? Why should chemical equations be balanced?

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18. Translate the following statement into chemical equation and then balance the equation:

Hydrogen gas combines with nitrogen to from ammonia.

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19. Translate the following statements into chemical equations and then balance them.

Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

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20. Translate the following statements into chemical equations and then balance them.

Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

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21. Translate the following statements into chemical equations and then balance them.

Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

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22. Balance the following chemical equations :

$HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$

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23. Balance the following chemical equations :

$NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

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24. Balance the following chemical equations :

$NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

Watch Video Solution

25. Balance the following chemical equations :

$BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$

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26. Write the balanced chemical equations for the following reactions :

Calcium hydroxide + Carbon dioxide $\rightarrow$ Calcium carbonate + Water

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27. Write the balanced chemical equation for the following reaction:

Zinc + Silver nitrate $\rightarrow$ Zinc nitrate + silver

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28. Write the balanced chemical equations for the following reactions :

Aluminium + Copper chloride $\rightarrow$ Aluminium chloride + Copper

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29. Write the balanced chemical equations for the following reactions :

Barium chloride + Potassium sulphate $\rightarrow$ Barium sulphate + Potassium chloride

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30. Write the balanced chemical equations for the following and identify the type of reaction in each case.

$\text{Potassium bromide}_{(aq)} + \text{Barium iodide}_{(aq)} \rightarrow \text{Potassium iodide}_{(aq)} + \text{B}$

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31. Write the balanced chemical equations for the following and identify the type of reaction in each case.

$\text{Zinc carbonate}_{(s)} \rightarrow \text{Zinc oxide}_{(s)} + \text{Carbon dioxide}_{(g)}$

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32. Write the balanced chemical equations for the following and identify the type of reaction in each case.

$\text{Hydrogen}_{(g)} + \text{Chlorine}_{(g)} \rightarrow \text{Hydrogen chloride}_{(g)}$

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33. Write the balanced chemical equations for the following and identify the type of reaction in each case.

$\text{Magnesium}_{(s)} + \text{Hydrochloric acid}_{(aq)} \rightarrow \text{Magnesium chloride}_{(aq)} + \text{Hyd}$

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34. What does one mean by exothermic and endothermic reactions? Give examples

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35. Why is respiration considered an exothermic reaction? Explain.

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36. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

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37. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

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38. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

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39. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

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40. What do you mean by a precipitation reaction? Explain by giving examples.

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41. Explain the following in terms of gain or loss of oxygen with two examples each.

Oxidation

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42. Explain the following in terms of gain or loss of oxygen with two examples each.

Reduction

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43. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed

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44. Why do we apply paint on iron articles?

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45. Oil and fat containing food items are flushed with nitrogen. Why?

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46. Explain the following terms with one example each:

(a) Corrosion (b) Rancidity

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47. Explain the following terms with one example each:

(a) Corrosion (b) Rancidity

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Exercise Multiple Choice Questions Level 1

1. When lead nitrate reacts with potassium iodide, yellow precipitate of

A. PbI_2 is formed

B. KNO_3 is formed

C. $Pb(NO_3)_2$ is formed

D. $PbIO_3$ is formed.

Answer: A

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2. When ferrous hydroxide reacts with hydrochloric acid, ___ and H_2O are produced.

A. $FeCl_3$

B. $FeCl_2$

C. $FeCl_4$

D. FeCl

Answer: B

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3. Which of the following reactions involves the combination of two elements?

A. $CaO + CO_2 \rightarrow CaCO_3$

B. $2Na + \frac{1}{2}O_2 \rightarrow Na_2O$

C. $SO_2 + \frac{1}{2}O_2 \rightarrow SO_3$

D. $NH_3 + HCl \rightarrow NH_4Cl$

Answer: B

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4. Which of the following is a displacement reaction?

A. $CaO + H_2O \rightarrow Ca(OH)_2$

B. $MgCO_3 \rightarrow MgO + CO_2$

C. $2Na + 2H_2O \rightarrow 2NaOH + H_2$

D. $H_2 + Cl_2 \rightarrow 2HCl$

Answer: C

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5. In the balanced reaction

$aFe_2O_3 + bH_2 \rightarrow cFe + dH_2O$

a, b, c and d, respectivel, are

A. 1, 1, 2, 3

B. 1, 1, 1, 1

C. 1, 3, 2, 3

D. 1, 2, 2, 3

Answer: C

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6. Which of the following is a decomposition reaction?

A. $ZnCO_3 \rightarrow ZnO + CO_2$

B. $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

C. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

D. $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

Answer: A

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7. Rancidity can be prevented by

A. adding antioxidants

B. packaging oily food in nitrogen gas

C. both (a) and (b)

D. none of these

Answer: C

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8. Combination of phosphorus and oxygen is an example of

A. oxidation

B. reduction

C. rancidity

D. none of these

Answer: A

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9. A redox reaction is one in which

A. both the substances are reduced

B. both the substances are oxidised

C. an acid is neutralised by the base

D. one substance is oxidised while the other is reduced.

Answer: D

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10. In the following equations

$$Na_2CO_3 + xHC1 \rightarrow 2NaC1 + CO_2 + H_2O$$

the value of x is

A. 1

B. 2

C. 3

D. 4

Answer: B

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11. $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$. Above reaction is

A. precipitation reaction

B. double displacement reaction

C. combination reaction

D. (a) and (b) both

Answer: D

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12. Which of the following statements is true?

A. Total mass of the substance remains same in a chemical change.

B. A chemical change is permanent and irreversible.

C. A physical change is temporary and is generally reversible.

D. All of these.

Answer: D

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13. Which metal is protected by layer of its own oxide ?

