



CHEMISTRY

BOOKS - PEARSON IIT JEE FOUNDATION

Language of Chemistry and Transformation of Substances

Concept Application Concept Application Level 1

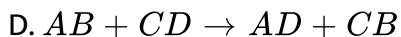
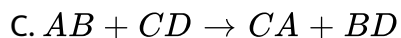
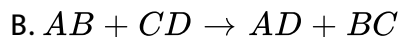
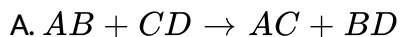
1. Which of the following is not a physical change?

- A. Dissolution of oxygen in water.
- B. Dissolution of carbon dioxide in water.
- C. Dissolution of alcohol in water
- D. Dissolution of salt in water.

Answer: B::C



2. Which of the following double displacement reactions is correct?

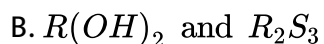
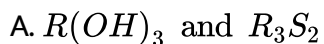


Answer: C::D



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3. The formula of the phosphate of an element R is RPO_4 , then the formulae of its hydroxide and sulphide respectively are _____ are _____ .



C. $R(OH)_2$ and R_3S_2

D. $R(OH)_3$ and R_2S_3

Answer: C::D

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4. The molecular weight of a compound which contains a total number of five radicals is 160, then it is

A. Ca_3P_2

B. Fe_2O_3

C. Al_2O_3

D. Mg_3N_2

Answer: B::C

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5. Removal of CO_2 and H_2O from atmospheric air using KOH and anhydrous $CaCl_2$ is an example of _____ and _____ changes respectively.

A. chemical, chemical

B. physical, physical

C. chemical, physical

D. physical, chemical

Answer: C



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6. Which of the following reactions is a synthesis reaction?

A. When steam is passed over red hot coke, a mixture of carbon monoxide and hydrogen is formed .

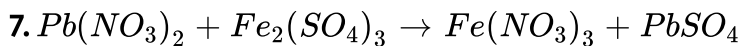
B. Sodium reacts with water to form sodium hydroxide and hydrogen .

C. When the milk of lime (calcium hydroxide) is added to hot sodium carbonate solution, sodium hydroxide is obtained and calcium carbonate separates out as mud.

D. Stannic chloride is prepared by passing chlorine into molten tin.

Answer: C::D

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Coefficients of lead sulphate and ferric nitrate in the balanced equation of above reaction are

A. 3,4

B. 3,3

C. 3,2

D. 2,3

Answer: C



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8. The names of the salts formed by the reaction of

(i) Ca and HNO_3

Ca and H_2SO_3 are

A. (i) Calcium nitrate (ii) Calcium sulphate

B. (i) Calcium nitrite (ii) Calcium sulphite

C. (i) Calcium nitrate (ii) Calcium sulphate

D. (i) Calcium nitrate (ii) Calcium sulphate

Answer: C



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9. The valency of nitride ion is same as the valency of _____ ion

- A. Ferric
- B. plumbic
- C. zinc
- D. calcium

Answer: A

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10. Removal of CO_2 and H_2O from atmospheric air using KOH and anhydrous $CaCl_2$ is an example of _____ and _____ changes respectively.

- A. chemical, chemical
- B. physical, physical
- C. chemical, physical
- D. physical, chemical

Answer: C

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11. Reaction between barium chloride and aluminium sulphate is an example of

- A. neutralisation reaction
- B. displacement reaction
- C. precipitation reaction.
- D. combination reaction.

Answer: C

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12. Which among the following salts produces maximum number of metal ions per molecule when dissolved in a suitable solvent?

- A. Aluminium phosphate $AlPO_4$

B. Magnesium phosphate $Mg(PO_4)_2$

C. Sodium biphosphate Na_2HPO_4

D. Aluminium dihydrogen phosphate $Al(H_2PO_4)$

Answer: B



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13. A series of chemical reactions were carried out in a laboratory in the following way. At first zinc granules reacted with H_2SO_4 to form H_2 gas. Then hydrogen gas reacted with chlorine gas under diffused sunlight to form hydrogen chloride gas. Hydrogen chloride gas produced in this process was dissolved in water to form hydrochloric acid. Hydrochloric acid reacted with sodium hydroxide to form sodium chloride and water. Sodium chloride thus produced is first melted and then electricity is passed through it. Due to the passage of electricity through sodium chloride, sodium metal and chlorine gas is obtained.

Rahul was asked to arrange the above reactions in the order of

combination, decomposition, displacement and double decomposition.

His answer is given below.

(a) Formation of H_2 gas.

(b) Formation of hydrogen chloride gas.

(c) Formation of sodium and chlorine from sodium chloride.

(d) Formation of sodium chloride.

Which among the following orders given below is correct, according to you?

A. c d b a

B. b c a d

C. a b c d

D. b c d a

Answer: B



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14. Arrange the following reactions in the given order, i.e., compound-element combination, compound-compound combination and element-element combination.

(1) Coke is burnt in an inadequate supply of air.

(2) The product formed in the reaction (1) is again burnt in the presence of oxygen.

(3) The product formed in the reaction (2) is treated with water.

A. a c b

B. b c a

C. b a c

D. c a b

Answer: B



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1. An oxide X of carbon on treatment with oxygen gives Y which turns lime water milky and blue litmus to red. Predict the valencies of carbon in X and Y and what is the composition of milky precipitate formed?

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2. One molecule of a binary acid contains two hydrogen atoms and a negative radical X. What will be the formula of the salts when it reacts with bases, like, $M(OH)$, $M(OH)_2$ and $M(OH)_3$? Explain with reasons.

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3. The formula of hydrogen phosphate of a metal M is $MHPO_4$. Give the formula of its

(a) chloride

(b) bicarbonate

(c) sulphite

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4. Write the balanced chemical equation for the following.

