CHEMISTRY

BOOKS - MTG IIT JEE FOUNDATION

MOLE CONCEPT, STOICHIOMETRY AND BEHAVIOUR OF GASES

Illustrations

1. 5.975 g of the higher oxide of metal gave 5.575 g lower oxide on heating. The quantity of the lower oxide gave 5.175 g of metal on reduction. Prove that

these results are in accordance with the law of multiple proportion.

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2. 2.16 of copper metal when treated with nitric acid followed by ignition of the nitrate gave 2.70 g of copper oxide. In another experiment 1.15 g of copper oxide upon reduction with hydrogen gave 0.92 g of copper. Show that the above data illustrate the Law of Definite Proportions.

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3. Explain Dalton's atomic theory of matter on the basis of law of chemical combination and other related chemical observations.

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4. Calculate number of moles in 392 grams of sulphuric acid.

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5. Calculate the mass of 0.1 mole of KNO_3.

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6. Calculate the number of atoms in 52 moles of He.

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7. Calculate the volume at STP occupied by 14 g of N_2.

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8. A compound of C, H, Cl has molecular formula of $C_2H_4Cl_2$. Its vapour density is 49.5. Calculate its total molecular mass without addition of mass of elements.

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9. Calculate the atomic mass of chromium, in K_2CrO_4 having 26.78% of Cr.

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10. A compound was found to have 78.2% boron and 21.8% of hydrogen. Its molar mass was determined to be 27.6 g mol^{-1}. What is the empirical and molecular formula of the compound.

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11. Determine the percentage composition of potassium nitrate (KNO_3).

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12. Calculate the mass of iron which will be converted into its oxide (Fe_3O_4) by the action of 18 g of steam on it.

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13. Calculate The volume of oxygen at STP obtained by decomposing 12.26 of $KClO_3$.

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14. 3.0 g of H_2 reacts with 29.0 g of O_2 to yield H_2O.

Which is the limiting reactant?

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15. 3.0 g of H_2 reacts with 29.0 g of O_2 to yield H_2O.

Calculate the maximum amount of H_2O that can be formed.

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16. 3.0 g of H_2 reacts with 29.0 g of O_2 to yield H_2O. Calculate the amount of one of the reactants which remains unreacted.

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17. What is the concentration of sugar $(C_{12}H_{22}O_{11})$ in $molL^{-1}$ if its $20g$ are dissolved in enough water to make a final volume up to $2L$?

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18. Calculate the mole fraction of ethanol if 9.2 g of it is mixed with 1.8 g water.

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19. The volumes of ozone and chlorine diffusing in the same time are $35mL$ and $29mL$, respectively. If the molecular weight of chlorine is 71, calculate the molecular weight of ozone.

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20. Which will diffuse faster, ammonia or CO_2?

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21. A 8 litre container has gas at 14 atm. Container is connected to another empty vessel of volume 20 litres. Find the pressure exerted by the gas in the new system at constant temperature.

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22. At what temperature, the volume of a given amount of gas at $25^{\circ}C$ becomes twice when pressure is kept constant?

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23. 4 gram oxygen and 2 gram hydrogen are kept in a one-litre container at $0^{\circ}C$. Calculate the total pressure.

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Solved Examples

1. Why do atomic masses of most of the elements in atomic mass units involve fractions?

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2. Silver is a very precious metal and is used in Jewellery. One million atoms of silver weigh 1.79×10^{-16}g. Calculate the atomic mass of silver.

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3. The density d of a gas is doubled due to compression. What is the pressure after compression if the initial pressure is in P units?

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4. In three moles of ethane (C_2H_6), calculate :

Number of moles of carbon atoms

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5. In three moles of ethane (C_2H_6), calculate :

Number of moles of hydrogen atoms

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6. In three moles of ethane (C_2H_6), calculate :

Number of molecules of ethane.

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7. Volume of a solution chagnes with chagne in temperature, then what will the molality of the solution be affected by temperature? Give reason for your answer.

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8. An atom of an element weighs 6.644×10^{-23} g. Calculate g atoms of element in 40 kg-

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9. How many moles of nitrogen are needed to produce 8.2 moles of ammonia by reaction with hydrogen ?

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10. At fixed temperature and $600mm$ pressure, the density of a gas is 42. At the same temperature and $700mm$ pressure, what is the density of the gas?

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11. A polymer containing iron has 0.165% by weight of metal in it. Its molecular weight is 67200. Find out the

number of iron atoms present in each molecule of it.

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12. 2.82 g of glucose (molar mass = 180) is dissolved in 30 g of water. Calculate (a) the molality.