A. Copper

B. Silver

C. Iron

D. Aluminium

Answer: D

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14. When dilute hydrochloric acid is added to zinc pieces taken in a test tube

A. no change takes place

B. the colour of the solution becomes yellow

C. a pungent smelling gas gets liberated

D. small bubbles of hydrogen gas appear on the surface of zinc pieces.

Answer: D

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15. An iron nail is dipped in the solution of copper sulphate for about 30 minture, state the change in colour observed. Give the reason for the change.

A. zinc sulphate

B. copper sulphate

C. iron sulphate

D. aluminium sulphate.

Answer: B

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16. In an endothermic reaction

A. the energy content of products is less than the heat content of reactants

B. the energy content of products is greater than the heat content of reactants

C. heat is released

D. heat is neither absorbed nor released.

Answer: B

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17. Heating limestone produces

A. quick lime

B. carbon dioxide

C. both (a) and (b)

D. carbon monoxide

Answer: C

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18. Ferrous sulphate on heating gives:

A. ferric oxide

B. carbon dioxide

C. oxygen

D. water

Answer: A

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19. White silver chloride in sunlight turns to

A. grey

B. yellow

C. red

D. none of these.

Answer: A

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20. Which of the following chemical equations is an unbalanced one?

A. $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$

B. $2C_4H_{10} + 12O_2 \rightarrow 8CO_2 + 10H_2O$

C. $2Al + 6H_2O \rightarrow 2Al(OH)_3 + 3H_2$

D. $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

Answer: B

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21. Which of the following is not a chemical reaction?

A. Souring of milk

B. Dissolution of sugar in water

C. Rusting of iron

D. Digestion of food in our body

Answer: B

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22. The electrolytic decomposition of water gives H_2 and O_2 in the ratio of

A. 1 : 2 by volume

B. 2 : 1 by volume

C. 8 : 1 by mass

D. 1 : 2 by mass.

Answer: B

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23. Copper on exposure to air reacts with moisture and CO_2 to develop a green layer which is

A. basic copper carbonate

B. copper sulphate

C. copper carbonate

D. copper nitrate.

Answer: A

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24. In exothermic reaction, the reactants

A. have less energy than the products formed

B. have more energy than the products formed

C. are at lower temperature than products

D. have equal energy as products.

Answer: B

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25. $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$ is an example of

A. displacement reaction

B. decomposition reaction

C. double displacement reaction

D. combination reaction.

Answer: A

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26. When washing soda is treated with hydrochloric acid, it gives off a colourless gas with a lot of effervescence. Identify the gas.

A. CO_2

B. O_2

C. CO

D. Cl_2

Answer: A

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27. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?

(i) Displacement reaction

(ii) Precipitation reaction

(iii) Combination reaction

(iv) Double displacement reaction

A. (i) only

B. (ii) only

C. (iii) and (iv) only

D. (ii) and (iv) only

Answer: D

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28. One mole of metal (Y) was added to 1.0 dm^3 of $2.0\text{mol}/dm^3$ hydrochloric acid. The metal reacted completely with the acid to form a salt and hydrogen. Which of the following could be metal (Y)?

A. Aluminium

B. Copper

C. Sodium

D. Zinc

Answer: D

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29. When copper turnings are added to silver nitrate solution, a blue coloured solution is formed after sometime. It is because, copper

A. oxidises silver from the solution

B. forms a blue coloured complex with $AgNO_3$

C. is oxidised to Cu^{2+}

D. is reduced to Cu^{2+}.

Answer: C

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30. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of

A. a combination reaction

B. a displacement reaction

C. a decomposition reaction

D. a double displacement reaction.

Answer: D

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Exercise Multiple Choice Questions Level 2

1. 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, it oxidises $FeSO_4$.

B. $FeSO_4$ acts as an oxidising agent and 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.

Answer: A

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2. A dilute solution of sodium carbonate was added to two test tubes - one containing dil. HCl (A) and the other containing dilute NaOH (B). The correct observation was

A. a brown coloured gas liberated in test tube A

B. a brown coloured gas liberated in test tube B

C. a colourless gas liberated in test tube A

D. a colourless gas liberated in test tube B.

Answer: C

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3. Which of the following species do not show disproportionation reaction ?

A. ClO^-

B. ClO_4^-

C. ClO_2^-

D. ClO_3^-

Answer: B

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4. In the reaction, $H_2S + H_2O_2 \rightarrow S + 2H_2O$

A. H_2S has been oxidised

B. SO_2 has been oxidised

C. H_2S is the oxidising agent

D. SO_2 is the reducing agent.

Answer: A

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5. Which of the following is true regarding dissolution of NH_4Cl in water?

A. It is an endothermic and chemical change.

B. It is an exothermic and physical change.

C. It is an endothermic and physical change.

D. It is an exothermic and chemical change.

Answer: C

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6. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

A. $2H_{2(l)} + O_{2(l)} \rightarrow 2H_2O_{(g)}$

B. $2H_{2(g)} + O_{2(l)} \rightarrow 2H_2O_{(l)}$

C. $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$

D. $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$

Answer: D

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7. In the ionic equation,

$BiO_3^- + 6H^+ + xe^- \rightarrow Bi^3 + 3H_2O$, the value of x is

A. 6

B. 2

C. 4

D. 3

Answer: B

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8. Which of the following shows the given reactions in the increasing order of speed of the reaction?