(i) Potassium bromide on treatment with manganese dioxide and sulphuric acid gives manganese and potassium sulphates, bromine and water.

(ii) In the preparation of phosphate fertilizers, calcium phosphate in phosphate rock is converted into phosphoric acid and calcium sulphate.

(iii) Sodium nitrite is produced by the reaction of the oxides of nitrogen in which nitrogen shows valency 2 and 4 in a solution of sodium carbonate.



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5. Nitrogen and oxygen react to produce nitric oxide. What is the weight of oxygen required to convert 4.9 g of nitrogen to nitric oxide ?



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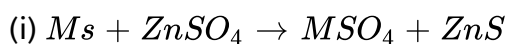
6. The salt of an oxyacid of metal M contains two sulphur and six oxygen atoms. What will be the formula of the base formed by the metal and why?

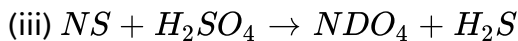
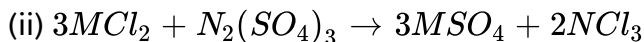
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7. The molecular weight of a salt of oxy acid of chlorine of a divalent metal which contains more number of oxygen atoms than its corresponding '-ic' acid is 239. What will the molecular weights of its (i) phosphate (ii) iodide (iii) bisulphate be?

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8. Given below are three chemical equations. Study the equations and identify the elements that show variable valency? Give reasons in support of your answer. ('M' and 'N' stand for different metals.)





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9. Blue coloured CuSO_4 is taken in two test tubes A and B. Zinc granules are added to test tube A and small iron pieces are added to test tube B. Explain the observations in each case by giving reasons.

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10. How do you account for the following ?

(1) Nitric acid is colourless but on long standing it turns yellow.

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11. In the welding of railway tracks, a proper proportion of aluminium powder and iron (iii) oxide are made to react with each other at high

temperature. Explain the type of reaction involved and also identify the reducing and the oxidizing agents.

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12. The valency of a metal is 2 and its atomic weight is 24. What will be the molecular weight of its

(a) sulphite (b) chloride (c) chloride?

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13. While balancing a chemical equation, only the coefficients of the formulae are changed, but the subscripts are not changed. Give reasons

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14. The chemical X is a hydroxide of a divalent metal. On treating this hydroxide with CO_2 a milky white precipitate of Y is formed. The

precipitate turns to colourless solution by the excess passage of CO_2

This colourless solution again gives milky white precipitate 'Y' on heating.

Identify X and Y and also give necessary equations.

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15. A hydrocarbon on complete combustion produces 176 g of carbon dioxide and 90 g of water. What will be the formula of hydrocarbon and also give balanced chemical equation of combustion of hydrocarbon?

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16. Heating and subsequent cooling of certain substances are given below. Classify them into either physical or chemical change.

- (a) Lead nitrate.
- (b) Bluish green copper carbonate
- (c) Yellow coloured lead oxide
- (d) White powdered zinc oxide

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17. Arrange the following radicals in the increasing order of total number of constituent atoms present in the respective radicals.

(a) hydroxide (b) nitride (c) chromate (d) sulphite (e) dihydrogen phosphate

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18. Two beakers A and B contain water. Glucose is added to beaker A and ammonia gas is passed through beaker B. What types of changes (physical or chemical) take place in the beakers? Justify.

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19. Oxide of a metal on treatment with water produces hissing sound and energy. The product (Y) formed on treatment with hydrochloric acid gives a solid 'X'. Identify the oxide, the product (Y) and X . Also write all the

balanced chemical equations and calculate molecular masses of the oxide, the product (Y) and X .

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20. A nonmetal X forms two oxides, A and B. The ratio of weight of the element X to the weight of oxygen in A and B is 7 : 20 and 7 : 16 respectively. If the molecular mass of the oxide, A is 108, identify A and B.

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21. Electrolysis of molten sodium chloride produces sodium and chlorine. Is this reaction a redox reaction? Give reasons in support of your answer.

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22. Two oxides of a metal contain 25.8% and 41.02% of oxygen by weight, respectively. Find the ratio of weights of metal combining with fixed

weight of oxygen?

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23. Express the following chemical changes in the form of chemical equations and identify what types of chemical reactions they are.

(a) A copper coin is placed in a solution of corrosive sublimate, mercuric chloride. The products obtained are cupric chloride and mercury. (b) A piece of (a) sulphur, (b) charcoal burns vigorously when dropped in molten potassium nitrate, because potassium nitrate decomposes to form potassium nitrite and oxygen and this oxygen helps to burn charcoal and sulphur giving out carbon dioxide and sulphur dioxide respectively.

(c) Aqueous ammonium hydroxide solution is made to react with aqueous copper sulphate solution and a bluish white precipitate of cupric hydroxide and ammonium sulphate are formed.

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24. (a) Decomposition reactions are always initiated with the supply of energy. Give appropriate reasons.

(b) Generally burning or combustion reactions are exothermic. Justify.

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25. In the welding of railway tracks, a proper proportion of aluminium powder and iron (III) oxide are made to react with each other at high temperature. Explain the type of reaction involved and also identify the reducing and the oxidizing agents.

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Concept Application Concept Application Level 3

1. What is the role of ultraviolet rays in the purification of water in modern water purifiers?

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2. Under which condition does Bunsen burner produce a luminous flame and a non-luminous flame? Give reasons in support of your answer.

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3. Anhydride of an acid X contains 2 phosphorous atoms, 5 oxygen atoms. If this acid X is made to react with bases like sodium hydroxide, calcium hydroxide and aluminum hydroxide, what will the formulae of the corresponding normal salts formed be?

