



CHEMISTRY

BOOKS - MTG IIT JEE FOUNDATION

CHEMICAL REACTIONS AND EQUATIONS

Illustrations

1. Write a balanced chemical equation for the reaction between sodium carbonate and hydrochloric acid indicating the physical state of the reactants and the products.



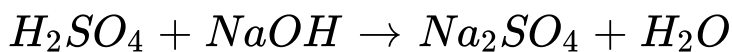
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2. Give the chemical equation when barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate.



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3. Balance the given chemical equation



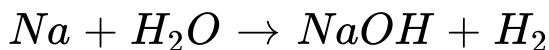
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4. State the law that is followed by balancing a chemical equation.



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5. Balance the following chemical equation



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6. Write combination reactions that occur when the metal barium reacts with the following nonmetals.

Hydrogen



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7. Write combination reactions that occur when the metal barium reacts with the following nonmetals.

Sulphur



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8. Write combination reactions that occur when the metal barium reacts with the following nonmetals.

Bromine



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9. Write combination reactions that occur when the metal barium reacts with the following nonmetals.

Nitrogen



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10. What change in colour is observed when white silver chloride is left exposed to sun light ? State the type of chemical reaction in this change.



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11. A green salt on heating decomposes to produce a colourless suffocating gas and leaves behind a reddish brown residue. Name the salt and write the decomposition reaction.



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12. What happens when an aqueous solution of sodium sulphate reacts with an aqueous solution of barium chloride? State the physical conditions of reactants in which the reaction between them will not take place. Write the balanced chemical equation for the reaction and name the type of reaction.

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13. 2 g ferrous sulphate crystals are heated in a dry boiling tube.

List any two observations.

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14. 2 g ferrous sulphate crystals are heated in a dry boiling tube.

Name the type of chemical reaction taking place.

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15. 2 g ferrous sulphate crystals are heated in a dry boiling tube.

Write the chemical equation of the reaction



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16. Can a displacement reaction be a redox reaction?

Explain with the help of an example



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17. Write the type of chemical reaction in the following:

Reaction between an acid and a base



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18. Write the type of chemical reaction in the following:

Rusting of iron



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Solved Examples

1. Mention the type of chemical reaction that takes place when :

a magnesium ribbon is burnt in air

Write the chemical equation for this reaction.



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2. Mention the type of chemical reaction that takes place when :

limestone is heated

Write the chemical equation for this reaction.



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3. Mention the type of chemical reaction that takes place when :

electricity is passed through acidified water.

Write the chemical equation for this reaction.



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4. Give an example where corrosion is an advantage rather than a disadvantage.



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5. Represent each of the following word equations with a balanced chemical equation.

Solid aluminium hydride is formed by a combination reaction of its two elements.

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6. Represent each of the following word equations with a balanced chemical equation.

When solid calcium bisulphite is heated decomposes to solid calcium oxide, sulphur dioxide, gas and water.

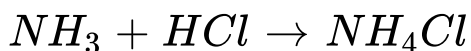
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7. What happens when zinc granules are treated with dilute solution of H_2SO_4 , HCl , HNO_3 , $NaCl$ and $NaOH$? Also write the chemical equations if reaction occurs.



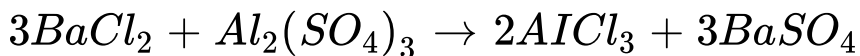
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8. Name the type of chemical reaction represented by the following equations :



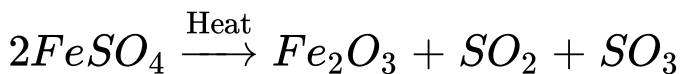
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9. Name the type of chemical reaction represented by the following equations :



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10. Name the type of chemical reaction represented by the following equations :



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

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12. Write chemical name and the formula of the brown gas produced during thermal decomposition of lead nitrate.

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13. Why do chips manufactures flush bags of chips with gas such as nitrogen?



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

Hydrogen + Chlorine \rightarrow Hydrogen chloride



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

Lead +Copper chloride \rightarrow Lead chloride +Copper



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

Zinc oxide + Carbon \rightarrow Zinc + Carbon monoxide



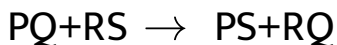
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17. State the type of chemical reactions, represented by the following equations :



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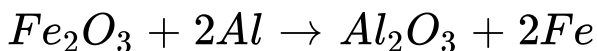
18. State the type of chemical reactions, represented by the following equations :



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19. What is a reduction reaction?