(i) $2KClO_{3(s)} \xrightarrow{\Delta} 2KCl_{(s)} + 3O_{2(g)}$

(ii) $2KClO_{3(s)} \xrightarrow[MnO_2]{\Delta} 2KCl_{(s)} + 3O_{2(g)}$

(iii) $6CO_{2(g)} + 6H_2O_l \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_{6(aq)} + 6O_{2(g)}$

A. $(iii) < (i) < (ii)$

B. $(i) < (ii) < (iii)$

C. $(ii) < (iii) < (i)$

D. $(iii) < (ii) < (i)$

Answer: A

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9. Which of the following is a redox reaction?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $H_2 + Cl_2 \rightarrow 2HCl$

C. $CaO + 2HCl \rightarrow CaCl_2 + H_2O$

D. $NaOH + HCl \rightarrow NaCl + H_2O$

Answer: B

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10. Given $E^{\circ}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V$, $E^{\circ}_{MnO_4^-/Mn^{2+}} = 1.51V$

Among the following, the strongest reducing agent is

$E^{\circ}_{Cr^{3+}/Cr} = -0.74V^{x}$, $E^{\circ}_{MnO_4^-/Mn^{2+}} = 1.51V$

$E^{\circ}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V$, $E^{\circ}_{Cl/Cl^-} = 1.36V$

Based on the data given above strongest oxidising agent will be

A. MnO_4^-

B. Cl^-

C. Cr^{3+}

D. Mn^{2+}

Answer: A

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11. Which of the following reactions evolves heat?

A. $C + O_2 \rightarrow CO_2$

B. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

C. $CaO + H_2O \rightarrow Ca(OH)_2$

D. All of these

Answer: D

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12. Which of the following is not a thermal decomposition reaction?

A. $2H_2O \rightarrow 2H_2 + O_2$

B. $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

C. $ZnCO_3 \rightarrow ZnO + CO_2$

D. $2KClO_3 \rightarrow 2KCl + 3O_2$

Answer: A

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13. Which of the following combination of reactants will lead to the formation of reddish brown precipitate?

A. $AgNO_{3\,(aq)} + NH_4OH_{(aq)}$

B. $Pb(NO_3)_{2\,(aq)} + Kl_{(aq)}$

C. $FeCl_{3\,(aq)} + NH_4OH_{(aq)}$

D. $CuSO_{4\,(aq)} + H_2S_{(g)}$

Answer: C

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14. 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 followig statement (s) is (are) correct?

1. In beakers A and B, exothermic process has occurred.

2. In beakers A and B, endothermic process has occurred.

3. In beaker C, exothermic process has occurred.

4. In beaker C, endothermic process has occurred.

A. Only (i)

B. Only (ii)

C. (i) and (iv)

D. (ii) and (iii)

Answer: C

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15. When the ion $Cr_2O_7^{2-}$ acts as an oxidant in acidic aqueous solution the ion Cr^{3+} is formed. How many mole of Sn^{2+} would be oxidised to Sn^{4+} by one mole $Cr_2O_7^{2-}$ ion:

A. $2/3$

B. $3/2$

C. 2

D. 3

Answer: D

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16. Which is a double displacement as well as neutralisation reaction?

A. $NaOH + HCl \rightarrow NaCl + H_2O$

B. $AgNO_3 + HCl \rightarrow AgCl + HNO_3$

C. $Mg + 2HCl \rightarrow MgCl_2 + H_2$

D. $N_2 + 3H_2 \rightarrow 2NH_3$

Answer: A

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17. Which of the following processes does not involve either oxidation or reduction?

A. Formation of slaked lime from quick lime

B. Heating mercuric oxide

C. Formation of manganese chloride from manganese oxide (MnO_2)

D. Formation of zinc from zinc blende

Answer: A

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18. When sodium hydroxide is added to ferric chloride solution, a reddish brown precipitate is formed. The precipitate is separated from the mixture by the process of _____.

A. evaporation

B. sublimation

C. fractional distillation

D. filtration

Answer: D

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19. Complete the chemical reaction.

$Mg_{(s)} + H_2SO_{4(aq)} \rightarrow ?$

A. $MgSO_3 + H_2O$

B. $MgSO + H_2O + O_2$

C. $MgSO_4 + H_2$

D. No reaction

Answer: C

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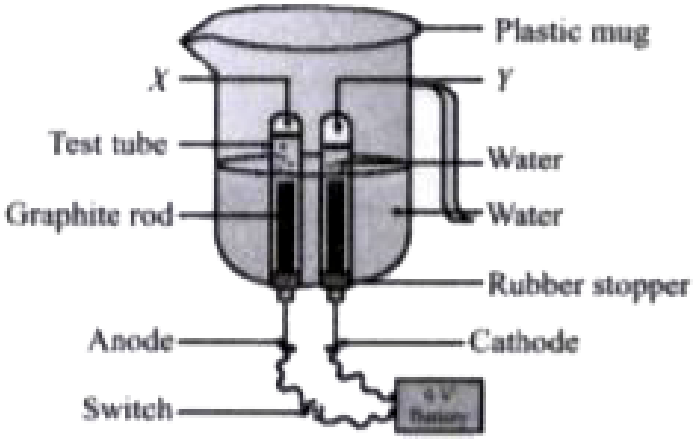
20. Study the given diagram carefully.



Identify X, Y and the type of reaction occurring.

A. H_2, O_2, Decomposition

B. O_2, H_2, Displacement

C. H_2, O_2, Displacement

D. O_2, H_2, Decomposition

Answer: D

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Exercise Match The Following

1. In this section, each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

List-I		List-II
(P) $A + B \rightarrow AB$	1.	Double displacement
(Q) $AB \rightarrow A + B$	2.	Combination
(R) $AB + XY \rightarrow AX + BY$	3.	Displacement
(S) $AB + C \rightarrow AC + B$	4.	Decomposition

A. P-1, Q-2, R-3, S-4

B. P-2, Q-4, R-1, S-3

C. P-3, R-1, Q-2, S-4

D. P-4, R-3, Q-1, S-2

Answer: B

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2. In this section, each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

List-I		List-II	
(P)	$2Ca + O_2$	1.	$2HCl$
(Q)	$4Fe + 3O_2$	2.	$2CaO$
(R)	$H_2 + Cl_2$	3.	$2Fe_2O_3$
(S)	$2Fe + 3Cl_2$	4.	$2FeCl_3$