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4. A compound 'X' of silver on treatment with barium chloride gives the respective products Y and Z. X on treatment with sodium hydroxide gives A and B where A can also be obtained when silver is attacked by ozone and B is the salt of an oxy acid of nitrogen which ends with the suffix '-ate'. Identify and give the chemical formulae of the substances X, Y, Z, A and B?



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5. The salt of hypohalous acid is prepared from the respective components namely halogen and the corresponding metallic hydroxide. The metal is the one which possesses the number of electrons in the ratio of $1 : 4 : 4 : 1$ which corresponds to namely K, L, M, N shells respectively and the halogen is a greenish-yellow colour gas which can displace bromine from magnesium bromide. Identify the salt and the respective components.



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6. The molecular masses of sulphate and hydroxide of a metal M are 142 and 40 respectively. Calculate atomic mass and valency of the metal.



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7. What are the changes observed when moist sugar is treated with anhydrous calcium chloride and concentrated H_2SO_4 respectively?

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8. Identify the type of chemical change that silver chloride undergoes in photo grey lenses.

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9. Blue coloured gas X having a characteristic fishy odour, can restore the colour of lead paintings. This gas X can also be used for sterilizing water. Identify the gas X. Mention the type of reaction(s) involved.

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10. Fluorine is very reactive and attacks all metals but still a copper vessel is used in the preparation of fluorine gas. Why?

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Example

1. Calculate the total positive charge present on the positive radicals in the following compounds:

Calcium phosphide

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2. Calculate the total positive charge present on the positive radicals in the following compounds:

Magnesium nitrate

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3. Calculate the total positive charge present on the positive radicals in the following compounds:

Zinc sulphide

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4. Calculate the total positive charge present on the positive radicals in the following compounds:

Sodium zincate

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5. An oxyacid contains three hydrogen atoms, one phosphorus atom and four oxygen atoms.

Name the acid.

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6. An oxyacid contains three hydrogen atoms, one phosphorus atom and four oxygen atoms.

Name the different salts that can be formed by the acid on reaction with sodium hydroxide.

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7. An oxyacid contains three hydrogen atoms, one phosphorus atom and four oxygen atoms.

Calculate the molecular masses of the salts that can be formed on reaction with NaOH

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8. The valency of a metal 'M' is 2 and its atomic weight is 24. Calculate the molecular masses of its sulphite

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9. The valency of a metal 'M' is 2 and its atomic weight is 24. Calculate the molecular masses of its chloride

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10. The valency of a metal 'M' is 2 and its atomic weight is 24. Calculate the molecular masses of its chlorate

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11. In an acid-base neutralization reaction, the salt produced contains one metal atom (M), two nitrogen atoms and four oxygen atoms. Give the formulae of the acid and the base.

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12. A molecule of a binary salt contains two metal atoms and one sulphur atom. Determine the number of metal atoms present in one molecule of the binary salt formed by that metal and nitrogen? Give reasons in support of your answer.

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13. Two oxides of a metal contain 25.8% and 41.02% of oxygen by weight, respectively. Find the ratio of weights of metal combining with fixed weight of oxygen?

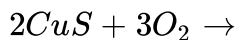
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14. The following reactions identify the products formed and balance the reaction.



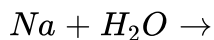
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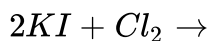
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16. The following reactions identify the products formed and balance the reaction.



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17. The following reactions identify the products formed and balance the reaction.



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18. Nitric acid turns yellow on long standing. Explain

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19. Silverware tarnishes on exposure to polluted atmosphere. Give reason.

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20. The complete combustion of a hydrocarbon gives CO_2 and H_2O . In the balanced chemical equation, the coefficients of CO_2 and H_2O are 3 and 4, respectively. Find out the formula of the hydrocarbon.

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21. In the welding of railway tracks, a proper proportion of aluminium powder and iron (III) oxide is made to react with each other at high

temperature. Explain the type of reaction involved and also identify the reducing and the oxidizing agents.

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22. Mercury loses its lusture and sticks to the walls of the glass in the presence of ozone. Write the reasons and the possible reaction for this change.

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Test Your Concepts Very Short Answer Type Questions

1. Why is the burning of LPG a chemical change?

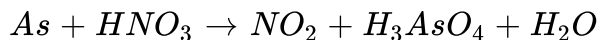
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2. The formula of ammonium bisulphate is _____



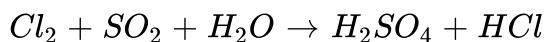
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3. Balance the chemical equations:



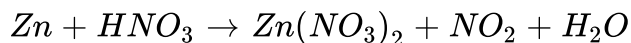
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4. Balance the chemical equations:



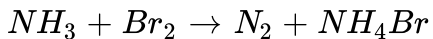
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5. Balance the chemical equations:



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6. Balance the chemical equations:



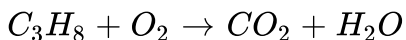
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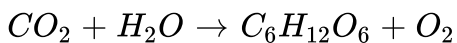
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8. Balance the chemical equations:



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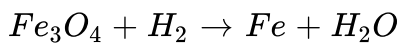
9. Balance the chemical equations:





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10. Balance the chemical equations:



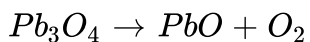
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11. Balance the chemical equations:



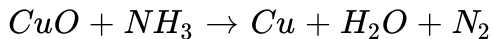
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12. Balance the chemical equations:



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13. Balance the chemical equations:



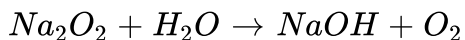
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14. Balance the chemical equations:



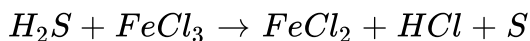
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15. Balance the chemical equations:



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16. Balance the chemical equations:





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17. Balance the chemical equations:



