CHEMISTRY

BOOKS - SURA CHEMISTRY (TAMIL ENGLISH)

BASIC CONCEPTS OF CHEMISTRY AND CHEMICAL CALCULATIONS

Evaluation I Choose The Best Answer

1. 40 ml of methane is completely burnt using 80ml of oxygen at room temperature the volume of gas left after cooling to room temperature is

A. 40 ML CO_2 gas

B. 40ml CO_2 gas and 80 ml H_2O gas

C. 60ml CO_2gas and 60mlH_2O gas

D. 120ml CO_2 gas

Answer: A

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2. An element X has the following isotopic composition $.^{200}X = 90\%, .^{199}X = 8\%$ and $.^{202}X = 2\%$. The weighted average atomic mass of the element X is closest to

A. 201u

B. 202u

C. 199u

D. 200u

Answer: B

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3. Assertion : Two mole of glucose contains 12.044×10^{23} molecules of glucose.

Reason : Total number of entities present in one mole of any substance is equal to 6.022×10^{22}

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

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

C. assertion is true but reason is false

D. both assertion and reason are false

Answer: A::B

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4. Carbon forms two oxides, namely carbon monoxide and carbon dioxide. The equivalent mass of which element remains constant ?

A. Carbon

B. oxygen

C. both carbon and oxygen

D. neither carbon nor oxygen

Answer: B

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5. The equivalent mass of trivalent metal element is $9geq^{-1}$ the molar mass of its anhydrous oxide is

A. 102g

B. 27g

C. 270g

D. 78g

Answer: A

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6. The number of water molecules in a drop of water weighing 0.018g is

A. 6.022×10^{26}

B. 6.022×10^{23}

C. 6.022×10^{20}

D. 9.9×10^{22}

Answer: A::B

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7. 1g of an impure sample of magnesium carbonate (containing no thermally decomposable impurities) on complete thermal decomposition gave 0.44g of carbon dioxide gas . The percentage of impurity in the sample is

A. 0%

B. 4.4%

C. 16%

D. 8.4%

Answer: A

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8. When 6.3 g of sodium bicarbonate is added to 30 g of acetic acid solution, the residual solution is found to weigh 33g. The number of moles of carbon dioxide is released in the reaction is

A. 3

B. 0.75

C. 0.075

D. 0.3

Answer:

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9. When $22.4L$ of $H_2(g)$ is mixed with 11.2 of $Cl_2(g)$, each at STP, the moles of HCl(g) formed is equal to

A. 2 moles of HCI (g)

B. 0.5 moles of HCI (g)

C. 1.5 moles of HCI (g)

D. 1 moles of HCI (g)

Answer: A::C

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10. Hot concentrated sulphuric acid is a moderately strong oxidising agent. Which of the following reactions does not show oxidising behaviour?

A. $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

B. $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$

C. $BaCI_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCI$

D. none of the above

Answer: A::B::C::D

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11. Choose the disproportionation reaction among the following redox reactions.

A. $3Mg_{(s)} + N_{2_{(g)}} \rightarrow Mg_3N_{2_{(s)}}$.

B. $P_{4(s)} + 3NaOH + 3H_2O \rightarrow PH_{3(g)} + 3NaH_2PO_{2(aq)}$.

C. $CI_{2(g)} + 2KI_{(aq)} \rightarrow 2KCI_{(aq)} + I_2$

D. $Cr_2O_{3_{(s)}} + 2AI_{(s)} \rightarrow AI_2O_3(s) + 2Cr(s)$

Answer: A::B::C::D

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12. The equivalent mass of postassium permanganate in alkaline medium is $MnO_4^- + 2H_2O + 3e^- \rightarrow MnO_2 + 4OH^-$.

A. 31.6

B. 52.7

C. 79

D. None of these

Answer: B

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13. Which one of the following represents 180g of water ?

A. 5 Moles of water

B. 90 Moles of water

C. $\frac{6.022 \times 10^{23}}{180}$ Molecules of water

D. 6.022×10^{24} Molecules of water

Answer: A::B::C::D

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14. 7.5g of a gas occupies a volume of 5.6 litres at $0^{\circ} C$ and 1atm pressure . The gas is

A. NO

B. N_2O

C. CO

D. CO_2

Answer:

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15. Total number of electrons present in 1.7 g of ammonia is

A. 6.022×10^{23}

B. $\frac{6.022 \times 10^{22}}{1.7}$

C. $\frac{6.022 \times 10^{24}}{1.7}$

D. $\frac{6.022 \times 10^{23}}{1.7}$.

Answer: A::B::C

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16. The correct increasing order of the oxidation state of sulphur in the anions

$SO_4^{2-}, SO_3^{2-}, S_2O_4^{2-}, S_2O_6^{2-}$ is

A. $SO_3^{2-} < SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

B. $SO_4^{2-} < S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

C. $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-} < SO_4^{2-}$.

D. $S_2O_6^{2-} < S_2O_4^{2-} < SO_4^{2-} < SO_3^{2-}$.

Answer: B::C::D

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17. In a certain reaction ferrous oxalate is oxidised to ferric sulphate and CO_2 by acidified potassium permanganate, the equivalent mass of ferrous oxalate is

A. $\frac{\text{molar mass of ferrous oxalate}}{1}$

B. $\frac{\text{molar mass of ferrous oxalate}}{2}$

C. $\frac{\text{molar mass of ferrous oxalate}}{3}$

D. none of these

Answer: A::C

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18. If Avagadro number were changed from 6.022×10^{23} to 6.022×10^{20}, this would change

A. The ratio of chemical species to each other in a balanced equation.

B. The ratio of elements to each other in a compound .

C. The definition of mass in units of grams

D. The mass of one mole of carbon

Answer: A::B::C

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19. Two 22.4 litre containers A and B contains 8 g of O_2 and 8 g of SO_2 respectively, at 273 K. and 1 atm pressure, then

A. Number of molecules in A and B are same

B. Number of molecules in B is more than that in A.

C. The ratio between the number of molecules in A to number of moleucles in B is $2:1$.

D. Number of molecules in B is three times greater than the number of molecules in A.

Answer: A::B::C

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20. What is the mass of precipitate formed when 50 ml of $8.5\ \%$ solution of $AgNO_3$ is mixed with 100ml of $1.865\ \%$ potassium chloride solution ?