A. P-1, Q-2, R-4, S-3

B. P-3, Q-4, R-2, S-1

C. P-2, Q-3, R-1, S-4

D. P-4, Q-1, R-3, S-2

Answer: C

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3. In this section, each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

List-I		List-II
(P) $C + O_2 \rightarrow CO_2$	1.	Displacement
(Q) $2AgBr \rightarrow 2Ag + Br_2$	2.	Combination
(R) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$	3.	Decomposition
(S) $NaOH + HCl \rightarrow NaCl + H_2O$	4.	Neutralisation

A. P-3, Q-4, R-2, S-1

B. P-1, Q-2, R-3, S-4

C. P-4, Q-1, R-3, S-2

D. P-2, Q-3, R-1, S-4

Answer: D

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4. In this section, each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

List-I		List-II
(P) $CuO + H_2 \rightarrow Cu + H_2O$	1.	Photodecomposition reaction
(Q) $2AgBr \rightarrow 2Ag + Br_2$	2.	Redox reaction
(R) $2H_2O \rightarrow 2H_2 + O_2$	3.	Thermal decomposition reaction
(S) $ZnCO_3 \rightarrow ZnO + CO_2$	4.	Electrolytic decomposition reaction

A. P-2, Q-1, R-4, S-3

B. P-3, Q-1, R-4, S-2

C. P-1, Q-4, R-3, S-2

D. P-4, Q-3, R-1, S-2

Answer: A

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5. In this section, each question has two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (a), (b), (c) and (d) out of which one is correct.

	List-I		List-II
(P)	Methane + Oxygen → Carbon dioxide + Water	1.	Neutralisation reaction
(Q)	Calcium carbonate → Calcium oxide + Carbon dioxide	2.	Combustion reaction
(R)	Magnesium + Copper oxide → Copper + Magnesium oxide	3.	Decomposition reaction
(S)	Hydrochloric acid + Sodium hydroxide → Sodium chloride + Water	4.	Oxidation reduction

A. P-1, Q-2, R-3, S-4

B. P-3, Q-2, R-1, S-4

C. P-2, Q-3, R-4, S-1

D. P-4, Q-1, R-2, S-3

Answer: C

View Text Solution

Exercise Assertion Reason Type

1. Assertion : $CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_2O_{(l)}$. It is a redox reaction.

Reason : In a redox reaction, reductant is reduced by accepting electrons and oxidant is oxidised by losing electrons.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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2. Assertion : When a zinc rod is dipped in a solution of copper sulphate, zinc rod dissolves partially and its surface is coated with copper metal.

Reason : This reaction is due to the presence of sulphate ions.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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3. Assertion : $2H_2S_{(g)} + O_{2(g)} \rightarrow 2S_{(s)} + 2H_2O_{(l)}$. It is a redox reaction.

Reason : Oxidation involves removal of hydrogen while reduction involves addition of hydrogen.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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4. Assertion (A): SO_2 and Cl_2 are both bleaching agents.

Reason (R): Both are reducing agents.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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5. The chemistry of corrosion of iron is essentially an electrochemical phenomenon. Explain the reactio:rs occurring during the corrosion of iron in the atmosphere.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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6. Assertion : Food materials are often packed in air tight container.

Reason : Oxidation, resulting in rancidity, is prevented.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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7. Assertion : A magnesium ribbon burns with a dazzling flame in air and changes into a white substance, magnesium oxide.

Reason : It is an example of decomposition reaction.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C

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8. Following reaction describes the rusting of iron

$4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$

Which one of the following statements is incorrect?

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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9. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B

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10. Write the balanced equation for the following chemical reaction:

$\text{Hydrogen} + \text{Chlorine} \rightarrow \text{Hydrogen chloride}$

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A

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Exercise Comprehension Type

1. Oxidation and reduction always occur simultaneously. These reactions which involve simultaneous oxidation and reduction are called redox reactions. Therefore, every redox reaction is made up of two half reactions. One half reaction represents oxidation and other half reaction

represents the reduction. Oxidation and reduction of an atom, molecule or ion can also be defined in terms of electrons. The substance that gains electrons, is reduced to a lower oxidation state and acts as an oxidising agent. Similarly, the substance which loses electrons is oxidised to a higher oxidation state, and is called a reducing agent.

In which of the following reactions hydrogen peroxide is acting as a reducing agent?

A. $2FeCl_2 + 2HCl + H_2O_2 \rightarrow 2FeCl_3 + 2H_2O$

B. $Cl_2 + H_2O_2 \rightarrow 2HCl + O_2$

C. $2HI + H_2O_2 \rightarrow 2H_2O + I_2$

D. $H_2SO_3 + H_2O_2 \rightarrow H_2SO_4 + H_2O$

Answer: B

View Text Solution

2. Oxidation and reduction always occur simultaneously. These reactions which involve simultaneous oxidation and reduction are called redox

reactions. Therefore, every redox reaction is made up of two half reactions. One half reaction represents oxidation and other half reaction represents the reduction. Oxidation and reduction of an atom, molecule or ion can also be defined in terms of electrons. The substance that gains electrons, is reduced to a lower oxidation state and acts as an oxidising agent. Similarly, the substance which loses electrons is oxidised to a higher oxidation state, and is called a reducing agent.

The reaction : $H_2S + H_2O_2 \rightarrow S + 2H_2O$ indicates

A. oxidising action of H_2O_2

B. reducing nature of H_2O_2

C. acidic nature of H_2O_2

D. alkaline nature of H_2O_2.

Answer: A

View Text Solution

3. Oxidation and reduction always occur simultaneously. These reactions which involve simultaneous oxidation and reduction are called redox reactions. Therefore, every redox reaction is made up of two half reactions. One half reaction represents oxidation and other half reaction represents the reduction. Oxidation and reduction of an atom, molecule or ion can also be defined in terms of electrons. The substance that gains electrons, is reduced to a lower oxidation state and acts as an oxidising agent. Similarly, the substance which loses electrons is oxidised to a higher oxidation state, and is called a reducing agent.