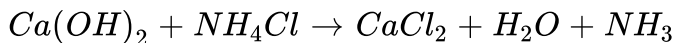
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18. Balance the chemical equations:



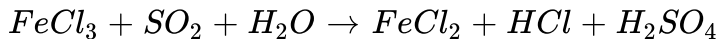
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19. Balance the chemical equations:



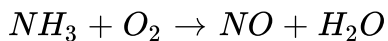
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20. Balance the chemical equations:



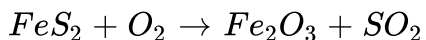
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21. Balance the chemical equations:



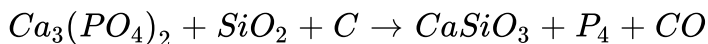
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22. Balance the chemical equations:



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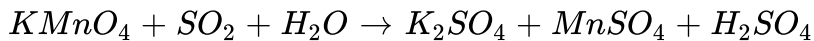
23. Balance the chemical equations:





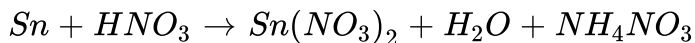
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24. Balance the chemical equations:



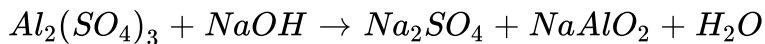
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25. Balance the chemical equations:



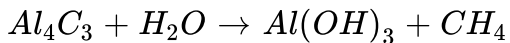
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26. Balance the chemical equations:



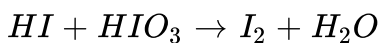
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27. Balance the chemical equations:



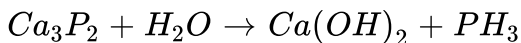
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28. Balance the chemical equations:



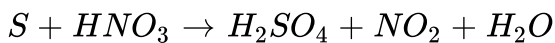
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29. Balance the chemical equations:



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30. Balance the chemical equations:





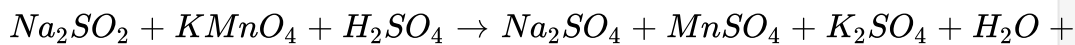
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31. Balance the chemical equations:



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32. Balance the chemical equations:



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33. Plumbous ion is represented as _____



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34. What is the difference between photochemical and thermochemical reactions?

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35. What is an inhibitor? What is the inhibitor used in the preparation of H_2SO_4 ?

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36. In the following table, some compounds are listed. In each case identify the positive and negative radicals presents in the compound

S. No.	Compounds	Positive radicals	Negative radicals
(i)	SiO_2		
(ii)	CuS		
(iii)	H_2O_2		
(iv)	BaO_2		
(v)	MgS		
(vi)	NaAlO_2		
(vii)	MnO_2		
(viii)	LiH		
(ix)	KMnO_4		
(x)	CaSiO_3		
(xi)	CaF_2		
(xii)	HOCl		
(xiii)	$\text{Ca}(\text{OCl})_2$		
(xvi)	H_2SO_3		
(xv)	KH_2PO_4		
(xvi)	K_2HPO_4		
(xvii)	H_2S		
(xviii)	H_2SO_3		
(xix)	$\text{Mn}(\text{ClO}_4)_2$		
(xx)	$\text{Ba}(\text{OH})_2$		



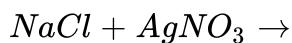
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37. The compound SF_6 is named as _____.



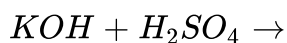
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38. For each of the following reactions identify the products formed and balance the reaction .



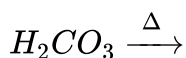
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39. For each of the following reactions identify the products formed and balance the reaction .



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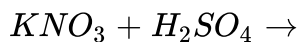
40. For each of the following reactions identify the products formed and balance the reaction .



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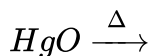
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41. For each of the following reactions identify the products formed and balance the reaction .



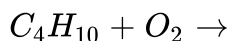
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42. For each of the following reactions identify the products formed and balance the reaction .



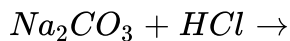
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43. For each of the following reactions identify the products formed and balance the reaction .



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44. For each of the following reactions identify the products formed and balance the reaction .



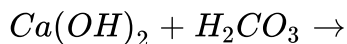
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45. For each of the following reactions identify the products formed and balance the reaction .



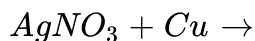
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46. For each of the following reactions identify the products formed and balance the reaction .



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47. For each of the following reactions identify the products formed and balance the reaction .



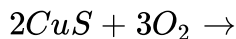
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48. The following reactions identify the products formed and balance the reaction.



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49. The following reactions identify the products formed and balance the reaction.



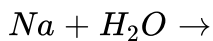
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50. For each of the following reactions identify the products formed and balance the reaction .



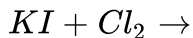
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51. The following reactions identify the products formed and balance the reaction.



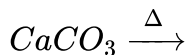
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52. For each of the following reactions identify the products formed and balance the reaction .



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53. For each of the following reactions identify the products formed and balance the reaction .



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54. For each of the following reactions identify the products formed and balance the reaction .



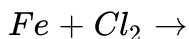
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55. For each of the following reactions identify the products formed and balance the reaction .



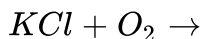
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56. For each of the following reactions identify the products formed and balance the reaction .



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57. For each of the following reactions identify the products formed and balance the reaction .



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58. Why is a physical change reversible?

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59. What is the difference between synthesis and analysis?

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60. The reaction $\text{Fe} + \text{S} \rightarrow \text{FeS}$ represents _____

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61. Why is the action of heat on iodine a physical change?

 [Watch Video Solution](#)

62. What is meant by oxidation and reduction?

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63. What is the change that takes place when common salt is dissolved in water?