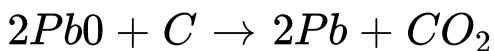
Identify the substances that are oxidised and the substances that are reduced in the following reaction.



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20. What is a reduction reaction?

Identify the substances that are oxidised and the substances that are reduced in the following reaction.



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Exercise Multiple Choice Questions

1. Bivalent cation is

A. aluminium

B. gold

C. nickel

D. sodium.

Answer: C



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2. A balanced chemical equation supports

A. law of chemical equilibrium

B. law of conservation of energy

C. law of conservation of mass

D. none of these.

Answer: C



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3. The substance that takes part in reaction is called

A. radical

B. product

C. reactant

D. ion

Answer: C



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4. The substance that is formed in the reaction is called

A. radical

B. product

C. reactant

D. ion

Answer: B



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5. Which of the following is correct?

A. Product \rightarrow reactant

B. Reactant \rightarrow product

C. Radical \rightarrow reactant

D. Radical \rightarrow product

Answer: B



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6. $AB \rightarrow A + B$ represents

- A. decomposition reaction
- B. combination reaction
- C. displacement reaction
- D. double displacement reaction

Answer: A



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7. Digestion of food in our body is

- A. combination reaction
- B. displacement reaction

C. decomposition reaction

D. neutralisation reaction.

Answer: C



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8. Which of the following plays a major role in chemical equations?

A. Radicals and ions

B. Cations and anions

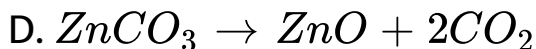
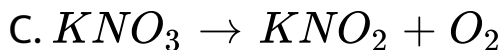
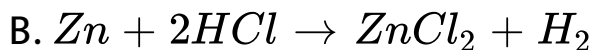
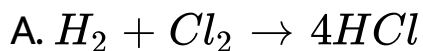
C. Reactants and products

D. Both (a) and (b)

Answer: C

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9. Which of the following is a balanced chemical equation?

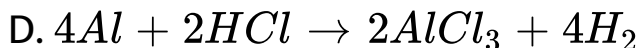
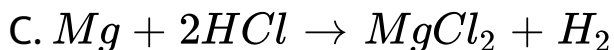
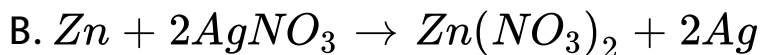
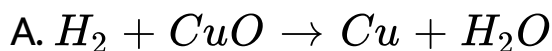


Answer: B



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10. Which of the following is not a balanced chemical equation?



Answer: D





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11. The chemical equation tells about

- A. substances which react in chemical reaction
- B. number of atoms of all substances
- C. reaction will complete or not
- D. both (a) and (b).

Answer: D



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12. The chemical equation is represented by

A. \rightarrow

B. \leftrightarrow

C. both (a) and (b)

D. —

Answer: A



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13. A balanced equation has

A. more number of reactants

B. more number of products

C. equal number of atoms in reactants and products

D. unequal number of atoms in reactants and products.

Answer: C



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14. A skeleton equation has

A. more number of reactants

B. more number of products

C. equal number of atoms in reactants and products

D. unequal number of atoms in reactants and products.

Answer: D



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15. unequal number of atoms in reactants and products.

- A. chemical change
- B. rearrangement of atoms
- C. formation of new substances
- D. all of these.

Answer: D



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16. Change in colour is a characteristic of

- A. chemical formula
- B. chemical equation

C. chemical reaction

D. all of these.

Answer: C



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17. Phosphorus burns in chlorine gas to form PCl_5 .

Which type of reaction is this?

