CHEMISTRY

BOOKS - MTG WBJEE CHEMISTRY (HINGLISH)

ATOMS MOLECULES AND CHEMICAL ARITHEMETIC

Wb Jee Workout Category 1 Single Option Correct Type 1 Mark

1. Four one-litre flasks are separately filled with the gases hydrogen, helium, oxygen and ozone at the same room temperature and pressure. The ratio of total number of atoms of these gases present in the different flasks would be

A. $1:1:1:1$

B. $1:2:2:3$

C. $2:1:2:3$

D. $3:2:2:1$

Answer: C

2. A balanced chemical equation is in accordance with

    A. Avogadro's law

    B. law of constant proportion

    C. law of conservation of mass

    D. law of gaseous volume

Answer: C

▶

3. 10 g $CaCO_3$ on heating leaves behind a residue weighing 5.6 g. Carbon dioxide released into the atmosphere at STP will be

A. 2.24 L

B. 4.48 L

C. 1.12 L

D. 0.56 L

Answer: A

4. I L of N_2 combines with 3 L of H_2 to form 2 L of NH_3 under the same conditions. This illustrates the

A. law of constant composition

B. law of multiple proportions

C. law of reciprocal proportions

D. Gay Lussac's law of gaseous volumes.

Answer: D

5. One gram mole of a gas at NTP occupies

22.4 litres. This fact was derived from

    A. law of gaseous volumes

    B. Avogadro's hypothesis

    C. Berzelius hypothesis

    D. Dalton's atomic theory

Answer: B

6. Which one of the following represents Avogadro's hypothesis?

A. Equal volumes of all gases under same conditions of temperature and pressure contain equal number of atoms.

B. Equal volumes of all gases under same conditions of temperature and pressure contain equal number of molecules.

C. Gases react together in volumes which bear a simple ratio to one another.

D. The rates of diffusion of gases are inversely proportional to the square root of their densities.

Answer: B

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7. The use of ^{12}C scale has superseded the older scale of atomic mass based on ^{16}O isotope, one important advantage of the former being

A. the atomic masses on ^{12}C scale became whole numbers

B. ^{12}C is more abundant in the earth's crust than ^{16}O

C. the difference between the physical and chemical atomic masses got narrowed

down significantly

D. ^{12}C is situated midway between metals and non-metals in the periodic table.

Answer: C

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8. Number of atoms of oxygen present in 10.6 g Na_2CO_3 will be

A. 6.022×10^{22}

B. 12.04×10^{22}

C. 1.806×10^{23}

D. 31.80×10^{28}

Answer: C

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9. A gas mixture contains 50% helium and 50% methane by volume. What is the percent by weight of methane in the mixture?

A. 19.97 %

B. 20 %

C. 50 %

D. 80 %

Answer: D

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10. A sample of phosphorus trichloride (PCl_3) contains 1.4 moles of the substance. How many atoms are there in the sample?

A. 4

B. 5.6v

C. 8.431×10^{23}

D. 3.372×10^{24}

Answer: D

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11. Which of the following contains maximum number of molecules?

A. 100 cc of CO_2 at STP

B. 150 cc of N_2 at STP

C. 50 cc of SO_2 at STP

D. 200 cc of NH_3 at STP

Answer: D

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12. Which has maximum number of atoms?

A. 24 g of C

B. 56 g of Fe(56)

C. 27 g of Al(27)

D. 108 of Ag (108)

Answer: A

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13. Amount of oxygen (in g) in 32.2g of $Na_2SO_4.10H_2O$ is

A. 20.8

B. 22.4

C. 2.24

D. 2.08

Answer: B

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14. Number of atoms in 558.5 g Fe (molar mass

Fe= $55.85 gmol^{-1}$)