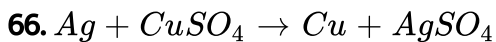
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64. Stibnum is the Latin name of _____ .

 [Watch Video Solution](#)

65. Define an exothermic reaction. Give an example.

 [Watch Video Solution](#)



Is this reaction possible ? Explain.

 [Watch Video Solution](#)

67. Why do chemical reactions involve loss or gain of energy?

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68. What is meant by oxidation and reduction?

 [Watch Video Solution](#)

69. When Fe^{+2} combines with O^{-2} , the compound obtained is _____

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70. What is a displacement reaction?

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71. What is chemical decomposition? Give one example.

 [Watch Video Solution](#)

72. What are catalytic reactions? Give an example.

 [Watch Video Solution](#)

73. Define endothermic reaction. Give one example.

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74. $N_2 + 3H_2 \rightarrow 2NH_3 + X$ kcal/mole, then the formation of NH_3 involves _____ of energy with respect to reactants.

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75. The symbols of carbon and cobalt are _____ and _____ respectively.

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76. The symbol S stands for _____

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Test Your Concepts Short Answer Type Questions

1. Burning of candle is an example of both physical and chemical changes.

Justify your answer.

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2. What is chemical equation? Write the steps involved in writing a chemical equation

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3. Write the differences between reduction and oxidation.

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4. To obtain hydrogen and oxygen from water, what are the conditions to be maintained?

What are the different names that can be given to this reaction?

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5. Why are the double decomposition reactions also called double displacement reactions?

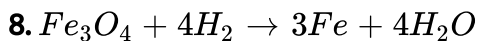
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6. Write the steps in naming a binary compound formed by two non-metallic elements, except hydrogen, with the help of an example.

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7. Write the steps in naming a base.

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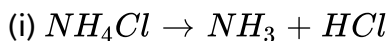
$2Na + Cl_2 \rightarrow 2NaCl$. Identify the oxidizing agent in the given reactions.

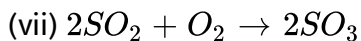
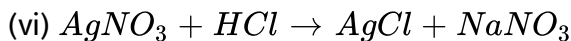
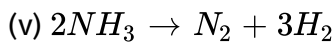
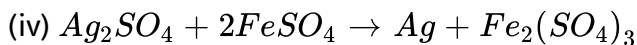
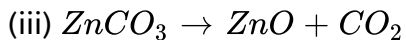
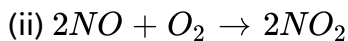
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9. Photolysis comes under which type of chemical reaction? Explain it with an example.

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10. Classify the following equations into combination, displacement, decomposition and double displacement.





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11. Write the characteristics of a chemical reaction.

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12. Classify the following into physical and chemical changes.

freezing of water

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13. Classify the following into physical and chemical changes.

fermentation of alcohol

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14. Classify the following into physical and chemical changes.

burning of coal

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15. Classify the following into physical and chemical changes.

breaking of glass

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16. Classify the following into physical and chemical changes.

glowing of an electric bulb



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17. Why do we need to use formulae?

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18. Write the steps in naming oxyacids with greater number of oxygen atoms

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19. Write the steps in naming oxyacids with less number of oxygen atoms.

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20. Explain the law of definite proportions with an example

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21. Give the differences between oxidation and reduction in terms of oxygen, hydrogen, electropositive element and electronegative element.

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22. What is a decomposition reaction? Explain different decomposition reactions with equations.

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23. What is a chemical combination reaction? Explain the different types of combination reactions.

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24. State the law of multiple proportion with example.

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Concept Application Level 1 State Whether The Following Statements Are True Or False

1. Formula for potassium biphosphate is $KHPO_4$.

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2. The compounds H_2O and D_2O follows Law of multiple proportions.

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3. A_2X is comprised of two divalent negative radicals and one monovalent positive radical.

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4. Formation of sodium nitrite and oxygen by thermal decomposition of sodium nitrate involves only chemical change.

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5. The reaction $C + O_2 \rightarrow CO$, follows the law of conservation of mass.

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6. Valency of sulphur in SO_2 is 2.

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7. In exothermic reactions, the energy of products is more than the energy of reactants.

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1. The valencies of sulphur in hydrogen sulphide and sulphur dioxide are _____ and _____, respectively.

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2. When 58 g of $Mg(OH)_2$ reacts with 98 g of H_2SO_4 , it gives 36 g of H_2O and of $MgSO_4$.

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3. If the molecular weight of a compound Na_XSO_Y is 142, then the values of X and Y are, respectively, _____ and _____

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4. In $Sn + HNO_3 \rightarrow Sn(NO_3)_2 + H_2O + NH_4NO_3$, the valencies of Sn are _____

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5. In binary compounds, the suffix _____ is added to the second element.

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6. The symbol of the element _____ is F.

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7. The reverse reaction of neutralization is _____.

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Concept Application Level 1 Match The Entries Given In Column A With Appropriate Ones In Column B

1. Match the entries given in Column A with appropriate ones in Column B.

Column A	Column B
A. 2H	() a. 9 Nitrogen atoms
B. 3CO	() b. 9 Sodium atoms
C. $4\text{H}_2\text{O}$	() c. 5 Hydrated copper sulphate molecules
D. 2H_2	() d. 4 Water molecules
E. 9Na	() e. 3 Cobalt atoms
F. 8Cl^{-1}	() f. 2 Hydrogen atoms
G. 9N	() g. 3 Carbon monoxide molecules
H. 9Na^{+1}	() h. 2 Hydrogen molecules
I. 3Co	() i. 8 Chloride radicals
J. $5\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	() j. 9 Sodium ions



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Concept Application Level 1 Select The Correct Alternative

1. Which of the following is not a physical change?

- A. dissolution of oxygen in water
- B. dissolution of carbon dioxide in water
- C. dissolution of alcohol in water
- D. dissolution of salt in water

Answer: B

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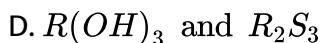
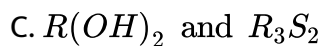
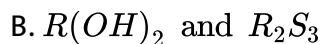
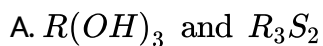
2. Which of the following double displacement reactions is correct?