A. Combination reaction

B. Displacement reaction

C. Decomposition reaction

D. Neutralization reaction

Answer: A

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18. Formation of carbon disulphide from carbon and sulphur takes place by

A. absorption of heat

B. evolution of heat

C. no change in heat content

D. none of the above.

Answer: A



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19. The reaction between an acid and a base is known as
as

A. condensation reaction

B. addition reaction

C. neutralisation reaction

D. elimination reaction.

Answer: C





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20. The chemical reaction

$HNO_3 + KOH \rightarrow KNO_3 + H_2O$ is an example of

- A. neutralization
- B. double displacement
- C. neutralization and double displacement
- D. combination

Answer: C



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21. Which of the following does not corrode when exposed to the atmosphere?

A. Iron

B. Copper

C. Gold

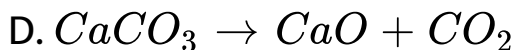
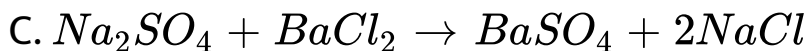
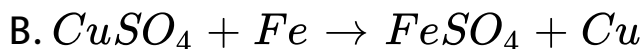
D. Silver

Answer: C



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22. Which of the following is a double displacement reaction?

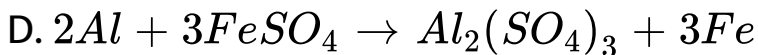
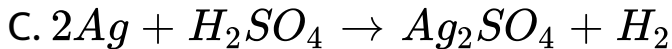
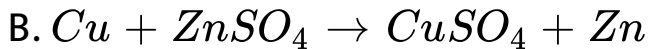
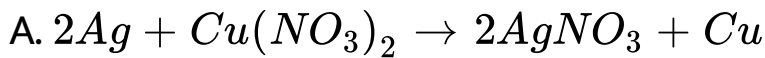


Answer: C



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23. Which of the following reactions will occur?

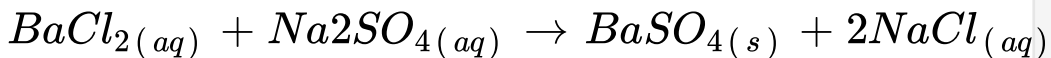


Answer: D



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24.



The types of reaction are

(1) displacement (2) precipitation

(3) combination

(4) double displacement

A. (1) and (3)

B. (1), (2) and (3)

C. (2) and (3)

D. (2) and (4).

Answer: D



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25. Heat is evolved during

- A. endothermic reaction
- B. displacement reaction
- C. combustion reaction
- D. combination reaction

Answer: C



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26. A change is said to be a chemical change when

- A. energy changes occurs
- B. new substances are formed

C. the change can not be easily reversed

D. all of these

Answer: D



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27. Copper displaces which of the following metals from its salt solution

A. $ZnSO_4$

B. $FeSO_4$

C. $AgNO_3$

D. $NiSO_4$

Answer: C



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28. Which of the following statements is correct?

Rusting of iron is a chemical change because

A. a new substance with new properties is produced

B. chemical composition of reactant is changed

C. change is permanent and can not be reversed

easily

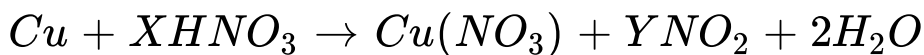
D. all of these.

Answer: D



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29. The equation



the values of X and Y are

A. 3 and 5

B. 8 and 6

C. 4 and 2

D. 7 and 1

Answer: C



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30. On heating ferrous sulphate crystals, one would get

A. sweet smell

B. sweet smell

C. irritating choking smell

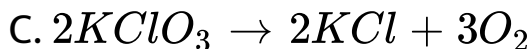
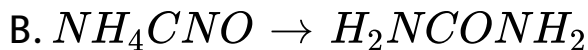
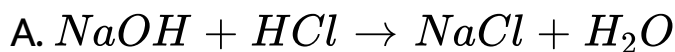
D. fruity smell.

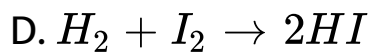
Answer: C



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31. Which of the following is a decomposition reaction ?



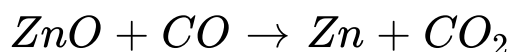


Answer: C



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32. Which of the statement about the following reactions is correct ?