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13. 2.82 g of glucose (molar mass = 180) is dissolved in 30 g of water. Calculate (b) mole fraction of glucose and water.

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Exercise Mcq

1. One mole of helium gas represents

A. $6.023 \times 10^{23} He$

B. $6.023 \times 10^{23} He_2$

C. $3.011 \times 10^{23} He_2$

D. $12.069 \times 10^{23} He$

Answer: A

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2. The modern basis of expressing atomic and molecular masses is based on

A. O - 16

B. H - 1

C. C - 12

D. Cl - 35.5

Answer: C

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3. One mole of glucose contains _____ moles of carbon.

A. one

B. six

C. twelve

D. two

Answer: B

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4. One mole of CO_2 contains

A. 6.023×10^{23} atoms of C

B. 6.023×10^{23} atoms of O

C. 18.1×10^{23} molecules of CO_2

D. 3 g atoms of CO_2

Answer: A

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5. The number of molecules in 4.25 g of ammonia is approximately

A. 1×10^{23}

B. 1.5×10^{23}

C. 2.0×10^{23}

D. 2.5×10^{23}

Answer: B

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6. Number of mole of $1m^3$ gas at NTP are:

A. 4.46

B. 44.6

C. 446

D. 4460

Answer: B

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7. An organic compound made of C, H and N contains 20% of nitrogen. Its molecular weight is

A. 70

B. 140

C. 100

D. 65

Answer: A

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8. Percentage by weight of 'M' in MCl_3 is 20%. Atomic weight of that element M is

A. 26.6

B. 13

C. 40

D. 10.4

Answer: A

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9. 2.3×10^{22} atoms of an element weigh 6.9 g. Atomic weight of that element is

A. 290 g

B. 180 g

C. 34.4 g

D. 10.4 g

Answer: B

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10. Number of atoms present in 1.6 g of methane is

A. 6.02×10^{23}

B. 3.01×10^{23}

C. 3.01×10^{22}

D. 6.02×10^{22}

Answer: D

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11. The vapour density of a gas is 11.2. The volume occupied by 11.2 g of the gas at STP will be

A. 22.4 L

B. 11.2 L

C. 1 L

D. 2.25 L

Answer: B

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12. If 'M' is the molecular weight of a gas, what volume in L at STP would be occupied by M/4 of that gas

A. 11.2

B. 22.4

C. 5.6

D. 22.4

Answer: C

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13. Number of moles of $CaCO_3$ which contain 1.5 moles of oxygen atoms is

A. 1.5

B. 1.0

C. 0.5

D. 2.0

Answer: C

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14. The empirical formula of hydrogen peroxide is.....

A. HO

B. H_2O_2

C. HO_2

D. $(HO)_2$

Answer: A

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15. Which of the following is independent of temperature of a gas?

A. Volume

B. Rate of diffusion

C. Vapour density

D. Pressure

Answer: C

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16. The absolute temperature of a gas

A. is a measure of number of molecules of the gas

B. indicates nature of the gas

C. is a measure of volume of the gas

D. none of these

Answer: C

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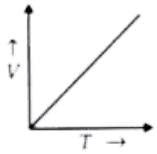
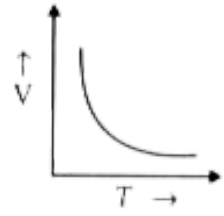
17. Which of the following graphs relates V and T?

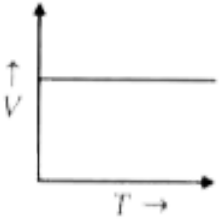
A.



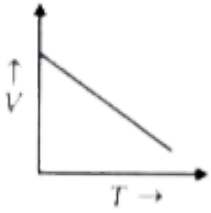
B.



C.



D.



Answer: A

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18. The mass of carbon present in 0.5 mole of $K_4\left[Fe(CN)_6\right]$ is -

A. 1.8 g

B. 18 g

C. 3.6 g

D. 36 g

Answer: D

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19. How is pressure related to volume at constant temperature?

A. $P \propto V$

B. $P \propto \frac{1}{V}$

C. $P = V$

D. No relation

Answer: B

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20. Equal volumes of different gases at any definite temperature and pressure have.