In acidic medium, Mn^{7+} changes to Mn^{2+}, it is

A. oxidation by 3 electrons

B. reduction by 5 electrons

C. oxidation by 5 electrons

D. reduction by 3 electrons

Answer: B

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4. Oxygen is prepared by catalytic decomposition of potassium chlorate $(KClO_3)$. Decomposition of potassium chlorate gives potassium chloride (KCl) and oxygen (O_2). The following reaction takes place : $2KClO_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)}$.

Mark the correct statement.

A. 2 moles of $KClO_3$ give 3 moles of oxygen.

B. 1 mole of $KClO_3$ gives 1 mole of oxygen.

C. 3 moles of oxygen are formed by 1 mole of $KClO_3$.

D. 200 g of $KClO_3$ gives 300 g of O_2.

Answer: A

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5. Oxygen is prepared by catalytic decomposition of potassium chlorine $(KClO_3)$. Decomposition of potassium, chloride gives potassium

chloride (KCl) and oxygen (O_2). How many moles and how many grams of $KClO_3$ are required to produce 2.4 mole O_2?

A. 2

B. 3

C. 1.6

D. 1.5

Answer: C

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6. Oxygen is prepared by catalytic decomposition of potassium chlorate $(KClO_3)$. Decomposition of potassium chlorate gives potassium chloride (KCl) and oxygen (O_2). The following reaction takes place : $2KClO_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)}$.

How many grams of $KClO_3$ are required to produce 128 grams of O_2?

[At. mass of O = 16 u, K = 39 u, Cl = 35.5 u]

A. 196 g

B. 200 g

C. 122 g

D. 327 g

Answer: D

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Exercise Very Short Answer Type

1. Write balanced equation for the following reaction:

$$\text{Zinc carbonate}_{(s)} \rightarrow \text{Zinc oxide}_{(s)} + \text{Carbon dioxide}_{(g)}$$

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2. Write chemical equation for the following reaction: When solid mercury (II) oxide is heated, liquid mercury and oxygen gas are produced.

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3. Balance the following equations :

$CH_{4(g)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(g)}$

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4. Balance the following equations :

$Al_{(s)} + HCl_{(aq)} \rightarrow AlCl_{3(aq)} + H_{2(g)}$

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5. Write the chemical equations for the following reactions :

Sulphur dioxide + Oxygen $\rightarrow$ Sulphur trioxide

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6. Identify the substance oxidised and the oxidising agent in the following reaction :

$H_2S + Cl_2 \rightarrow S + 2HCl$

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7. What do you mean by 'skeletal equation'?

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8. Give one example of a reaction in which two compounds combine to form a single compound.

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9. Give one example of an electrolytic decomposition reaction used in metallurgy.

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10. Why does zinc react with dilute sulphuric acid to give hydrogen gas but copper does not?

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11. What is the difference between the following two types of reactions?

$AgNO_3 + HCl \rightarrow AgCl + HNO_3$

$Mg + 2HCl \rightarrow MgCl_2 + H_2$

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12. To preserve food items, we keep them in a refrigerator. Why?

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13. State two ways by which rusting can be prevented ?

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14. What type of reaction is represented by the digestion of food in our body?

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15. Taking a suitable example, explain that oxidation and reduction take place side by side.

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16. Write balanced equation for the reaction : Phosphorus burns in chlorine gas to form phosphorus pentachloride.

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Exercise Short Answer Type

1. Can we place silver nitrate solution in an iron vessel? Why or why not?

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2. What is the relationship between combination and decomposition reactions? Write an equation for each type.

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3. Can oxidation or reduction take place alone? Why or why not? What are such reactions called?

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4. A White salt upon heating decomposes to give brown fumes and a residue is left behind.

(i) Name the salt.

(ii) Write the equation for the decomposition reaction.

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5. Why is burning of coal considered a chemical change?

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6. In the following situations, a reaction may or may not take place. If it does, write the balanced molecular, total ionic and net ionic equations illustrating the reaction. Assume all the reactions take place in aqueous solutions.

Some iron nails are placed in a $CuCl_2$ solution.

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7. In the following situations, a reaction may or may not take place. If it does, write the balanced molecular, total ionic and net ionic equations illustrating the reaction. Assume all the reactions take place in aqueous solutions.

Silver coins are dropped in hydrochloric acid solution.

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8. In the following situations, a reaction may or may not take place. If it does, write the balanced molecular, total ionic and net ionic equations illustrating the reaction. Assume all the reactions take place in aqueous solutions.

A copper wire is placed in $Pb(NO_3)_2$ solution.

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9. A substance X, which is an oxide of a group 2 element, is used intensively in the cement industry. This element is present in bones also.

On treatment with water it forms a solution which turns red litmus blue.

Identify X and also write the chemical reactions involved.

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10. Why do fire flies glow at night?

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11. Why do we store silver chloride in dark coloured bottles?

Watch Video Solution

12. Below are given two chemical reactions :

(i) $2KBr(aq) + Cl_2(aq) \rightarrow KCl(aq) + Br_2(g)$

(ii) $Fe(s) + S(s) \rightarrow FeS(s)$

Which is combination reaction and which is displacement reaction ?

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Which is combination reaction and which is displacement reaction ?

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14. An old cycle frame was left in open for a few days. A brown layer slowly got deposited on its surface and could not be removed when rubbed with sand paper. What happened actually?

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15. A solution of $CuSO_4$ was kept in an iron pot. After a few days, the pot developed some holes in it. How will you account for this?

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16. X, Y and Z are three elements which undergo chemical reactions according to following equations.