A. ZnO is being oxidizing

B. CO is being reduced.

C. CO_2 is being oxidized

D. ZnO is being reduced

Answer: D

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33. In the decomposition of lead (II) nitrate to give lead (II) oxide, nitrogen dioxide and oxygen gas, the coefficient of nitrogen dioxide (in the balanced equation) is

A. 1

B. 2

C. 3

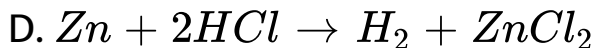
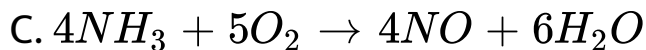
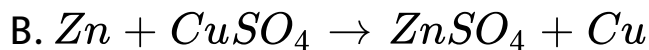
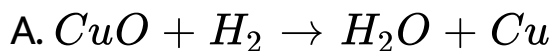
D. 4

Answer: D



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34. Which of the following is not an example of single displacement reaction ?



Answer: C



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35. The reaction in which two compounds exchange their ions to form two compounds is called

- A. displacement reaction
- B. combination reaction
- C. double displacement reaction
- D. redox reaction.

Answer: C





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36. Antioxidants are

- A. hydrating agents
- B. dehydrating agents
- C. oxidizing agents
- D. reducing agents.

Answer: D



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37. Aluminium is more reactive than iron. But aluminium is less easily corroded than iron because.

- A. aluminium is a noble metal
- B. oxygen forms a protective oxide layer
- C. iron undergoes reaction easily with water
- D. iron forms mono and divalent ions

Answer: B



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38. The example for exothermic reaction is

A. melting of ice cubes

B. decomposition of vegetable matter into
compost

C. cooking an egg

D. baking bread.

Answer: B



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39. What does the symbol (aq) represent in a chemical equation?

A. Solid state

B. Gaseous state

C. Solution made in water

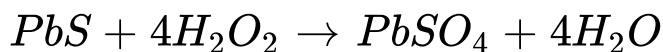
D. Supercooled state

Answer: C



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40. In the reaction between lead sulphide and hydrogen peroxide which substance is reduced?



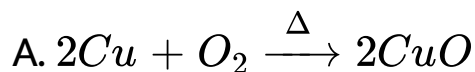
- A. Lead sulphide
- B. Hydrogenperoxide
- C. Lead sulphate
- D. Water

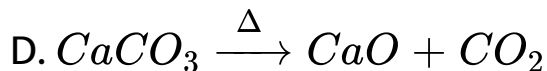
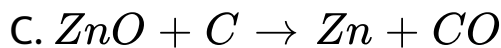
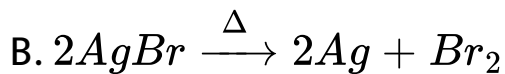
Answer: B



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41. Which of the following reactions is involved in black and white photography?

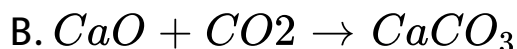


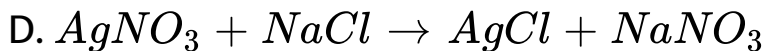


Answer: B

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42. Which of the following is not a combination reaction?



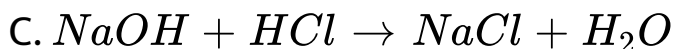
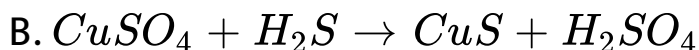
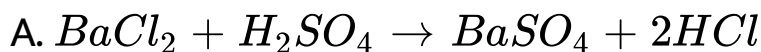


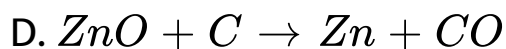
Answer: D



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43. Which of the following is not a double displacement reaction?





Answer: D



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44. The addition of oxygen to a substance is called

A. redox

B. oxidation

C. reduction

D. none of these

Answer: B



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45. Identify the following type of reaction.



- A. It is a combination reaction.
- B. It is a decomposition reaction and is accompanied by release of heat.
- C. It is a photochemical decomposition reaction by release of heat.
- D. It is a decomposition reaction and is endothermic in nature.

Answer: D



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46. Which of the following pairs will give displacement reactions?

A. NaCl solution and copper metal

B. $MgCl_2$ solution and aluminium metal

C. $FeSO_4$ solution and silver metal

D. $AgNO_3$ solution and copper metal

Answer: D





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47. Which of the following is a chemical change?