A. equal atoms

B. equal masses

C. equal densities

D. equal molecules

Answer: D

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21. The value of gas contant per degree per mol is approximately :

A. 1 cal

B. 2 cal

C. 3 cal

D. 4 cal

Answer: B

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22. The total pressure of a mixture of two gases is

A. sum of partial pressures of the gases

B. difference in partial pressures of the gases

C. product of partial pressures of the gases.

D. ratio of partial pressures of the gases

Answer: A

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23. A gas is found to have a formula $[CO]_x$. If its vapour density is 70, then value of x is

A. 2.0

B. 3.0

C. 5.0

D. 6.0

Answer: C

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24. In the gas equation, PV = nRT

A. V denotes volume of one mole

B. n is the number of molecules of a gas

C. n moles of gas have volume V

D. P is pressure of gas when only one mole of gas is present

Answer: C

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25. Which one of the following plots will be a parabola at constant temperature?

A. $Pvs\frac{1}{V}$

B. PV vs P

C. V vs P

D. none of these

Answer: D

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26. The kinetic theory of gases predicts that total kinetic energy of a gaseous assembly depends on

A. pressure of the gas

B. volume of the gas

C. temperature of the gas

D. P, V, T of the gas

Answer: C

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27. Volume occupied by an ideal gas at one atmospheric pressure and $0^{\circ}C$ is V ml. Its volume at 273 K will be

A. V mL

B. V/2 mL

C. 2 V mL

D. none of these

Answer: A

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28. When gases are heated from 20° to 40° C at constant pressure their volumes

A. increase by same magnitude

B. become double

C. increase in the ratio of their molecular masses

D. increase but to different extent

Answer: D

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29. In the equation of state of an ideal gas `PV = nRT, the value of universal gas constant would depend only

on :

A. nature of the gas

B. pressure of the gas

C. temperature of the gas

D. units of measurements

Answer: D

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30. If the absolute temperature of a gas is doubled and the pressure is reuced to one-half, the volume of the gas will _____

A. remain unchanged

B. be doubled

C. increase four-fold

D. get reduced to 1/4th

Answer: C

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31. The percentage of nitrogen in urea is about:

A. 46

B. 85

C. 18

D. 28

Answer: A

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32. To neutralise 100 mL of 0.1 N H_2SO_4, amount of 2N NaOH required is

A. 5 mL

B. 0.5 mL

C. 0.1 mL

D. 100 mL

Answer: A

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33. A metal oxide contains 60% metal . The equivalent weight of metal is

A. 12

B. 24

C. 40

D. 48

Answer: A

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34. The simplest formula of a compound containing 50% of element X (atomic mass 10) and 50% of element Y (atomic mass 20) is

A. XY

B. X_2Y

C. XY_3

D. X_2Y_3

Answer: B

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35. In a hydrocarbon the mass ratio of hydrogen to carbon is $1:3$. The empirical formula of the hydrocarbon is

A. CH

B. CH_2

C. CH_4

D. CH_3

Answer: C

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36. The molecular mass of a compound is 88 amu having empirical formula of C_2H_4O. Its molecular formula will be

A. $C_2H_4O_2$

B. $C_4H_8O_2$

C. $C_8H_4O_2$

D. $C_2H_8O_2$

Answer: B

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37. If 0.56 g KOH is present in 100 mL of solution, then its normality will be

A. 1 N

B. 0.1 N

C. 2 N

D. 0.2 N

Answer: B

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38. To prepare 600 mL of 2 N solution of NH_4OH, volume of 10 N NH_4OH required is

A. 60 mL

B. 120 mL

C. 300 mL

D. 600 mL

Answer: B

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39. Normality of an acid is equal to

A. $M \times$ acidity

B. $M \times$ basicity

C. $m \times$ acidity

D. $m \times$ basicity

Answer: B

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40. Number of moles of solute dissolved per litre of solution is

A. normality

B. molarity

C. molality

D. none of these

Answer: B

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41. Under similar conditions of P and T, equal volume of all gases contains equal number of molecules. It is

A. Boyle's law

B. Charles' law

C. Gay Lussac's

D. Avogadro's law

Answer: D

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42. Which of the following is independent of temperature?

A. normality

B. molarity

C. molality

D. All of above

Answer: C

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43. The number of moles of NaCl in $250cm^3$ of 0.50 M NaCl is

A. 0.250 mol

B. 2 mol

C. 0.125 mol

D. 1 mol

Answer: C

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44. A solution is prepared by dissolving 10 g of NaOH in 100 mL of solution. Its molarity is

A. 1.0 M

B. 2.5 M

C. 1.5 M

D. 4.0 M

Answer: B

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45. The empirical formula of sucrose is :

A. CH_2O

B. CHO

C. $C_{12}H_{22}O_{11}$

D. $C(H_2O)_2$

Answer: C

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46. Which one of the following is not the standard for atomic mass?