A. twice than in 60 g carbon

B. 6.023×10^{22}

C. half that of 8g He

D. $558.6 \times 6.023 \times 10^{23}$

Answer: A

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15. The molarity of a NaOH solution by dissolving 4 g of it in 250 ml water is
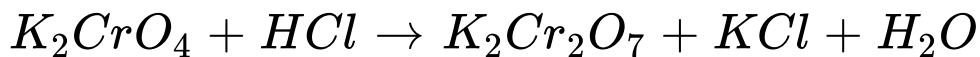
A. 0.4 M

B. 0.8 M

C. 0.2 M

D. 0.1 M

Answer: A

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16. The set of numerical coefficients that balances the equation

$$K_2CrO_4 + HCl \rightarrow K_2Cr_2O_7 + KCl + H_2O$$

is

A. 1,1,2,2,1

B. 2,2,1,1,1

C. 2,1,1,2,1

D. 2,2,1,2,1

Answer: D

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17. The volume of water to be added to 100 cm of 0.5 N H_2SO_4 to get decinormal concentration is

A. $100\ cm^3$

B. $450 cm^3$

C. $500 cm^3$

D. $400 cm^3$

Answer: D

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18. $10\ dm^3$ of N_2 gas and $10\ dm^3$ of gas X at the same temperature contain the same number of molecules. The gas X is

A. CO

B. CO_2

C. H_2

D. NO

Answer: A

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19. How much of NaOH is required to neutralise 1500 cm^3 of 0.1 N HCl? (Na = 23)

A. 40 g

B. 4 g

C. 6 g

D. 60 g

Answer: C

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20. The percentage of nitrogen in urea is about

A. 46

B. 85

C. 18

D. 28

Answer: A

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21. The weight of a molecule of the compound

$C_{60}H_{122}$ is

A. $1.4 \times 10^{-21} g$

B. $1.09 \times 10^{23} \ g$

C. $5.025 \times 10^{23} \ g$

D. $16.023 \times 10^{23} \ g$

Answer: A

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22. The specific heat of a metal is 0.16. Its approximate atomic weight would be

A. 32

B. 16

C. 40

D. 64

Answer: C

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23. One mole of calcium phosphide on reaction with excess of water gives

A. one mole of phosphine

B. two moles of phosphoric acid

C. two moles of phosphine

D. one mole of phosphorus pentoxide

Answer: C

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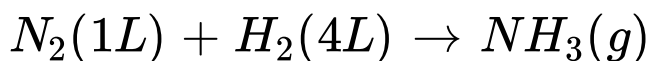24. Amolal solution is one that contains 1 mole

of a solute in

A. 1000 g of the solvent

B. one litre of the solvent

C. one litre of the solution

D. 22.4 litres of the solution

Answer: A

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25. What is left after the reaction?

$$N_2(1L) + H_2(4L) \rightarrow NH_3(g)$$

A. 1.5 L N_2

B. $1 L H_2$

C. $1 L N_2$

D. $0.5 L H_2$

Answer: B

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26. The number of molecules in 16 g of

methane is

A. 3.0×10^{23}

B. 6.02×10^{23}

C. $\dfrac{16}{6.02} \times 10^{23}$

D. $\dfrac{16}{3.0} \times 10^{23}$

Answer: B

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27. 2 N HCl solution will have same molar conc.

as a

A. 4.0 N H_2SO_4

B. $0.5NH_2SO_4$

C. $1NH_2SO_4$

D. $2NH_2SO_4$

Answer: A

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28. In acidic medium, the equivalent weight of

$K_2Cr_2O_7$ (molecular weight = M) is

A. M

B. M/2

C. M/3

D. M/6

Answer: D

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29. Which one of the following statements is incorrect?

A. One gram atom of carbon contains Avogadro's number of atoms.

B. One mole of oxygen gas contains Avogadro's number of molecules.

C. One mole of hydrogen contains Avogadro's number of atoms.

D. One mole of electrons stands for 6.02×10^{23} electrons

Answer: C

30. 4 g of copper was dissolved in concentrated nitric acid. The copper nitrate on strong heating gave 5 g of its oxide. The equivalent weight of copper is

A. 23

B. 32

C. 12

D. 20

Answer: B

Wb Jee Workout Category 2 Single Option Correct Type 2 Marks

1. In Haber process, 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of the gaseous mixture under the aforesaid condition in the end?