A. 3.59g

B. 7g

C. 14g

D. 28g

Answer: A

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21. The mass of a gas that occupies a volume of 612.5 ml at room temperature and pressure ($25^{\circ}c$ and 1 atm pressure) is 1.1 g. The molar mass of the gas is

A. $66.25gmol^{-1}$

B. $44gmol^{-1}$

C. $24.5gmol^{-1}$

D. $662.\ gmol^{-1}$

Answer: b

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22. Which of the following contain same number of carbon atoms as in 6 g of carbon-12?

A. 7.5g ethane

B. 8g methane

C. both (a) and (b)

D. none of these

Answer: B

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23. Which of the following compound(s) has /have percentage of carbon same as that in ethylene (C_2H_4) .

A. propene

B. ethyne

C. benzene

D. ethene

Answer:

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24. Which of the following is/are true with respect to carbon -12?

A. relative atomic mass is 12 u

B. oxidation number of carbon is $+4$ in all its compounds.

C. 1 mole of carbon -12 contain 6.022×10^{22} carbon atoms.

D. all of these

Answer: A::B::C

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25. Which one of the following is used as a standard for atomic mass.

A. $_{}(6)C^{12}$

B. $._7 C^{12}$

C. $._6 C^{13}$

D. $._6 C^{14}$.

Answer: A::B::C

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Evaluation Ii Write Brief Answer To The Following Questions

1. Define relative atomic mass.

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2. What do you understand by the term mole .

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3. Define equivalent mass.

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4. What do you understand by the term oxidation number?

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5. Distinguish between oxidation and reduction

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6. Calculate the molar mass of the following compounds.

(i) Urea $\left[CO(NH_2)_2\right]$

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7. Calculate the molar mass of the following compounds.

(ii) Acetone $\left[CH_3COCH_3\right]$

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8. Calculate the molar mass of the following compounds.

(iii) Boric acid $\left[H_3BO_3\right]$

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9. Calculate the molar mass of the following compounds.

(iv) Sulphuric acid $\left[H_2SO_4\right]$

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10. The density of carbon dioxide is equal to 1.965 kg m^{-3} at 273 K and 1 atm pressure. Calculate the molar mass of CO_2.

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11. Which contains the greatest number of moles of oxygen atoms (i) 1 mol of ehtanol (ii) 1 mol of formic acid (iii) 1 mol of h2o

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12. Calculate the number of moles in the following . (ii) 4.66 mg of silicon.

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13. Calculate the number of moles in the following . (iii) 65.6 mg of oxygen.

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14. Calculate the average atomic mass of naturally occurring magnesium using the following data

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15. In a traction $x + y + z_2 \rightarrow xyz_2$, Identity the limiting reagent If tiny, in the following traction mixtures.

(a) (A) 200 atoms of x+ 200 atoms of y+ 50 molecules of z_2

(b) 1 mol of x+1 mol of y +3 3 mol ofz_2

(c) 50 atoms of x + 25 atoms of y + 50 molecules of z_2

(d) 2.5 mol of x + 5 mol of y + 5 mol of z_2

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16. Mass of one atom of an element is $6.645 \times 10^{-23} g$. How many moles of element are there in $0.320 kg$.

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17. (a) Define atomic mass unit.

(b) Distinguish between molecular mass and molar mass.

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18. What is the empirical formula of the following ?

(i) Fructose $(C_6H_{12}O_6)$ found in honey

(ii) Caffeine $(C_8H_{10}N_4O_2)$ a substance found in tea and coffee.

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19. Equivalent Mass

The eqivalent mass of a substance is defined as the number of parts by mass of it which combine with or displace 1.0078 parts by mass of hydrogen, 8 parts by mass of oxygen and 35.5 parts by mass of chlorine. The equivalent mass of a substance expressed in grams is called gram equivalent mass.

The equivalent mass of a substance is not constant. It depends upon the reaction in which the substance is participating. A compound may have different equivalent mass in different chemical reactions and under different experimental conditions.

(a) Equivalent mass of an acid

It is the mass of an acid in grams which contains 1.0078 g of replaceable H^+ ions or it is mass of acid which contains one mole of replaceable H^+ ions. It may be calculated as :

Equivalent mass of acid=$\frac{\text{Molecular mass of acid}}{\text{Basicity of acid}}$

Basicity of acid = Number of replaceable hydrogen atoms present in one molecule of acid

(b) Equivalent mass of a base

It is the mass of the base which contains one mole of replaceable OH^- ions in molecules.

Equivalent mass of base=$\frac{\text{Molecular mass of acid}}{\text{Acidity of acid}}$

Acidity of base= Number of replaceable OH^- ions present in one molecule of the base

Equivalent mass of an oxidising agent

(a) Electron concept:

Equivalent mass of oxidising agent = $\frac{\text{Molecular mass of oxidising agent}}{\text{Number of electrons gained by one molecule}}$

(b) Oxidation number concept:

Equivalent mass of oxidising agent= $\frac{\text{Molecular mass of oxidising agent}}{\text{Total change in oxidation number per molecule of oxidising agent}}$

Equivalent mass of $Fe_{0.9}O$ in reaction with acidic $K_2Cr_2O_7$ is : (M= Molar mass)

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20. Equivalent Mass

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It is the mass of the base which contains one mole of replaceable OH^- ions in molecules.