$X_2O_3 + 2Y \rightarrow Y_2O_3 + 2X$

$3ZSO_4 + 2Y \rightarrow Y_2(SO_4)_3 + 3Z$

$3ZO + 2X \rightarrow X_2O_3 + 3Z$

Answer the following equations :

Which element is the most reactive?

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$3ZSO_4 + 2Y \rightarrow Y_2(SO_4)_3 + 3Z$

$3ZO + 2X \rightarrow X_2O_3 + 3Z$

Answer the following equations :

Which element is the least reactive?

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18. What happens chemically when quick lime is added to water ?

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19. A solution of potassium chloride when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of the chemical reaction.

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Exercise Long Answer Type

1. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$2CuO_{(s)} \rightarrow 2Cu_{(s)} + O_{2(g)}$

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2. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$2KClO_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)}$

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3. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$Zn_{(s)} + 2AgNO_{3(aq)} \rightarrow Zn(NO_3)_{2(aq)} + 2Ag_{(s)}$

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4. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$MgO_{(s)} + C_{(s)} \xrightarrow{\text{At high temp.}} CO_{(g)} + Mg_{(s)}$

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5. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$Ni(NO_3)_{2(aq)} + 2NaOH_{(aq)} \rightarrow Ni(OH)_2 \downarrow + 2NaNO_{3(aq)}$

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6. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$NH_{3(g)} + HCl_{(g)} \rightarrow NH_4Cl_{(s)}$

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7. Classify each of the following reactions as combination, decomposition, displacement or double displacement reactions :

$2KNO_{3(s)} \rightarrow 2KNO_{2(s)} + O_{2(g)}$

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8. Name the substance oxidised and substance reduced in the following reactions :

$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

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9. Identify the substances that are oxidised and the substances that are reduced in the following reactions :

(1)$2H_2S_{(g)} + SO_{2(g)} \rightarrow 3S_{(s)} + 2H_2O_{(l)}$

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10. Name the substance oxidised and substance reduced in the following reactions :

$2PbO + C \rightarrow 2Pb + CO_2$

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11. Name the substance oxidised and substance reduced in the following reactions :

$PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

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12. You are given the following materials :

(i)	Iron nails	(ii)	Copper sulphate solution
(iii)	Barium chloride solution	(iv)	Copper powder
(v)	Ferrous sulphate crystals	(vi)	Quick lime

Identify the type of chemical reaction taking place when :

(a) Barium chloride solution is mixed with copper sulphate solution and a white precipitate is observed.

(b) On heating, copper powder in air in a china dish, the surface of copper powder becomes black.

(c) On heating green ferrous sulphate crystals, reddish brown solid is left and a gas having smell of burning sulphur is noticed.

(d) Iron nails when left dipped in blue copper sulphate solution becomes

brownish in colour and blue colour of copper sulphate solution fades away.

Watch Video Solution

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(i)	Iron nails	(ii)	Copper sulphate solution
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(v)	Ferrous sulphate crystals	(vi)	Quick lime

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Watch Video Solution

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Watch Video Solution

16. You are given the following materials:

(i) Iron nails

(ii) Copper sulphate solution

(iii) Barium chloride solution

(iv) Copper powder

(v) Ferrous sulphate crystals

(vi) Quick lime

Identify the type of chemical reaction taking place when :

Quick lime reacts vigorously with water releasing a large amount of heat.

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17. Write balanced equations by predicting the products of the following reactions. Include the physical state of each element or compound.

The combination of barium and iodine.

View Text Solution

18. Write balanced equations by predicting the products of the following reactions. Include the physical state of each element or compound.

The neutralization of aqueous rubidium hydroxide with hydrobromic acid.

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19. Write balanced equations by predicting the products of the following reactions. Include the physical state of each element or compound.

A single-replacement reaction of calcium metal with a nitric acid solution.

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20. Write balanced equations by predicting the products of the following reactions. Include the physical state of each element or compound.

The combustion of solid naphthalene $(C_{10}H_8)$.

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21. Write balanced equations by predicting the products of the following reactions. Include the physical state of each element or compound.

Decomposition of aluminium hydroxide into solid aluminium oxide and gaseous water.

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22. What happens when a piece of zinc metal is added to copper sulphate solution?

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23. What are different types of combination reactions?

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24. The reaction of zinc with sulphuric acid is represented by the symbol equation:

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

Write the ionic equation for the reaction.

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25. The reaction of zinc with sulphuric acid is represented by the symbol equation:

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

The net ionic equation can be represented by two half equations. Write these equations.

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26. The reaction of zinc with sulphuric acid is represented by the symbol equation:

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

Explain why this is a redox reaction.

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27. Why is combustion reaction an oxidation reaction?

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28. How will you test that the gas evolved in a reaction is hydrogen.

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29. What information is conveyed by the following chemical equation :

$$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$$

(Given that the atomic mass : Zn = 65, Cl = 35.5.)

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30. Why cannot a chemical change be normally reversed?

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31. Why is it always essential to balance a chemical equation?

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32. Why do diamond and graphite, the two allotropic forms of carbon evolve different amounts of heats on combustion?

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33. Fill in the blanks in the following statements:

When carbon dioxide is passed through lime water, it turns milky due to the formation of _____.

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34. Can rusting of iron take place in distilled water?