- A. $AB + CD \rightarrow AC + BD$
- B. $AB + CD \rightarrow AD + BC$
- C. $AB + CD \rightarrow CA + BD$
- D. $AB + CD \rightarrow AD + CB$

Answer: C

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3. The formula of the phosphate of an element R is RPO_4 , then the formulae of its hydroxide and sulphide respectively are _____ are _____ .

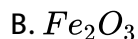
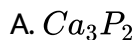


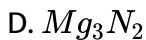
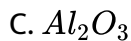
Answer: C



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4. The molecular weight of a compound which contains a total number of five radicals is 160, then it is





Answer: B

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5. Removal of CO_2 and H_2O from atmospheric air using KOH and anhydrous $CaCl_2$ is an example of _____ and _____ changes respectively.

A. chemical, chemical

B. physical, physical

C. chemical, physical

D. physical, chemical

Answer: C

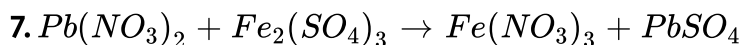
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6. Which of the following reactions is a synthesis reaction?

- A. When steam is passed over red hot coke, a mixture of carbon monoxide and hydrogen is formed.
- B. Sodium reacts with water to form sodium hydroxide and hydrogen.
- C. When the milk of lime (calcium hydroxide) is added to hot sodium carbonate solution, sodium hydroxide is obtained and calcium carbonate separates out as mud.
- D. Stannic chloride is prepared by passing chlorine into molten tin.

Answer: C

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Coefficients of lead sulphate and ferric nitrate in the balanced equation of the above reaction are

A. 3, 4

B. 3,3

C. 3,2

D. 2, 3

Answer: C



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8. The names of the salts formed by the reaction of

(i) Ca and HNO_3

Ca and H_2SO_3 are

A. (i) calcium nitrate (ii) calcium sulphate

B. (i) calcium nitrite (ii) calcium sulphite

C. (i) calcium nitrate (ii) calcium sulphite

D. (i) calcium nitrite (ii) calcium sulphate

Answer: C

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9. A, B and C are the elements such that A on reaction with air produces a dazzling white flame, B is used in rubber industry for hardening and acts as a conductor with rise in temperature. Then A, B and C are

- A. metals
- B. metal, and non-metal, respectively
- C. non-metal, metal and metalloid, respectively
- D. metal, non-metal and metalloid, respectively

Answer: C

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10. In the preparation of H_2SO_4 the catalyst and the inhibitor, respectively, are

- A. platinum, molybdenum
- B. iron, arsenic oxide
- C. platinum, arsenic oxide
- D. iron, molybdenum

Answer: C



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11. $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$, in this reaction

- A. Fe undergoes oxidation and C undergoes reduction
- B. Fe undergoes reduction and C undergoes oxidation
- C. both Fe and C undergo reduction
- D. both Fe and C undergo oxidation

Answer: B

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12. Arrange the elements Zn, Sn, Ca and Al in the increasing order of their reactivity for replacing Cu from $CuSO_4$ solution:

A. $Zn > Sn > Ca > Al$

B. $Ca > Al > Zn > Sn$

C. $Ca > Al > Sn > Zn$

D. $Ca > Sn > Zn > Al$

Answer: B

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13. The valency of sulphate radical is equal to the valency of

- A. phosphate radical
- B. hydrogen phosphate radical
- C. dihydrogen phosphate radical
- D. phosphide radical

Answer: B

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14. The ratio of oxygen atoms present in one molecule of cupric nitrite and ferric sulphite is

- A. 4 : 9
- B. 2 : 3
- C. 1 : 2
- D. 1 : 3

Answer: A

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15. Which of the following statements is false?

- A. A catalyst is highly specific.
- B. The percentage of yield of products can be influenced by a catalyst.
- C. All catalysts have a large surface area.
- D. Composition of a catalyst changes during the reaction.

Answer: B

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16. Which one of the following is the salt of a binary acid?

- A. calcium sulphate
- B. magnesium bromide
- C. zinc phosphate

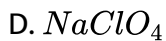
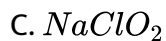
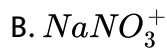
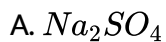
D. sodium carbonate

Answer: B



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17. Which of the following is a salt of 'ous' acid?

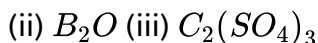
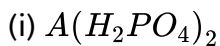


Answer: C



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18. Arrange the following compounds in the order of valency of a positive radical.



A. (iii) > (i) > (ii)

B. (iii) > (ii) > (i)

C. (ii) > (i) > (iii)

D. (i) > (ii) > (iii)

Answer: A



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19. The name of a substance is given to a student. He was asked to write its formula. What is the systematic method to be followed to derive the formula? Arrange the given statements in a proper sequence to obtain the formula.

- (1) Symbol of positive ion or radical should be placed to the left-hand side and symbol of negative ion should be placed to the right-hand side.
- (2) Place the valency with charge of respective radicals on the top right hand corner of their symbols.
- (3) Write the symbols of the respective ions or radicals present in the given compound.
- (4) Criss-cross the valency on the lower right hand side of ions/radicals.
- (5) A radical consisting of more than one element has to be enclosed within the brackets if the respective number attained in criss-cross is more than one.
- (6) No space should be left in between oppositely charged ions while writing the formula.