Equivalent mass of base=$\frac{\text{Molecular mass of acid}}{\text{Acidity of acid}}$

Acidity of base= Number of replaceable OH^- ions present in one molecule of the base

Equivalent mass of an oxidising agent

(a) Electron concept:

Equivalent mass of oxidising agent = $\frac{\text{Molecular mass of oxidising agent}}{\text{Number of electrons gained by one molecule}}$

(b) Oxidation number concept:

Equivalent mass of oxidising agent= $\frac{\text{Molecular mass of oxidising agent}}{\text{Total change in oxidation number per molecule of oxidising agent}}$

Equivalent weight of oxalic acid salt in following reaction is :(Atomic masses:O=16,C=12,K=39) $H_2C_2O_4 + Ca(OH)_2 \rightarrow CaC_2O_4 + H_2O$

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21. How many moles of ethane is equaired to produce 44 g of $CO_{2(g)}$ after combustion.

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22. Hydrogen peroxide is an oxidising agent. It oxidises ferrous ion to ferric ion and reduced itself to water. Write a balanced equation.

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23. Calculate the empirical and molecular formula of a compound containing 76.6% carbon, 6.38 % hydrogen and rest oxygen its vapour density is 47

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24. A compound on analaysis gave $Na = 14.3\,\%\, S = 9.97\,\%\, H = 6.22\,\%$ and $O = 69.5\,\%$ calaculate the molecular formula of the compound, if all the hydrogen in the compound is present in combination with oxyhen as water of crystallization. (molecular mass of the compound is 322).

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25. (i) $K_2Cr_2O_7 + KI + H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + I_2 + H_2O.$

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26. Balance the following equation by oxidation number method.

$KMnO_4 + FeSO_4 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + Fe_2(SO_4)_3 + H_2O$

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27. Balance the following equations by oxidation number method

(iii) $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$

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28. Balance the following equation by oxidation number method.

$KMnO_4 + FeSO_4 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + Fe_2(SO_4)_3 + H_2O$

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29. Balance the following equaitons by ion electron method.

(i) $KMnO_4 + SnCI_2 + HCI \rightarrow MnCI_2 + SnCI_4 + H_2O + KCI$

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30. Balance the following equaitons by ion electron method.

(ii) $C_2O_4^{2-} + Cr_2O_7^2 \rightarrow Cr^{3+} + CO_2$ (in acid medium).

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31. Balance the following equaitons by ion electron method.

(iii) $Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + NaI$

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32. Balance the following equaitons by ion electron method.

(iv) $Zn + NO_3^- \rightarrow Zn^{2+} + NO$(in acid medium)

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Additional Questions Additional Choose The Correct Answers

1. Match the list I with List II correctly by using the code given below the list.

A. $\begin{matrix} A & B & C & D \\ 2 & 3 & 4 & 1 \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ 4 & 3 & 1 & 2 \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ 3 & 1 & 4 & 2 \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ 2 & 1 & 4 & 3 \end{matrix}$

Answer: A::B::C::D

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2. The equivalent mass of a divalent metal element is $10eq^{-1}$. The molar mass of its anhydrous oxide is

A. 46g

B. 36g

C. 52g

D. none of these

Answer: B

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3. Consider the following statements

1. Matter possesses mass.

2. 22 carat gold is a mixture.

3. Dry ice is a compound

Which of the following statement(s) given above is/are correct?

A. 1 & 3

B. only 1

C. 1 & 2

D. 1,2& 3

Answer: A::B::C

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4. The solid state of matter is converted inot gas by

A. sublimation

B. deposition

C. freezing

D. condensation

Answer: A::B

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5. The characteristic feature of orderly arrangement of molecules belongs to

A. Solids

B. Liquid

C. Gases

D. None of these

Answer: D

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6. The volume occupied by any gas at S.T.P. is _____

A. 22.4 litres

B. 2.24 litres

C. 223 litres

D. 0.224 litres

Answer: B::D

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7. Identify the incorrect statement about a compound .

A. A molecule cannot be separated into its constituent elements by physical methods of separation

B. A molecule of a compound has atoms of different elements

C. A compound retains the physical properties of its constituent element

D. The ratio of atoms of different elements in a compound is fiexed

Answer: A::C::D

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8. Which among the following statement(s) describe an element ?

(i) It is pure substance which could be split into two or more simpler substance.

(ii) It is a pure substance which cannot be split into simpler substance

(iii) It's composition is not uniform

(iv) All the above

A. only (iv)

B. only (ii)

C. (ii) and (iii)

D. (i) and (iii)

Answer:

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9. What will be the basicity of H_2BO_3, which is not a protic acid ?

A. one

B. two

C. three

D. four

Answer:

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10. Which form of based on physical characteristics posses neither definite volume nor definite shape ?

A. Solids

B. Liquids

C. Gases

D. Both (a) and (b)

Answer: A

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11. Atoms are too small with diameter of 10^{-10} m and weigh approximately

A. $10^{-27}kg$

B. $10^{-27}g$

C. $10^{-31}kg$

D. $10^{-11}g$

Answer: A::B

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12. 1amu (or) $1u \propto$

A. $1.6605 \times 10^{-25}kg$

B. $1.6605 \times 10^{-26}kg$

C. $1.6605 \times 10^{-27} kg$

D. $1.6605 \times 10^{-28} kg.$

Answer: A::B

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13. 12 g of carbon -12 contains

A. 6.022×10^{23}

B. 6

C. 12

D. 12.022×10^{23}

Answer: A

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14. Atomicity of nitrogen is

A. 1

B. 2

C. 3

D. zero

Answer: B

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15. Statement I : Equivalent mass of Mg is determined by Oxide Method.

Statement II : Molecular mass is claculated using vapour density.