- A. Melting of ice
- B. Dissolving salt in water
- C. Rusting of iron
- D. Boiling of water into steam

Answer: C



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48. When copper sulphate solution reacts with iron metal, copper metal is formed. This reaction comes under which of the following category?

- A. Decomposition reaction
- B. Single displacement reaction
- C. Double displacement reaction
- D. Combination reaction

Answer: B



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49. Which information is not conveyed by a balanced chemical equation?

- A. Physical quantity of reactants and products.
- B. Symbols and formula of all the substances involved in a particular reaction.
- C. Number of atoms/molecules of the reactants and products formed.
- D. Whether a particular reaction is actually feasible or not.

Answer: D



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50. The process of respiration is:

- A. an oxidation reaction which is endothermic
- B. a reduction reaction which is exothermic
- C. a combination reaction which is endothermic
- D. an oxidation reaction which is exothermic.

Answer: D

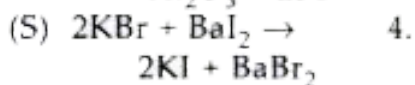
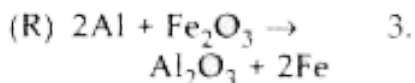
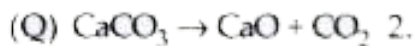
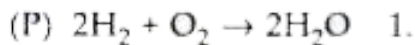


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Exercise Match The Following

1. Match the following columns

List-I



List-II

1. Double displacement reaction

2. Combination reaction

3. Displacement reaction

4. Decomposition reaction

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

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

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

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

Answer: A



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2. Match the following columns

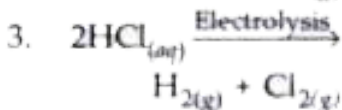
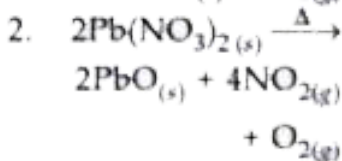
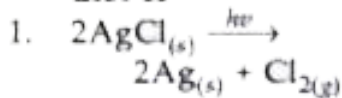
List-I

(P) Thermal decomposition

(Q) Photodecomposition

(R) Electrolytic dissociation

List-II



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

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

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

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

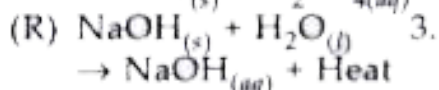
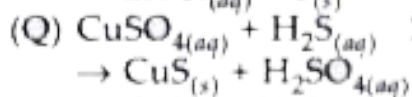
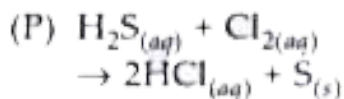
Answer: B



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3. Match the following columns

List-I



List-II

1. Oxidation -
reduction reaction

2. Exothermic
reaction

3. Precipitation
reaction

A. P-3, Q-2, -1

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

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

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

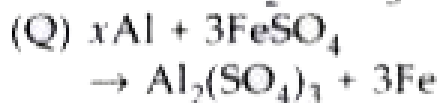
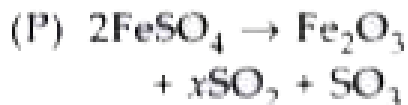
Answer: D



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4. Match the following columns

List-I



List-II

1. $x = 3$

2. $x = 1$

3. $x = 2$

4. $x = 4$

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

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

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

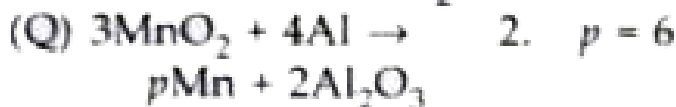
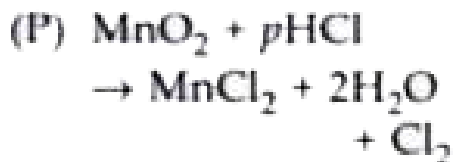
D. P-4, Q-1, R-2, S-3

Answer: C

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5. Match the following columns

List-I



List-II

1. $p = 3$

2. $p = 6$

3. $p = 4$

4. $p = 2$

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

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

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

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

Answer: D



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Exercise Assertion Reason Type

1. Assertion: Chemical reactions are chemical changes.

Reason It does not tells about the state of substance.

- 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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2. Assertion : Balancing a chemical equation is important to study a chemical reaction.