A. 20 litres NH_3, 25 litres N_2, 20 litres H_2

B. 10 litres NH_3, 25 litres N_2, 15 litres H_2

C. 20 litres NH_3, 10 litres N_2, 30 litres H_2

D. 20 litres NH_3, 25 litres N_2, 15 litres H_2

Answer: B

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2. Number of water molecules in the drop of water, if 1 mL of water has 20 drops and A is Avogadro's number, is

A. 0.5 A/18

B. 0.05 A

C. 0.5 A

D. 0.05 A/18

Answer: D

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3. The maximum number of molecules is present in

A. 15 L of H_2 gas at STP

B. 5L of N_2 gas at STP

C. 0.5 g of H_2 gas

D. 10 g of O_2 gas

Answer: A

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4. Mixture X= 0.02 mole of $[Co(NH_3)_5SO_4]Br$ and 0.02 mol of $[Co(NH_3)_5Br]SO_4$ was prepared in 2 litre of

solution.

1 litre of mixture X + excess $AgNO_3 \rightarrow Y$

1 litre of mixture X + excess of $BaCl_2 \rightarrow Z$

Number of moles of Y and Z are

A. 0.01, 0.01

B. 0.02, 0.01

C. 0.01, 0.02

D. 0.02, 0.02

Answer: A

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5. What volume of hydrogen gas at 273 K and 1 atm pressure will be consumed in obtaining 21.6 g elemental boron (atomic mass = 10.8) from the reduction of boron trichloride by hydrogen?

    A. 67.2 L

    B. 44.8 L

    C. 22.4 L

    D. 89.6 L

Answer: A

6. An aqueous solution of 6.3 g of oxalic acid dihydrate is made upto 250 mL. The volume of 0.1 N NaOH required to completely neutralise 10 mL of this solution is

A. 40 mL

B. 20 mL

C. 10 mL

D. 4 mL

Answer: A

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7. 250 mL of sodium carbonate solution contains 2.65 grams of Na_2CO_3. If 10 mL of this solution is diluted to one litre, what is the concentration of the resultant solution? (Mol. wt. of $Na_2CO_3 = 106$)

A. 0.1 M

B. 0.001 M

C. 0.01 M

D. 10^{-4} M

Answer: B

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8. The percentage of Se in peroxidase enzyme is 0.5% by weight (atomic weight = 78.4). Then minimum molecular weight of peroxidase anhydrous enzyme is

A. 1.568×10^4

B. 1.568×10^3

C. 15.68

D. 3.136×10^4

Answer: A

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9. A 100 mL solution of 0.1 N HCl was titrated with 0.2 N NaOH solution. The titration was discontinued after adding NaOH solution.The

remaining titration was completed by adding 0.25 N KOH solution. The volume of KOH required for completing the titration is

A. 70 mL

B. 32 mL

C. 35 mL

D. 16 mL

Answer: D

10. 50 mL of 10 NH_2SO_4 , 25 mL of 12 N HCl and 40 mL of 5 N HNO_3 were mixed together and the volume of the mixture was made 1000 mL by adding water. The normality of the resultant solution will be

    A. 1 N

    B. 2 N

    C. 3 N

    D. 4 N

Answer: A

11. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200. The number of iron atoms (at. wt. of Fe = 56) present in one molecule of haemoglobin is

A. 6

B. 1

C. 4

D. 2

Answer: C

12. 10 g of a piece of marble was put into excess of dilute HCl acid. When the reaction was complete, 1120 cm^3 of CO_2 was obtained at STP. The percentage of $CaCO_3$ in the marble is

A. $25\ \%$

B. $50\ \%$

C. 75 %

D. 100 %

Answer: B

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13. A metal M with specific heat (0.16) have chlorine 68.3% then the formula of the compound is similar to

A. MCl

B. MCl_2

C. MCl_3

D. MCl_4

Answer: B

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14. The molecular weight of O_2 and SO_2 are

32 and 64 respectively. At 15°C and 150 mm Hg

pressure, one litre of O_2 contains N molecules.