A. Both the statements are individually true

B. Both the statements are individually true and statement II is the correct explanation of statements I.

C. Statement I is true but statement II is false.

D. Statement I is false but statement II is true.

Answer: A::B::C::D

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16. One mole of sulphuric acid contains _____oxygen atoms.

A. 4×10^{23}

B. $4 \times 6.023 \times 10^{-23}$

C. $4 \times 6.023 \times 10^{23}$

D. $4 \times 6.023 \times 10^{32}$

Answer: C

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17. Unit of Avogadro's number is

A. mol

B. g

C. mol^{-1}

D. no unit.

Answer: A

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18. Assertion : An element that has a fractional atomic mass.

Reason : An element exist an isotope.

A. Both assertion and reason are correct and reason is the correct explanation for assertion.

B. Both assertion and reason are correct but reason is not the correct explanation for assertion

C. Assertion is true but reason are false.

D. Both assertion and reason are false

Answer: A::B::C::D

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19. The empirical formula and melecular mass of a compound are CH_2O and $180g$ respectively . What will be the molecualr formula of the compound ?

A. $C_9H_{19}O$

B. CH_2O

C. $C_6H_{12}O_6$

D. $C_2H_4O_2$

Answer: C

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20. One 'U' stands for the mass of

A. An atom of carbon -12

B. $1/12^{t}h$ of the carbon-12

C. $1/12^{t}h$ of hydrogen atom

D. One atom of any of the element

Answer: A::B::C

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21. In the reaction $NH_2 + H_2O \rightarrow NH_4^+ + O\overline{H}NH_3$ is acidic in nature. The reason for its acidity is _____.

A. Acceptance of one H^+ from water

B. Release of one OH^- ion

C. Due to the nitrogen ion

D. All the above.

Answer: A::C

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22. The oxidation number of hydrogen in LiH is _____ .

A. $+1$

B. -1

C. $+2$

D. -2

Answer: B

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23. The oxidation number of oxygen in O_2 is _____ .

A. 0

B. $+1$

C. $+2$

D. -2

Answer: A

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24. Calculate the percentage of N is ammonia molecule.

A. $121.42\ \%$

B. $28.35\ \%$

C. $82.35\ \%$

D. $28.53\ \%$.

Answer: C

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25. If a beaker holds 576g of water, what will be the gram molecules of water in that beaker ?

A. 23 gram molecule

B. $23\ \%$

C. $32\ \%$

D. 32 gram molecule

Answer: D

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26. The oxidation number of chromium in dichromate ion is

A. $+4$

B. $+6$

C. $+5$

D. 0

Answer: B

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27. The oxidation state of a element in its uncombined state is

A. zero

B. $+1$

C. -1

D. none

Answer:

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28. $Fe^2 \rightarrow Fe^{3+} + e^-$ is a _____reaction .

A. redox

B. reduction

C. oxidation

D. decomposition

Answer: A::D

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29. Assertion : The atomic masses of most of the elements are in fraction.

Reason : The atomic mass represents the ratio of the average mass of the atom to one avogram.

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion .

C. Assertion is true but reason are false.

D. Both assertion and reason are false

Answer: A::B::C::D

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30. Assertion : The number of oxygen atoms in 16 g of oxygen and 16 g of ozone is same .

Reason : Each of the species represent 1g atom of oxygen .

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion

C. Assertion is true but reason are false.

D. Both assertion and reason are false

Answer: A::B::C::D

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31. Identify disproportionation reaction.

A. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

B. $CH_4 + 4CI_2 \rightarrow \mathbb{C}I_4 + 4HCI$

C. $2F_2 + 2OH^- \rightarrow 2F^- + OF_2 + H_2O$

D. $2NO_2 + 2OH^- \rightarrow NO_2^- + NO_3^- + H_2O$

Answer: B::C

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32. The oxidation number of Cr in $Cr_2O_7^{2-}$ is _____ .

A. $+6$

B. -6

C. $+7$

D. -7

Answer:

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33. Assertion : The ash is produced by burning paper in air is lighter than the original mass of paper.

Reason : The residue is left after the combustion of a chamical reaction that entities is always lighter.

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion

C. Assertion is true but reason are false.

D. Both assertion and reason are false

Answer: A::B

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34. Assertion : Oxalic acid is a dibasic acid

Reason : It contains two basic radicals

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion .

C. Assertion is true but reason are false.

D. Both assertion and reason are false

Answer: A::B

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35. How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 moles of oxygen atoms ?

A. 0.02

B. 3.125×10^{-2}

C. 1.25×10^{-2}

D. 2.5×10^{-2}

Answer: A::B::C

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36. Assertion : Equal volumes of all the gases do not contain equal number of atoms.

Reason : Atom is the smallest particle which takes part in chemical reactions.

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion .

C. Assertion is true but reason are false.

D. Both assertion and reason are false.

Answer: A::B::C::D

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37. Assertion : Fluorine has an oxidation state of -1 in all its compounds.

Reason : Fluorine is the most electronegative element of the periodic table.

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion .

C. Assertion is true but reason are false.

D. Both assertion and reason are false.

Answer: A::B::C::D

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38. The compound in which mass percentage of carbon in $75\ \%$ and that of hydrogen is $25\ \%$ is

A. C_2H_6

B. C_2H_2

C. CH_4

D. C_2H_4

Answer: C::D

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39. Among the three metals, zinc, copper and silver, the electron releasing tendency decreases in the following order.

A. zinc $<$ silver $<$ copper

B. zinc $<$ copper $<$ silver

C. silver $<$ copper $<$ zinc

D. copper $<$ silver $<$ zinc

Answer: C

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40. Consider the following statements

(i) Oxidation number of $He =$ zero

(ii) Increase in oxidation number results in reduction .

(iii) The substance undergoing increase in oxidation number is reducing agent.

Which among the above statement(s) is/are correct ?