A. 3 1 2 4 5 6

B. 4 3 6 2 5 1

C. 4 1 3 2 4 6

D. 5 6 4 2 1 3

Answer:

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20. The different samples of CO_2 were found to contain carbon and oxygen in the same ratio of their mass. This illustrates

- A. law of conservation of mass
- B. law of definite proportions
- C. law of multiple proportions
- D. law of reciprocal proportions

Answer:

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21. When the reaction, $Pb(NO_3)_2 \rightarrow PbO + NO_2 + O_2$ is balanced, the coefficients of $Pb(NO_3)_2$, PbO and NO_2 are _____, _____ and _____ respectively.

A. 2, 2 and 2

B. 2, 4 and 4

C. 4, 2 and 4

D. 2, 2 and 4

Answer:



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22. The reaction $Hg + S \rightarrow HgS$ represents a - as well as a _____ reaction.

A. combination, synthesis

B. combination, analysis

C. decomposition, analysis

D. decomposition, synthesis

Answer:

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23. The reaction $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

- A. follows law of conservation of mass
- B. is a neutralization reaction
- C. is a precipitation reaction
- D. Both (a) and (b)

Answer:

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24. The formation of sulphur trioxide from sulphur dioxide and oxygen is an reaction.

- A. endothermic as well as redox
- B. endothermic as well as precipitation

C. exothermic as well as redox

D. exothermic as well as precipitation

Answer:

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25. The valency of nitride ion is same as the valency of _____ ion

A. ferric

B. plumbic

C. zinc

D. calcium

Answer:

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26. Removal of CO_2 and H_2O from atmospheric air using KOH and anhydrous $CaCl_2$ is an example of _____ and _____ changes respectively.

- A. chemical, chemical
- B. physical, physical
- C. chemical, physical
- D. physical, chemical

Answer:

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27. Reaction between barium chloride and aluminium sulphate is an example of

- A. neutralization reaction
- B. displacement reaction
- C. precipitation reaction

D. combination reaction

Answer:

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28. Which among the following salts produces maximum number of metal ions per molecule when dissolved in a suitable solvent?

A. aluminium phosphate, $AlPO_4$

B. magnesium phosphate, $Mg_3(PO_4)_2$

C. sodium biphosphate, Na_2HPO_4

D. aluminium dihydrogen phosphate, $Al(H_2PO_4)$

Answer:

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29. A series of chemical reactions were carried out in a laboratory in the following way. At first zinc granules reacted with H_2SO_4 to form H_2 gas. Then hydrogen gas reacted with chlorine gas under diffused sunlight to form hydrogen chloride gas. Hydrogen chloride gas produced in this process was dissolved in water to form hydrochloric acid. Hydrochloric acid reacted with sodium hydroxide to form sodium chloride and water. Sodium chloride, thus, produced is first melted and then electricity is passed through it. Due to the passage of electricity through sodium chloride, sodium metal and chlorine gas are obtained. Rahul was asked to arrange the above reactions in the order of combination, decomposition, displacement and double decomposition.

His answer is given below.

(1) formation of H_2 gas

(2) formation of hydrogen chloride gas

(3) formation of sodium and chlorine from sodium chloride

(4) formation of sodium chloride Which among the following orders given below is correct, according to you?

A. 3 4 2 1

B. 2 3 1 4

C. 1 2 3 4

D. 2 3 4 1

Answer:



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30. Arrange the following reactions in the given order, i.e., compound-element combination, compound-compound combination and element-element combination.

(1) Coke is burnt in an inadequate supply of air.

(2) The product formed in the reaction (1) is again burnt in the presence of oxygen.

(3) The product formed in the reaction (2) is treated with water.

A. 1 3 2

B. 2 3 1

C. 2 1 3

D. 3 1 2

Answer:

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Concept Application Level 2

1. An oxide X of carbon on treatment with oxygen gives Y which turns lime water milky and blue litmus to red. Predict the valencies of carbon in X and Y and what is the composition of milky precipitate formed?

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2. One molecule of a binary acid contains two hydrogen atoms and a negative radical X. What will be the formula of the salts when it reacts with bases, like, $M(OH)$, $M(OH)_2$ and $M(OH)_3$? Explain with reasons.

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3. The formula of hydrogen phosphate of a metal M is $MHPO_4$. Give the formula of its

(a) chloride

(b) bicarbonate

(c) sulphite

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4. Write the balanced chemical equation for the following:

Potassium bromide on treatment with manganese dioxide and sulphuric acid gives manganese and potassium sulphates, bromine and water.

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5. Write the balanced chemical equation for the following:

In the preparation of phosphate fertilisers, calcium phosphate in

phosphate rock is converted into phosphoric acid and calcium sulphate.

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6. Write the balanced chemical equation for the following:

Sodium nitrite is produced by the reaction of the oxides of nitrogen in which nitrogen shows valency 2 and 4 in a solution of sodium carbonate.

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7. Nitrogen and oxygen react to produce nitric oxide. What is the weight of oxygen required to convert 4.9 g of nitrogen to nitric oxide ?

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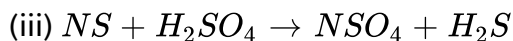
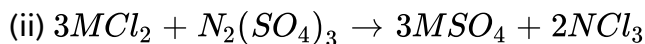
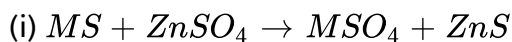
8. The salt of an oxyacid of metal M contains two sulphur and six oxygen atoms. What will be the formula of the base formed by the metal and why?

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9. The molecular weight of a salt of oxyacid of chlorine of a divalent metal which contains more number of oxygen atoms than its corresponding 'ic acid is 239. What will be the molecular weights of its (i) phosphate, (ii) iodide and (iii) bisulphate?