The number of molecules in two litres of SO_2 ,

under the same conditions of temperature and pressure will be

A. N/2

B. N

C. 2N

D. 4N

Answer: C

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15. 0.635 g Cu was dissolved in 5.0 mL hot 60% HNO_3 (sp. gr. = 1.5). When the reaction came to an end, the volume of the solution was adjusted to 250.0 mL, What is the normality of the solution with respect to HNO_3 ? (Cu= 63.5)
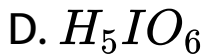
A. 0.256 N

B. 0.126 N

C. 0.324 N

D. 0.425 N

Answer: B

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Wb Jee Workout Category 3 One Or More Than One Option Correct Type 2 Marks

1. A certain oxide of iodine has been found to contain iodine and oxygen. The ratio iodine : oxygen is 254: 112. On being dissolved in water this oxide can produce

A. HIO_2

B. HIO_3

C. HIO_4

D. H_5IO_6

Answer: C::D

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2. 16 g of oxygen has same number of molecules as in

A. 16 g of CO

B. 28 g of N_2

C. 14 g of N_2

D. 1.0 g of H_2

Answer: C::D

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3. Which of the following is/are correct statement(s)?

A. Gram atomic mass of an element inay be defined as the mass of Avogadro's number of atoms.

B. The molecular mass of a diatomic elementary gas is twice its atomic mass.

C. Gay Lussac's law of chemical combination is valid for all substances.

D. A pure compound has always a fixed proportion of masses of its constituents.

Answer: A::B::D

4. The atomic weights of two elements A and B are 20 and 40 respectively. Which of the following statements are correct for these two elements?

A. x g of A contains y atoms which is equal to atoms present in x g of B.

B. x g of A contains y atoms which is equal to atoms present in 2x g of B.

C. At STP, x L of monoatomic gas A is equal

to xL of monoatomic gas B.

D. At STP, x L of monoatomic gas A weighs y

g and y g monoatomic gas B has volume

xy.

Answer: B::C

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5. On being heated in oxygen, 3.120 g of a metal M converts to 4.560 g of oxide (atomic weight of M= 52.0). Mark the correct statement(s).

A. Equivalent wt. of metal M= 17.33

B. Number of equivalents of oxygen reacted with metal = 0.09

C. Metal M forms halide MCl_2

D. The simplest formula of the metal oxide which it forms is M_2O_3

Answer: A::D

6. The following substances are present in different containers :

(i) one gram atom of nitrogen

(ii) one mole of calcium

(iii) one atom of silver

(iv) one mole of oxygen molecules

(v) 10^{23} atoms of carbon

(vi) one gram of iron.

The correct order of increasing masses (in grams) is/are

A. (iii) (iv)lt(i) lt(v) (b)

B. (iii) lt(vi) lt(iv) lt(ii)

C. (vi) lt(v)lt(i) lt(iv)

D. (iii) lt(ii) lt(v) lt(iv)

Answer: B::C

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7. In $MgSO_4$ (At. Mass: Mg = 24, S = 32, O = 16), the mass percentage of

    A. Mg = 80%

    B. Mg = 20%

    C. S= 26.7%

    D. S = 53.3 %

Answer: B::C

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8. A solution contains 25% water, 25% ethanol (C_2H_5OH) and 50% acetic acid (CH_3COOH) by mass. The mole fraction of

    A. water =0.502
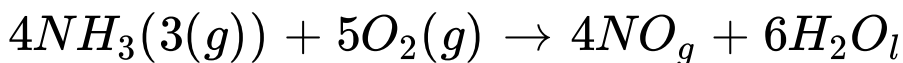
    B. ethanol = 0.302

    C. acetic acid = 0.196

    D. ethanol + acetic acid = 0.497

Answer: A::D

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9. In the reaction,

$$4NH_3(3(g)) + 5O_2(g) \rightarrow 4NO_g + 6H_2O_l$$

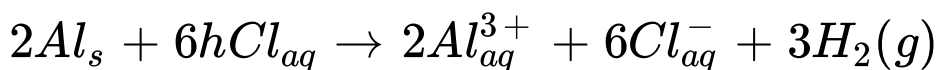when 1 mol of ammonia and 1 mol of O_2 are made to react to completion then