A. only (i)

B. (ii) and (iii)

C. (i) and (iii)

D. only (ii)

Answer: A::D

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41. What is the ratio of empirical formula mass to molecular formula mass of benzene ?

A. $1:6$

B. $6:1$

C. $2:3$

D. $3:2$

Answer: A

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42. Rusting of iron is an example of .....reaction.

A. Combination

B. decomposition

C. reduction reaction and redox reaction

D. hydrolysis

Answer: A::C::D

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43. Maximum oxidation state is present in the central metal atom of which compound

A. CrO_2CI_2

B. MnO_2

C. $\left[Fe(CN)_6\right]^{3-}$

D. MnO

Answer: B::C

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44. Which of the following statement(s) is/are not true about the following decomposition reaction.

$2KClO_3 \rightarrow 2KCl + 3O_2$

(i) Potassium is undergoing oxidation

(ii) Chlorine is undergoing oxidation

(iii) Oxygen is reduced

(iv) None of the species are under going oxidation and reduction .

A. only (iv)

B. (i) and (iv)

C. (iv) and (iii)

D. All of these.

Answer: A::D

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45. Identify the correct statement(s) with respect to the following reaction :

$Zn + 2HCI \rightarrow ZnCI_2 + H_2$

(i) Zinc is acting as an oxidant

(ii) Chlorine is acting as a reductant

(iii) Hydrogen is not acting as an oxidant

(iv) Zn is acting as a reductant

A. only (ii)

B. only (iv)

C. both (ii) and (iii)

D. both (i) and (i)

Answer:

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46. Identify the correct statements with reference to the given reaction

$$P_4 + 3OH^- + 3H_2O \rightarrow PH_3 + 3H_2PO_2^-$$

(i) Phosphorous is undergoing reduction only

(ii) Phorphorous is undergoing oxidation only

(iii) Phosphorous is undergoing both oxidation and reduction .

(iv) Hydrogen is undergoing neither oxidation nor reduction .

A. only (iii)

B. both (iii) and (iv)

C. only (i)

D. None of these.

Answer: A::B::D

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47. Give an example of molecule in which the ratio of the molecular formula is six times the empirical formula.

A. $C_6H_{12}O_6$

B. CH_2O

C. CH_4

D. Na_2CO_3

Answer: A::B::C

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48. The change in the oxidation number of S in H_2S and SO_2 in the following industrial reaction :

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

A. -2 to 0, $+4$ to 0

B. -2 to 0, $+4$ to -1

C. -2 to -1, $+4$ to 0

D. -2 to -1, $+4$ to -2

Answer: A

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49. In which of the following reactions, hydrogen peroxide acts as an oxidising agent ?

A. $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

B. $PbS + 4H_2O \rightarrow PbSO_4 + 4H_2O$

C. $2MnO_4^- + 3H_2O_2 \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$

D. $HOCI + H_2O_2 \rightarrow H_2O^+ + CI^- + O_2.$

Answer: B::D

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50. Two elements X and Y (atomic mass of $X = 75, Y = 16$) combine to give a compound having $76\ \%$ of X. The formula of the compound is ?

A. XY

B. X_2Y

C. X_2Y_2

D. X_2Y_3

Answer: C

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51. Assertion (A): Among halogens fluorine is the best oxidant.

Reason (R) : Fluorine is the most electronegative atom.

A. Both A and R are true and R explains A

B. Both A and R are true but R does not explian A

C. A is true but R is false

D. Both A and R is false.

Answer: A::B::D

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52. Equal volume of nitrogen and Hydrogen gases will react to form ammonia in favourable condition then the limitting reagent is

A. H_2

B. N_2

C. NH_2

D. No reactant is limiting regent.

Answer: A

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53. Identify the redox reaction taking place in a beaker.

A. $Zn_{(s)} + Cu^{2+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$.

B. $Cu_{(s)} + 2Ag^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$.

C. $Cu_{(s)} + Zn^{2+}_{(aq)} \rightarrow Zn_{(s)} + Cu^{2+}_{(aq)}$.

D. $2Ag_{(s)} + Cu^{2+}_{(aq)} \rightarrow 2Ag^{+}_{(aq)} + Cu_{(s)}$.

Answer: A::B::C

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54. A compound has an empirical formula C_2H_4O. If the value of $n = 2$ the molecular formula of the compound is _____ .

A. C_2H_4O

B. CH_2O

C. CH_2

D. $C_4H_8O_2$

Answer: D

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55. If ten volumes of dihydrogen gases react with five volumes of dioxygen gases that, how many volumes of water vapour would be produced ?

A. 1

B. 2

C. 5

D. 10

Answer: D

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56. Limiting reagent is in a chemical reaction is the reactant in which

A. left some amount unreacted after the completion of reaction

B. reacts completely in the reaction

C. does not react in the reaction

D. All of these.

Answer: B

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57. Assertion : When 4 moles of H_2 reacts with 2 moles of O_2. Then 4 moles of water is formed.

Reason : O_2 will act as limiting reagent.

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

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

C. Only assertion is true but reason is false.

D. Both assertion and reason are false.

Answer: A::B::C::D

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58. Assertion : $K_{20}.AI_2O_3.SiO_2.6H_2O$ is the empirical formula of potash alum.

Reason : It is a double salt.

A. Both assertion and reason are correct and reason is the correct explanation for assertion .

B. Both assertion and reason are correct but reason is not the correct explanation for assertion .

C. Assertion is true but reason are false.

D. Both assertion and reason are false.

Answer: A::B::C::D

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59. Anything that has mass and occupies space is called _____

A. matter

B. weight

C. energy

D. system

Answer: A

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60. The mass of one mole of a substance is _____

A. molecular mass

B. Atomic mass

C. molar mass

D. Nuclear mass

Answer: c

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61. Which of the following is correct ?