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Exercise Integer Numerical Value Type

1. The value of x in balanced equation is

$$C_6H_{12}O_{6(aq)} + 6O_{2(g)} \rightarrow \mathrm{x}CO_{2(g)} + 6H_2O_{(l)} + \text{energy}$$

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2. Electrolysis of water is a decomposition reaction. The sum of mole ratio of hydrogen and oxygen gases liberated during electrolysis of water is

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3. In the given balanced equation,

$$2Al_{(s)} + 6H^+_{(aq)} \rightarrow 2Al^{3+}_{(aq)} + 3H_{2(g)}$$

when two moles of $Al_{(s)}$ completely react, then the total number of moles of electrons transferred from $Al_{(s)}$ to $H^+_{(aq)}$ is

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4. Among the following, the number of underlined elements having $+5$ oxidation state are

$\underline{Fe}_3O_4$, $K_2\underline{Cr}_2O_7$, $H\underline{Cl}O_3$, $\underline{P}_2O_7^{4-}$, $\underline{S}O_4^{2-}$

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5. 1.5 mol of O_2 combine with Mg to form MgO. The mol of Mg that has combined is

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Olympiad Hots Corner

1. When you mix solutions of lead (II) nitrate and potassium iodide.

(i) What is the colour of the precipitate formed ? Name the compound involved.

(ii) Write a balanced chemical equation for the reaction

(iii) Is this a double displacement reaction ?

A. $Pb(NO_3)_2, KI$

B. $AgNO_3, NaCl$

C. $Na_2SO_4, BaCl_2$

D. $FeCl_3, NH_4OH$

Answer: A

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2. $Mg + CuO \rightarrow MgO + Cu$

Which of the following is wrong relating to the above reaction?

A. CuO gets reduced.

B. Mg gets oxidised.

C. CuO gets oxidised.

D. It is a redox reaction.

Answer: C

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3. Which of the following are exothermic processes?

1. Reaction of water with quick lime

2. Dilution of an acid

3. Evaporation of water

4. Sublimation of camphor (crystals)

A. I and II

B. II and III

C. I and IV

D. III and IV

Answer: A

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4. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate?

A. Lead sulphate (insoluble)

B. Lead acetate

C. Ammonium nitrate

D. Potassium sulphate

Answer: B

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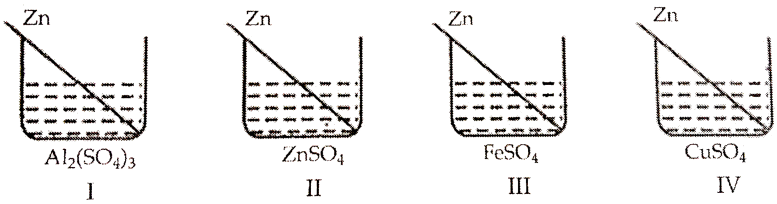
5. Four students A,B,C and D noted the initial colour of the solutions in beakers I, II, III and IV. After inserting zinc rods in each solution and leaving it undisturbed for two hours, noted the colour of each solution again.



They recorded their observations in thr form of a table given below:

Student	Colour of the solution	I	II	III	IV
A	Initial Final	Colourless Colourless	Colourless Colourless	Light green Colourless	Blue Colourless
B	Initial Final	Colourless Colourless	Light yellow Colourless	Light green Light green	Blue Colourless
C	Initial Final	Colourless Light blue	Colourless Colourless	Light green Colourless	Blue Light blue
D	Initial Final	Light green Colourless	Colourless Colourless	Light green Dark green	Blue Colourless

Which student noted the colour change in all four beakers correctly?

A. P

B. Q

C. R

D. S

Answer: D

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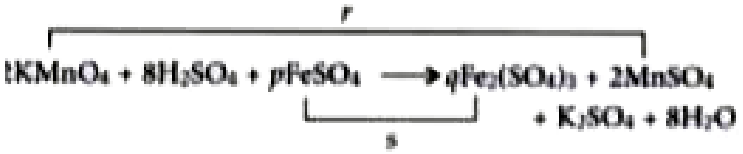
6. For the given redox reaction :



Identify p, q, r and s.

A. p-5, q-10, r-oxidation, s-reduction

B. p-8, q-4, r-reduction, s-oxidation

C. p-6, q-3, r-oxidation, s-reduction

D. p-10, q-5, r-reduction, s-oxidation

Answer: D

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7. Identify the type of reaction for each of the following as

Combination - (p), Decomposition - (q), Displacement - (r), Double displacement - (s), Combustion -(t)

(i) A compound breaks apart into its elements.

(ii) A metal and a non-metal react to form an ionic compound.

(iii) A compound of hydrogen and carbon reacts with oxygen to produce carbon dioxide and water.

(iv) Silver ion from $Ag(NO_3)$ (aq.) forms a precipitate with bromide ion from KBr (aq.).

A. (i) - q, (ii) - p, (iii) - r, (iv) - s

B. (i) - q, (ii) - p, (iii) - t, (iv) - s

C. (i) - s, (ii) - r, (iii) - q, (iv) - p

D. (i) - p, (ii) - t, (iii) - q, (iv) - r

Answer: B

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8. Identify the correct oxidant and reductant in the following reaction :

$PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

A. pbs - Oxidant

H_2O_2 - Reductant

B. pbs - Reductant

$PbSO_4$ - Oxidant

C. PbS - Reductant

H_2O_2 - Oxidant

D. H_2O_2 - Oxidant

H_2O - Reductant

Answer: C

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9. The given reaction occurs in a car battery when it is used to produce electricity.

$$Pb + PbO_2 + 2H_2SO_4 \rightarrow 2PbSO_4 + 2H_2O$$

Which of the following statements are incorrect about this reaction?

I. Pb is acting as an oxidising agent.

II. H_2SO_4 is acting as a reducing agent.

III. The reaction is a precipitation reaction.

IV. PbO_2 oxidises Pb to $PbSO_4$.

A. III and IV only

B. I and II only

C. I and III only

D. I, II, III and IV

Answer: B

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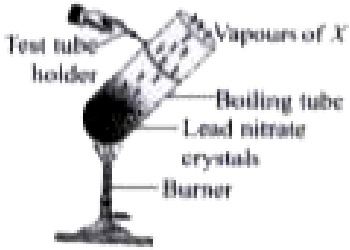
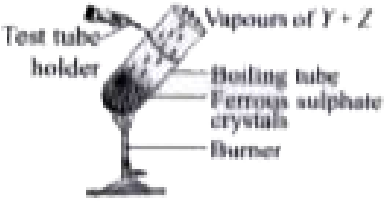
10. Rohit and Mayuri conducted two experiments to study the types of chemical reactions as shown in the given figures.