A. 1.0 mol of H_2O will be produced

B. 1.0 mol of NO will be produced

C. all the ammonia will be consumed

D. all the oxygen will be consumed.

Answer: D

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10. In the reaction,

$$2Al_s + 6hCl_{aq} \rightarrow 2Al^{3+}_{aq} + 6Cl^-_{aq} + 3H_2(g)$$

A. 11.2 L $H_2(g)$ at STP is produced for every

mole HCl_{aq} consumed

B. 6 L HCl_{aq} is consumed for every 3 L

$H_2(g)$ produced

C. 33.6 L $H_2(g)$ is produced at STP for every

mole Al that reacts.

D. 67.2 L H_2(g) at STP is produced for every

mole Al that reacts.

Answer: A

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1. Number of hydrogen ions present in 10

millionth part of 1.33 cm of pure water at 25ºC

is

A. 6.023 million

B. 60 million

C. 8.01 million

D. 80.23 million.

Answer: C

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2. The system that contains the maximum number of atoms is

    A. 4.25 g of NH_3

    B. 8 g of O_2

    C. 2g of H_2

    D. 4 g of He

Answer: C

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3. You are supplied with 500 mL each of 2 N HCl and 5 N HCl. What is the maximum volume of 3 M HCl that you can prepare using only these two solutions?

    A. 250 mL

    B. 500 mL

    C. 750 mL

    D. 1000 mL

Answer: C

4. 0.126 g of an acid is needed to completely neutralise 20 mL 0.1 N NaOH solution. The equivalent weight of the acid is

A. 53

B. 40

C. 45

D. 63

Answer: D

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5. In a flask, the weight ratio of CH_4 (e) and SO_2 (g) at 298 K and I bar is 1 : 2. The ratio of the number of molecules of SO_2 (g) and CH_4 (g) is

    A. 1 : 4

    B. 4 : 1

    C. 1 : 2

    D. 2 : 1

Answer: C

6. How many moles of electrons will weigh one kilogram?

A. 6.023×10^{23}

B. $\dfrac{1}{9.108} \times 10^{21}$

C. $\dfrac{6.023}{9.108} \times 10^{54}$

D. $\dfrac{1}{9.108 \times 6.023} \times 10^{8}$

Answer: D

7. In the crystalline solid $MSO_4 . nH_2O$ of molar mass 250 $gmol^{-1}$, the percentage of anhydrous salt is 64 by weight. The value of n is

A. 2

B. 3

C. 5

D. 7

Answer: C

8. At S.T.P. the volume of 7.5 g of a gas is 5.6 L.

The gas is

A. NO

B. N_2O

C. CO

D. CO_2

Answer: A

▶ **View Text Solution**

1. The volume of ethyl alcohol (density 1.15 g/cc) that has to be added to prepare 100 cc of 0.5 M ethyl alcohol solution in water is

A. 1.15 cc

B. 2 cc

C. 2.15 cc

D. 2.30 cc

Answer: B

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2. What will be the normality of the salt solution obtained by neutralizing x mL y (N) HCl with y mL x (N) NaOH, and finally adding (x + y) mL distilled water?

A. $\dfrac{2(x+y)}{xy}$ N

B. $\dfrac{xy}{2(x+y)}$ N

C. $\left(\dfrac{2x}{x+y}\right)$ N

D. $\left(\dfrac{x+y}{xy}\right)$ N

Answer: B

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3. A metal M (specific heat 0.16) forms a metal chloride with a 65% chorine present in it. The formula of the metal chloride will be

A. MCl

B. MCl_2

C. MCl_3

D. MCl_4

Answer: B

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