A. Elecmental analysis of a compound gives the mass percentage of atoms present in the compound

B. Using the mass percentage, we can determine the empirical formula of the compound

C. Molecular formula of the compound can be arrived at from the empirial formula using the molar mass of the compound.

D. All the above are correct.

Answer: A::B::C::D

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62. Which formula of a compound is a whole number multiple of the empirical formula ?

A. molecular

B. mass

C. energy

D. weight

Answer: A

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63. All oxidation reactions are accompanied by _____reactions .

A. accession

B. addition

C. reduction

D. decomposition

Answer: C::D

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64. Hema attached to the _____molecule.

A. hydrogen

B. oxygen

C. protein

D. water

Answer:

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65. During which reactions the oxidation number of elements changes ?

A. metabolic reactions

B. reduction reactions

C. exchange reactions

D. redox reactions

Answer: D

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66. An ion in a compound is replaced by an ion of another element are called _____ reactions.

A. displacement

B. ionic

C. chemical

D. physical

Answer: A

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67. Which method is used for ionic redox reactions ?

A. Ionic method

B. Ion-Electron method

C. Proton - Electron method

D. Oxidation number method

Answer: C::D

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Additional Questions Additional Short Answers

1. Assertion : Two mole of glucose contains 12.044×10^{23} molecules of glucose.

Reason : Total number of entities present in one mole of any substance is equal to 6.022×10^{22}

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2. How many moles of hydrogen is required to produce 10 moles of ammonia ?

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3. Calculate the total number of electrons present in 17g of ammonia.

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4. Mixutre of salt and water is a solution while that of oil and water is not .Explain.

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5. Why is air sometimes considered as a heterogeneous mixture ?

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6. By applying the knowledge of chemical classification, classify each of the following into elements, compounds or mixtures.

(i) Sugar (ii) Sea water (iii) Distilled water (iv) Carbon dioxide (v) Copper wire (vi) Table salt (vii) Silver plate (viii) Naphthalene balls

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7. Matter is defined as anything that has mass and occupies space. All matter is compound of atoms.

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8. List the differences between elements and compounds.

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9. Write a note on 'mxiture' based on the chemical classification of matter.

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10. How will you classify matter based on physical state ?

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11. Explain the classification of matter based on chemical composition.

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12. Define the avogadro's number :

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13. Define molar volume.

Watch Video Solution

14. State Avogadro's law.

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15. Which law co-relates the mass and volume of a gas ?

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16. Motor volume is occupied 1 mole of any (ideal) gas at standard temperature and pressure. Show that it is 22.4 litres.

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17. Bring about the dissimilarities in mole concept and molar mass by clearly analysing them.

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18. (i) If an acid is mono basic. How will you relate their equivalent mass and molecular mass.

(ii) What is the basicity of $H_4P_2O_7$?

(iii) Give any two examples for dibasic acids.

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19. Why are the atomic mass of most of the elements fractional ?

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20. Write down the formulate for calculating the equivalent mass of an acid, base and oxidising agent.

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21. Define limiting reagent .

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22. Define stoichiometry.

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23. What do you understand by stoichiometric coefficients in a chemical equation ?

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24. Write the simplest formula for the following .

(i) N_2O_4 (ii) $C_6H_{12}O_6$ (iii) H_2O (iv) H_2O_2.

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25. Write the electronic concept of oxidation and reduction reactions.

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26. Calculate the amount of water produced by the combustion of 32 g of methane.

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27. Categorise the redox reaction that occur in our daily life.

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28. Which of the following behaves as both oxidising and reducing agents ?

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29. How would you know whether a redox reaction is taking place in an acidic, alkaline or neutral medium.

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30. Zn rod is immersed in $CuSO_4$ solution.What will you observe after an hour ? Explain you observation in terms of redox reaction .

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31. What will be oxidation number of sulphur in $S_2O_8^{2-}$ ion and $S_4O_6^{2-}$ ion ?

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32. Nitric acid is an oxidising agent and reacts with PbO but it does not react with PbO_2. Explain why ?

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33. Which one of the two, $CIO_26(-)$ or CIO_4^- shows disproportionation reaction and why ?

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34. Identify the type of redox reaction taking place in the following .

$\overset{0}{3}Mg_{(g)} + \overset{0}{N}_{2_{(g)}} \rightarrow \overset{+2}{M}g_3\overset{-3}{N}_{2_{(s)}}$.

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35. Identify the type of redox reaction taking place in the following .

$\overset{+5}{Y}_2O_{5_{(s)}}^{-2} + 5C_{a_{(s)}}^0 \rightarrow \overset{0}{2}V_{(s)} + \overset{+2}{5}C\overset{-2}{a}O_{(s)}$

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36. Identify the type of redox reaction taking place in the following .

$$\overset{+1}{2K}\overset{+5}{C}\overset{-2}{I}O_{3(s)} \rightarrow \overset{+1}{2K}\overset{-1}{C}I_{(s)} + \overset{0}{3O_{2(g)}}$$

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37. Complete and balance the following reactions :

(i) $H_2(g) + M_6O_3(s) \xrightarrow{\Delta}$.

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38. Identify the oxidant the reductant in the following reaction.

$$Cl_2(g) + 2Br^-(aq) \rightarrow 2Cl^-(aq) + Br_2(aq)$$

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39. Identify the type of redox reaction taking place in the following .

$$\overset{0}{C}I_{2(g)} + 2OH^-_{(aq)} \rightarrow \overset{-1}{C}IO^-_{(aq)}\ \overset{-1}{C}I^-_{(aq)} + H_2O_{(l)}$$

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40. Define molar volume.

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41. How can we say sugar has solid and water has liquid ?

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42. Define Average atomic mass ?

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43. State Avogadro's law.

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44. The approximate production of Na_2CO_3 per month is $424 \times 10^6 g$ while that of methyl alcohol is $320 \times 10^6 g$. Which is produced more in terms of moles ?