A. ${}_{1}^{1}H$

B. ${}_{6}^{12}C$

C. ${}_{6}^{14}C$

D. ${}_{8}^{16}O$

Answer: C

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47. Mole fraction of sugar, if 34.2 g of sugar is dissolved in 180 g of water is

A. 0.0099

B. 0.099

C. 0.99

D. 9.90

Answer: A

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48. Which of the following contains more molecules?

A. 1 g CO_2

B. 1 g N_2

C. 1 g H_2

D. 1 g CH_4

Answer: C

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49. One mole of H_2O corresponds to

A. 22.4 L at 1 atm and $25^\circ C$

B. 6.023×10^{23} atoms of hydrogen

C. 18 g

D. 1 g

Answer: C

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50. The volume of 0.5 mole of gas at 1 atm pressure and $273^\circ C$ temperature is

A. 22.4 L

B. 11.2 L

C. 44.8 L

D. 5.6 L

Answer: A

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Exercise Match The Following

	List-I		List-II
	(P) Charles' law	(1)	$V \propto n$
1.	(Q) Boyle's law	(2)	$P \propto T$
	(R) Avogadro's law	(3)	$P \propto 1/V$
	(S) Gay Lussac's law	(4)	$V \propto T$

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

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

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

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

Answer: B

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2.

	List-I		List-II
(P)	12 g of carbon	(1)	Atomic mass unit
(Q)	28 g of nitrogen	(2)	Gram atom
(R)	22400 cc	(3)	Gram molar volume
(S)	$1.67 \times 10^{-24} g$	(4)	Gram molecule

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

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

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

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

Answer: A

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	List-I		List-II
	(P) Mass of one atom of C	(1)	$12 \times N_A$
3.	(Q) Number of atoms in 144 g C	(2)	$12 / N_A$
	(R) 24 g of magnesium	(3)	$1 / N_A$
	(S) 1 atomic mass unit	(4)	N_A

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

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

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

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

Answer: D

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4.

	List-I		List-II
(P)	0.1 mole	(1)	9 g of water
(Q)	0.2 mole	(2)	0.1 g atom of iron
(R)	0.25 mole	(3)	1.5×10^{23} molecules of oxygen gas
(S)	0.5 mole	(4)	4480 mL of CO_2 at STP

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

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

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

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

Answer: C

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	List-I		List-II
	(P) Molarity	(1)	$W(g)/GEM$
5.	(Q) Normality	(2)	$n/W(kg)$
	(R) Molality	(3)	$n_A/(n_A+n_B)$
	(S) Mole fraction	(4)	$W(g)/GMM$

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

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

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

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

Answer: B

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Exercise Assertion Reason Type

1. Assertion : The empirical mass of ethene is half of its molecular mass.

Reason : The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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2. Assertion : One atomic mass unit is defined as one twelfth of the mass of one C-12 atom.

Reason : C-12 is the least abundant isotope of carbon and has been choosen as the standard.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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3. Assertion : Empirical and molecular formula of Na_2CO_3 is same.

Reason : Na_2CO_3 does not form hydrate.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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4. Assertion : Both 32 g of SO_2 and 8 g of CH_4 contain same number of molecules.

Reason : Equal moles of two compounds contain same number of molecules.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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5. Assertion : 1 g O_2 and 1 g O_3 have equal number of atoms.

Reason : Mass of 1 mole atom is equal to its gram atomic mass.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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6. Assertion : Avogadro's law holds good only under similar conditions of temperature and pressure.

Reason : Changes in temperature or pressure bring about changes in volume.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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7. Assertion : Gram atomic mass and gram molecular mass of all elemental substances are same.

Reason : All metallic elements are diatomic.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: D

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8. Assertion : One mole of oxygen gas occupies 22.4 L volume at STP.

Reason : Volume of a gas depends on temperature and pressure and also on nature of gas.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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9. Assertion : Plot of P vs 1/V is a straight line.

Reason : Pressure is directly proportional to volume.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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10. Assertion : Kinetic energy of a gas is independent of temperature.

Reason : Absolute temperature of gas is not always $0^\circ C$.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: D

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Exercise Comprehension Type

1. PASSAGE-I : Earlier the concept of equivalent weights was very common and the concentrations of the

solutions were expressed in terms of normalities. The convenience was that the substances react in the ratio of their gram equivalents. So, there was no need to write balanced equation to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in the acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, mole fraction etc. are also used.