Experiment 1



Experiment 2

They recorded their observations as :

I. In experiment 1, yellow residue is left behind while in experiment 2 reddish brown solid is left behind.

II. In both experiments, two different gases were given out.

III. The colourless gas evolved in experiment 1 extinguishes the glowing splint while the gas evolved in experiment 2 turns green solution of acidified $KMnO_4$ orange.

IV. X is reddish brown gas while gases Y and Z both have burning sulphur smell.

The incorrect observation(s) is/are

A. IV only

B. III only

C. I and III only

D. II and III only

Answer: B

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11. Which one of the following reactions is not possible?

A. $Ca + H_2SO_4 \rightarrow CaSO_4 + H_2$

B. $Cu + H_2SO_4 \rightarrow CuSO_4 + H_2$

C. $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

D. $Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$

Answer: B

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12. Addition of HCl to an aqueous solution of $Pb(NO_3)_2$ gives a

A. yellow precipitate

B. brown precipitate

C. white precipitate

D. black precipitate

Answer: C

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13. The equation, $Mg_{(s)} + CuO_{(s)} \rightarrow MgO_{(s)} + Cu_{(s)}$ represents

(A) Decomposition reaction

(B) Displacement reaction

(C) Combination reaction

(D) Double displacement reaction

(E) Redox reaction

A. A and B

B. C and D

C. B and E

D. D and E

Answer: C

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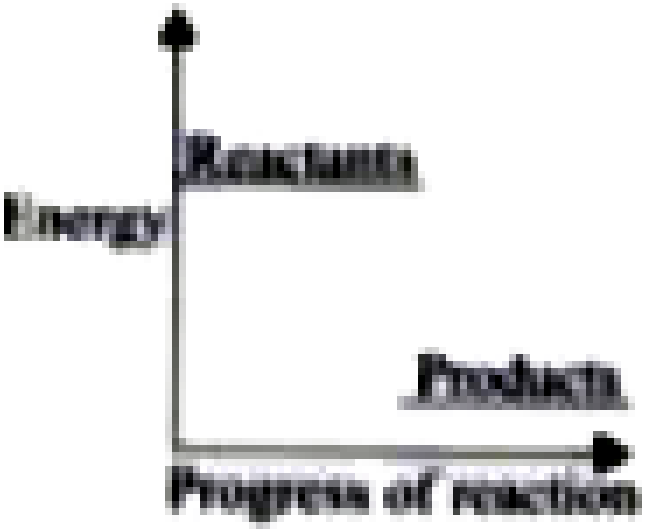
14. The given diagram shows the energy levels of the reactants and products for a particular reaction:



Which of the following processes can be related to the given diagram?

A. Ethyne gas burns in oxygen to form carbon dioxide and water along with evolution of heat.

B. When solid mercury (II) oxide is heated liquid mercury and oxygen gas are produced.

C. Hydrogen gas combines with chlorine gas in the presence of light to form hydrogen chloride gas.

D. Potassium chlorate decomposes in presence of heat to form potassium chloride and oxygen.

Answer: A

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15. The chemical reaction between quicklime and water is characterised by :

A. evolution of hydrogen gas

B. formation of carbon dioxide gas

C. change in temperature of mixture

D. change in colour of the product.

Answer: C

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16. The chemical reactions and their corresponding observable features are matched below. The correct option is

1.	Change in temperature	(i)	Magnesium reacting with dilute sulphuric acid
2.	Evolution of a gas	(ii)	Potassium iodide reacting with lead nitrate
3.	Formation of a precipitate	(iii)	Sulphur dioxide gas reacting with acidified potassium dichromate solution
4.	Change in colour	(iv)	Zinc granules reacting with dilute sulphuric acid

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17. A science teacher wrote the following statements about rancidity:

(i) When fats and oils are reduced, they become rancid.

(ii) In chips packet, rancidity is prevented by oxygen.

(iii) Rancidity is prevented by adding antioxidants.

Select the correct option.

A. (i) only

B. (ii) and (iii) only

C. (iii) only

D. (i), (ii) and (iii)

Answer: C

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18. Which one is an example of a redox reaction?

A. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

B. $CaCO_3 \rightarrow CaO + CO_2$

C. $Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$

D. $NaH + H_2O \rightarrow NaOH + H_2$

Answer: D

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19. Classify each of the following reactions.

(i) $Zn_{(s)} + 2AgNO_{3(aq)} \longrightarrow Zn(NO_3)_{2(aq)} + 2Ag_{(s)}$

(ii) $Ca(OH)_{2(s)} \xrightarrow{\text{Heating}} CaO_{(s)} + H_2O_{(g)}$

(iii) $Cu(NO_3)_{2(aq)} + Na_2S_{(aq)} \longrightarrow CuS_{(s)} + 2NaNO_{3(aq)}$

(iv) $H_2SO_{3(aq)} + 2KOH_{(aq)} \longrightarrow K_2SO_{3(aq)} + 2H_2O_{(l)}$

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20. P, Q and R are three metals that undergo chemical reactions as follows:

$P_2O_3 + 2Q \rightarrow Q_2O_3 + 2P$

$2P + 3RO \rightarrow P_2O_3 + 3R$

$3RSO_4 + 2Q \rightarrow Q_2(SO_4)_3 + 3R$

Observe the reactions and arrange the metals in the increasing order of their reactivity.

A. R, P, Q

B. Q, P, R

C. P, Q, R

D. Q, R, P

Answer: A

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