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45. How many moles of glucose are present in 720 g of glucose ?

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46. What do you understand by the terms:

hydrogenation

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47. What is meant by negative work ? Give example.

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48. Define limiting reagent .

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49. What is combination reaction ? Give example.

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50. What is decompostion reaction ? Give 2 example.

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51. What are disproportionate reactions? Give example.

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52. What is displacement reactions ? Give its types. Explain with example.

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53. What are competive electron transfer reaction ? Give example.

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54. Explain the classification of matter

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55. An organic compound present in vinegar has 40% carbon , 6.6% hydrogen and 53.4% oxygen. Find the empirical formula of the compound.

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56. Discuss the characteristic the properties of physical classification of matter.

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Additional Questions Additional Long Answers

1. Define oxidation number. Balance the following equation using oxidation number method.

$As_2S_3 + HNO_3 + H_2O \rightarrow H_3AsO_4 + H_2SO_4 + NO$

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2. What is condition for molar Volume ?

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3. Define auto -oxidation reaction and its examples.

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4. Write any theee rules assigning for the oxidation number ?

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5. Distinguish between the following .

(i) Atomic and molecular mass

(ii) Atomic mass and atomic weight

(iii) Empirical and molecular formula

(iv) Moles and molecules.

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6. What is disproportionation reaction ? Give example.

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7. A redox reaction is

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Numerical Problems

1. Calculate the number of atoms in each of the following

a. $52mol$ of He

b. $52u$ of He

c. $52g$ of He

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2. Calculate the number of atoms in each of the following .

(ii) 52 moles of He.

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3. Calculate the mass of the following : (i) 1 atm of silver

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4. Calculate the mass of the following : (ii) 1 molecule of benzene

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5. Calculate the mass of the following : (iii) 1 molecule of water.

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6. Silver crystallizes in fcc lattic. If the edge length of the cell is $4.07 \times 10^{-8} cm$ and density is $10.5 g cm^{-3}$. Calculate the atomic mass of silver.

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7. How much mass (in gram units) is represented by the following ? (i) 0.2 mol of NH_3

(ii) 3.0 mol of CO_2

(iii) 5.14 mol of H_5IO_6

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8. What mass of N_2 will be required to produce 34 g of NH_3 by the reaction , $N_2 + 3H_2 \rightarrow 2NH_3$.

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9. Calculate the formula weights of the following compounds.

(a) NO_2

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10. Calculate the formula weights of the following compounds.

(b) Glucose $(C_6H_{12}O_6)$

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11. Calculate the formula weights of the following compounds.

(c) $NaOH$

Watch Video Solution

12. Calculate the formula weights of the following compounds.

(d) $Mg(OH)_2$.

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13. Calculate the equivalent weight of H_3PO_4 and $Ca(OH)_2$ on the basis of given reaction .

$H_3PO_4 + NaOH \rightarrow NaH_2PO_4 + H_2O$

$Ca(OH)_2 + HCI \rightarrow Ca(OH)CI + H_2O$

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14. (i) Calculate the gram molecular mass of sugar having molecular formula $C_{12}H_{22}O_{11}$.

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15. Calculate mass of one molecule of sulphur dioxide (SO_2) in gram.

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16. Calculate the number of moles in the following . (i) 7.85g of copper

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17. Calculate the number of moles in the following . (ii) 4.66 mg of silicon.

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18. Calculate the number of moles in the following . (iii) 65.6 mg of oxygen.

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19. What will be the molecular formula for the compound. Whose empirical formula is CH_2CI and molar mass is $98.96g$?

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20. Calculate the oxidation number of nitrogen nitrous acid and nitric acid

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21. Balance the following reaction by oxidation number method.

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22. A compound on analysis was found to contain $C = 34.6\,\%$, $H = 3.85\,\%$ and $O = 61.55\,\%$ .Calculate its empirical formula.

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23. Calculate the mass of oxygen atom in amu.

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24. How many moles of barium suphate is precipitated when 1 mole of aluminium sulphate reacts completely with barium chloride ?

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25. Calculate the molecular mass of the following : (a) $KMnO_4$

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26. Calculate the molecular mass of the following : (b) Crystalline Oxalic acid

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27. Calculate the molecular mass of the following : (c) Methane

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28. (a) Calculate the number of atoms/molecules present in the following:

(a) 10g of Hg

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29. (a) Calculate the number of atoms/molecules present in the following:

(b) 1.8g of water

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30. (a) Calculate the number of atoms/molecules present in the following:

(c) 100g of sulpurdioxide

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31. (a) Calculate the number of atoms/molecules present in the following:

(d) 1 kg of acetic acid

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32. Calculate the number of moles present in the following : (a) 50 g of calcium chloride

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33. Calculate the number of moles present in the following : (b) 120 g of sodium hydroxide

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34. Calculate the number of moles present in the following : (c) 46 g of ethanol

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35. Calculate the number of moles present in the following : (d) 90 g of magnesium oxide

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36. Calculate the number of moles present in the following : (e) 19.5 g of potassium

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37. Calculate the molar volume of the following : (a) 88 g of CO_2

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38. Calculate the molar volume of the following : (b) 5 moles of methane

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39. Calculate the molar volume of the following : (c) 460 g of formic acid

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40. Calculate the molar volume of the following : (d) 3.0115×10^{23} molecules of SO_2 gas .

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41. Calculate the equivalent mass of the following (a) Zn

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42. Calculate the equivalent mass of the following (b) Nitrate ion

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43. Calculate the equivalent mass of the following (c) Sodium

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44. $0.456g$ of a metal gives $0.606g$ of its chloride. Calculate the equivalent mass of the metal.

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45. $1.05g$ of a metal gives a oxidation $1.5g$ of its oxide. Calculate its equivalent mass.