Reason A balanced chemical equation tells about energy changes that take place.

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: $2H_2 + O_2 \rightarrow 72H_2O$ is balanced equation.

Reason Formation of water is combination 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: B



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4. Assertion: Chemical equation is made up of reactants and products

Reason The equation which have equal number of atoms in reactant and product is called skeleton equation

- 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. Assertion: Corrosion of iron is commonly known as rusting.

Reason Corrosion of iron occurs in presence of water and air.

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 : The reaction in which a substance is decomposed into two or more simple substances is known as decomposition reaction.

Reason: The decomposition can be carried out by giving energy in the form of heat, light, electricity, etc.

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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7. Assertion: Nitrogen and hydrogen combine together to form ammonia

Reason: It is an endothermic 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.

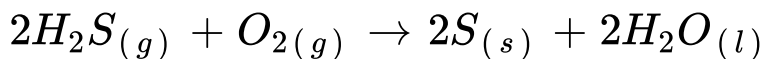
Answer: C



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8.

Assertion:



It is an oxidation reaction.

Reason: Oxidation is a process which involves removal 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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9. Assertion: Hydrogen gas combines with nitrogen gas to form nitric acid.

Reason: It is a 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: D

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10. Assertion: Reaction between barium chloride and sodium sulphate is a double displacement and precipitation reaction.

Reason: Reaction between barium chloride and sodium sulphate involves the exchange of ions between the reactants and a white precipitate of barium sulphate is formed.

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. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ is a chemical equation. The products are

A. Zn, Cu

B. $CuSO_4$, $ZnSO_4$

C. $ZnSO_4$, Cu

D. $CuSO_4$, Zn

Answer: C



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2. $CH_4 + O_2 \rightarrow CO_2 + H_2O$ is a chemical equation

The reactants are

A. CH_4, CO_2

B. H_2O, O_2

C. CO_2, H_2O

D. CH_4, O_2

Answer: D





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3. $2Al_2O_3 \rightarrow 4Al + 3O_2$ is

- A. chemical equation
- B. balanced chemical equation
- C. unbalanced chemical equation
- D. none of these.

Answer: B



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4. The characteristics of chemical reaction is

A. change in state

B. change in colour

C. both

D. none of these.

Answer: C



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5. Decomposition reactions are reverse of

- A. chemical reaction
- B. chemical change
- C. combination reaction
- D. displacement reaction.

Answer: C



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6. Digestion of food is

- A. combination reaction
- B. decomposition reaction

C. displacement reaction

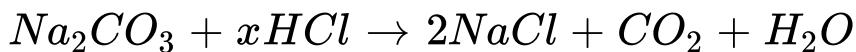
D. neutralisation reaction.

Answer: B

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Exercise Integer Numerical Value Type

1. In the following equations

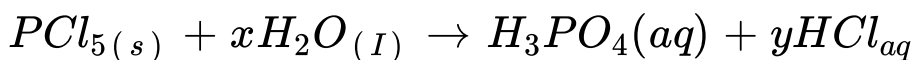


the value of x is

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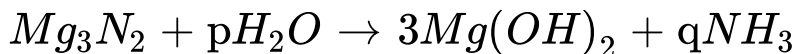
2. Phosphorus (V) chloride dissolves in water to form phosphoric acid, H_3PO_4 and hydrochloric acid.

What is the value of $(x + y)$ in the balanced equation for this reaction?



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3. Consider the following reaction:



When the equation is balanced the sum of p and q is



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4. Consider the following chemical reaction:

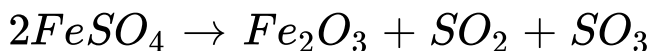


Is this decomposition reaction?



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5. Consider the following chemical reactions:

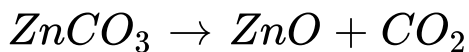


Is this decomposition reaction?



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6. Consider the following chemical reactions:

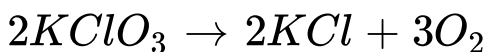


Is this decomposition reaction?



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7. Consider the following chemical reactions:



Is this decomposition reaction?



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8. How many of these metals will be able to replace iron from its solution? Na, Cu, Ag, Ca, Mg, Au



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