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10. Given below are three chemical equations. Study the equations and identify the elements that show variable valency? Give reasons in support of your answer. ("M'and 'N' stand for different metals.)



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11. Blue coloured $CuSO_4$ is taken in two test tubes A and B. Zinc granules are added to test tube A and small iron pieces are added to test tube B. Explain the observations in each case by giving reasons.

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12. How do you account for the following?

Nitric acid is colourless but on long standing it turns yellow.

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13. How do you account for the following?

Hydrochloric acid can be concentrated by conc. H_2SO_4 but not by phosphorous pentoxide (or) quick lime.

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14. In the welding of railway tracks, a proper proportion of aluminium powder and iron (iii) oxide are made to react with each other at high temperature. Explain the type of reaction involved and also identify the reducing and the oxidizing agents.

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15. The valency of a metal is 2 and its atomic weight is 24. What will be the molecular weight of its

(a) sulphite (b) chloride (c) chloride?

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16. While balancing a chemical equation, only the coefficients of the formulae are changed, but the subscripts are not changed. Give reasons.

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17. The chemical X is a hydroxide of a divalent metal. On treating this hydroxide with CO_2 , a milky white precipitate of Y is formed. The precipitate turns to colourless solution by the excess passage of CO_2 . This colourless solution again gives milky white precipitate Y on heating. Identify X and Y and also give necessary equations.

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18. A hydrocarbon on complete combustion produces 176 g of carbon dioxide and 90 g of water. What will be the formula of hydrocarbon? Also give balanced chemical equation of combustion of hydrocarbon

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19. Heating and subsequent cooling of certain substances are given below. Classify them into either physical or chemical change.

(a) lead nitrate

(b) bluish green copper carbonate

(c) yellow coloured lead oxide

(d) White powdered zinc oxide

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20. Arrange the following radicals in the increasing order of total number of constituent atoms present in the respective radicals.

(a) hydroxide (b) nitride (c) chromate (d) sulphite (e) dihydrogen phosphate

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21. Two beakers A and B contain water. Glucose is added to beaker A and ammonia gas is passed through beaker B. What types of changes (physical or chemical) take place in the beakers? Justify.

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22. Oxide of a metal on treatment with water produces a hissing sound and energy. The product (Y) formed on treatment with hydrochloric acid gives a solid X. Identify the oxide, the product (Y) and X. Also write all the balanced chemical equations and calculate molecular masses of the oxide, the product Y and X

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23. A non-metal X forms two oxides, A and B. The ratio of weight of the element X to the weight of oxygen in A and B is 7:20 and 7: 16, respectively. If the molecular mass of the oxide, A is 108, identify A and B.

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24. Electrolysis of molten sodium chloride produces sodium and chlorine. Is this reaction a redox reaction? Give reasons in support of your answer.

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25. Express the following chemical changes in the form of chemical equations and identify what types of chemical reactions they are.

A copper coin is placed in a solution of corrosive sublimate, mercuric chloride. The products obtained are cupric chloride and mercury.

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26. Express the following chemical changes in the form of chemical equations and identify what types of chemical reactions they are.

A piece of (a) sulphur and (b) charcoal burns vigorously when dropped in molten potassium nitrate, because potassium nitrate decomposes to form potassium nitrite and oxygen and this oxygen helps to burn charcoal and sulphur giving out carbon dioxide and sulphur dioxide, respectively.

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27. Express the following chemical changes in the form of chemical equations and identify what types of chemical reactions they are.

Aqueous ammonium hydroxide solution is made to react with aqueous copper sulphate solution and a bluish white precipitate of cupric hydroxide and ammonium sulphate are formed.

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28. Decomposition reactions are always initiated with the supply of energy. Give appropriate reasons.

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29. Generally, burning or combustion reactions are exothermic. Justify.

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30. In the welding of railway tracks, a proper proportion of aluminium powder and iron (iii) oxide are made to react with each other at high temperature. Explain the type of reaction involved and also identify the reducing and the oxidizing agents.

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Concept Application Level 3

1. What is the role of ultraviolet rays in the purification of water in modern water purifiers?

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2. Under which condition does Bunsen burner produce a luminous flame and a non-luminous flame? Give reasons in support of your answer.

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3. Anhydride of an acid X contains 2 phosphorous atoms and 5 oxygen atoms. If this acid X is made to react with bases, like, sodium hydroxide, calcium hydroxide and aluminium hydroxide, what will be the formulae of the corresponding normal salts formed?



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4. A compound X of silver on treatment with barium chloride gives the respective products Y and Z. X on treatment with sodium hydroxide gives A and B where A can also be obtained when silver is attacked by ozone and B is the salt of an oxyacid of nitrogen which ends with the suffix 'ate.' Identify and give the chemical formulae of the substances X, Y, Z, A and B.



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5. The salt of hypohalous acid is prepared from the respective components, namely, halogen and the corresponding metallic hydroxide.

The metal is the one which possesses the number of electrons in the ratio of 1: 4:4:1 which corresponds to, namely, K, L, M and N shells, respectively, and the halogen is a greenish-yellow colour gas which can displace bromine from magnesium bromide. Identify the salt and the respective components.

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6. The molecular masses of sulphate and hydroxide of a metal M are 142 and 40 respectively. Calculate atomic mass and valency of the metal.

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7. What are the changes observed when moist sugar is treated with anhydrous calcium chloride and concentrated H_2SO_4 respectively?

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8. Identify the type of chemical change that silver chloride undergoes in photo grey lenses.

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9. Blue-coloured gas X having a characteristic fishy odour, can restore the colour of lead paintings. This gas can also be used for sterilizing water. Identify the gas X. Mention the type of reaction(s) involved.

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10. Fluorine is very reactive and attacks all metals but still a copper vessel is used in the preparation of fluorine gas. Why?

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