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46. Calculate equivalent mass of the following : (a) Sodium hydroxide

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47. Calculate equivalent mass of the following : (b) Aluminium hydroxide

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48. Calculate equivalent mass of the following : (c) Ammonium hydroxide.

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49. Calculate equivalent mass of the following : (d) Calcium hydroxide.

Watch Video Solution

50. Calculate equivalent mass of the following : (e) Magnesium hydroxide.

Watch Video Solution

51. Calculate the equivalent mass of potassium dichromate in acid medium

$[K_2Cr_2O_7 + 4H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + 4H_2O + 3(O)3 \times 16 = 4$

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52. Calculate equivalent mass of the following : (a) Hydrochloric acid

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53. Calculate equivalent mass of the following : (b) Nitric acid

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54. Calculate equivalent mass of the following : (c) Acetic acid

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55. Calculate equivalent mass of the following : (d) Crystalline oxalic acid

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56. Calculate equivalent mass of the following : (e) Phosphorous acid

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57. $3.24g$ of titanium reacts with oxygen to form $5.40g$ of the metal oxide. Find the empirical formula of the metal oxide ?

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58. A compound contains $11.99\,\%\,N$, $13.70\,\%\,O$, $9.25\,\%\,B$ and $65.06\,\%\,F$. Find its empirical formula .

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59. A orange compound used for welding operation contains the following composition by mass : $C = 92.3\,\%$,H=7.7%`. Find out the molecular formula of the compound . At STP, 10.0 L of the gas is found to weight 11.6 g .

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60. The organic compound Vitamin -C, has the following composition by mass: $40.92\,\%\,C, 4.58\,\%\,H$, and the rest is oxygen. Determine its molecular formula . Molar mass of the substance is $176 g \mathrm{mol}^{-1}$.

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Redox Reaction Activity

1. A piece of cut apple becomes brown. Why ? Can you prevent it by a simple method ?

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2. Place an iron piece in amosit atomsphere and observe it after two days. Is there and deposition of new substance ? Why does it happen ? What is this phenomenon called ?

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3. Calculate the oxidaiton number of underlined atoms of the fopllowing :

$K_2\underline{Mn}O_4$

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4. Calculate the oxidaiton number of underlined atoms of the fopllowing :

$K_2\underline{Cr}O_4$

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5. Calculate the oxidaiton number of underlined atoms of the following :

$\underline{N}O_3^-$.

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6. Calculate the oxidaiton number of underlined atoms of the fopllowing :

$H_4\underline{P}_2o_7$

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7. Calculate the oxidaiton number of underlined atoms of the fopllowing :

$\underline{C}IO_3^-$

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8. Calculate the oxidaiton number of underlined atoms of the fopllowing :

$\underline{A}sO_3^{3-}$.

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9. An iron nail is placed in copper sulphate solution taken in the beaker. Observe it for some time ? Find the changes that takes place and why ?

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10. The approximate production of Na_2CO_3 per month is $424 \times 10^6 g$ while that of methyl alcohol is $320 \times 10^6 g$. Which is produced more in terms of moles ?

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11. Find the molecular mass of $FeSO_4 7H_2O$.

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12. The density of $CO_2 = 1.977 kmg^{-3}$ at STP. Calculate the molecular mass of CO_2.

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13. How many moles of glucose are present in 720 g of glucose ?

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14. Calculate the weight of 0.2 mole of sodium carbonate.

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15. Calculate the equivalent mass of bicarbonate ion.

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16. Calculate the equivalent mass of barium hydroxide.

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17. Boric acid, H_3BO_3 is a mild antiseptic and is often used as an eye wash. A sample contains 0.543 mol H_3BO_3. What is the mass of boric acid in the sample.

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18. (i) $K_2Cr_2O_7 + KI + H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + I_2 + H_2O.$

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19. (ii) $KMnO_4 + Na_2SO_3 \rightarrow MnO_2 + Na_2SO_4 + KOH$ (Alkaline medium).

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20. (iii) $K_2Cr_2O_7 + KCI + H_2SO_4 \rightarrow KHSO_4 + CrO_2CI_2 + H_2O.$

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21. Balance the following equations by oxidation number method

(iii) $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$

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22. (v) $P + HNO_3 \rightarrow H_3PO_4 + NO_2 + H_2O$

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23. (vi) $P + 5HNO_3 \rightarrow H_3PO_3 + 5NO_2 + 2H_2O$

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24. (vii)

$H_2C_2O_4 + KMnO_4 + H_2SO_4 \rightarrow H_2SO_4 + MnSO_3 + CO_2 + H_2O.$

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25. (viii) $CuO + NH_3 \rightarrow Cu + N_2 + H_2O$

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26. (ix) $Zn + HNO_3 \rightarrow Zn(NO_3)_2 + NH_4NO_3 + H_2O$.

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27. (i) $MnO_4^- + Sn^{2+} \rightarrow Mn^{2+} + Sn^{4+}$

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28. (ii) $C_2O_4^{2-} + Cr_2O_7^{2-} \rightarrow Cr^{3+} + CO_2$.

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29. (iii) $S_2O_3^{2-} + I_2 \rightarrow S_2O_4^{2-} + I^-$.

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30. (iv) $Sb^{3+} + MnO_4^- \rightarrow Sb^{5+} + Mn^{2+}$.

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31. (v) $MnO_4^{2-} \rightarrow MnO_4^{2-} + MnO_2$.

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32. (vi) $MnO_4^- + Fe^{2+} \rightarrow Mn^{2+} + Fe^{3+}$.

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33. (vii) $S_2O_3^{2-} + I_2 \rightarrow S_2O_6^{2-} + I^-$.

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34. A compound contains $50\,\%$ of X (atomic mass 10)and $50\,\%$ Y (atomic mass 20) . Give its molecular formula .

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35. Determine the empirical formula of a compound containing $K = 24.75\,\%$, $Mn = 34.77\,\%$ and rest is oxygen.

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