The equivalent weight of Cu

A. will be same in CuO and Cu_2O

B. will be double in Cu_2O than in CuO

C. will be double in CuO than in Cu_2O

D. depends upon whether copper is pure or impure

Answer: B

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2. PASSAGE-I : Earlier the concept of equivalent weights was very common and the concentrations of the solutions were expressed in terms of normalities. The convenience was that the substances react in the ratio of their gram equivalents. So, there was no need to

write balanced equation to determine the amounts of the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in the acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, mole fraction etc. are also used.

The chloride of an element is found to contain 52.8% chlorine. The equivalent weight of the element is

A. 63.4

B. 31.7

C. 47.2

D. 18.7

Answer: B

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3. PASSAGE-I : Earlier the concept of equivalent weights was very common and the concentrations of the solutions were expressed in terms of normalities. The convenience was that the substances react in the ratio of their gram equivalents. So, there was no need to write balanced equation to determine the amounts of

the substances reacted. However, determination of equivalent weights posed difficulty in certain cases. Moreover, the equivalent weight of the same substance is not same in different reactions. For example, $KMnO_4$ has different equivalent weight in the basic medium than in the acidic medium. Hence, now-a-days, mole concept is more common and the concentrations of the solutions are generally expressed in terms of molarities, though some other methods like molality, mole fraction etc. are also used.

A 40% w/w hydrochloric acid is found to have a density of 1.20 g mL^{-1}. The molality of the above solution will be nearly.

A. 15.3 m

B. 16.3 m

C. 17.3 m

D. 18.3 m

Answer: D

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4. PASSAGE-II : Empirical formula is the simplest formula of the compound which gives the atomic ratio of various elements present in one molecule of the compound. However, the molecular formula of the compound gives the number of atoms of various elements present in one molecule of the compound.

Molacular formula = (Empirical formula) $\times n$

implies $n = \frac{\text{Molecular mass}}{\text{Empirical formula mass}}$

A compound may have same empirical and molecular formula. Both these formulae are calculated using percentage composition of constituent elements.

Which of the following compounds have the same empirical formula as that of formaldehyde?

A. Formic acid

B. Glucose

C. Sucrose

D. Ethanol

Answer: B

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5. PASSAGE-II : Empirical formula is the simplest formula of the compound which gives the atomic ratio of various elements present in one molecule of the compound. However, the molecular formula of the compound gives the number of atoms of various elements present in one molecule of the compound.

Molacular formula = (Empirical formula) $\times n$

implies $n = \frac{\text{Molecular mass}}{\text{Empirical formula mass}}$

A compound may have same empirical and molecular formula. Both these formulae are calculated using percentage composition of constituent elements.

An oxide of iodine (Atomic mass of I = 127 u) contains

25.4 g of iodine and 8 g of oxygen. Its formula could be

:

A. I_2O_3

B. I_2O

C. I_2O_5

D. I_2O_7

Answer: C

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6. PASSAGE-II : Empirical formula is the simplest formula of the compound which gives the atomic ratio

of various elements present in one molecule of the compound. However, the molecular formula of the compound gives the number of atoms of various elements present in one molecule of the compound.

Molacular formula = (Empirical formula) $\times n$

implies $n = \frac{\text{Molecular mass}}{\text{Empirical formula mass}}$

A compound may have same empirical and molecular formula. Both these formulae are calculated using percentage composition of constituent elements.

10 g of hydrofluoric acid gas occupies 5.6 litre of volume at STP. If the empirical formula of the gas is HF, then its molecular formula in the gaseous state will be

A. HF

B. H_2F_2

C. H_3F_3

D. H_4F_4

Answer: B

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7. PASSAGE-III : In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14^{th} general conference on weights and measurements in 1971. A mole contains as many elementary particles as the number of atoms present in 12 g of ^{12}C. 1 mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is not

definite. Molar mass of a substance is also called gram-atomic mass or gram molar mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1 mole of a substance contains 6.023×10^{23} elementary particles like atom or molecule. Atomic mass unit (amu) is the unit of atomic mass, e.g., atomic mass of single carbon is 12 amu.

The mass of one amu is approximately

A. 1 g

B. 0.5 g

C. $1.66 \times 10^{-24} g$

D. $3.2 \times 10^{-24} g$

Answer: C

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8. PASSAGE-III : In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14^{th} general conference on weights and measurements in 1971. A mole contains as many elementary particles as the number of atoms present in 12 g of ^{12}C. 1 mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is not definite. Molar mass of a substance is also called gram-atomic mass or gram molar mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1 mole of a substance contains 6.023×10^{23} elementary particles like atom or molecule. Atomic

mass unit (amu) is the unit of atomic mass, e.g., atomic mass of single carbon is 12 amu.

5.6 litre of a gas at STP is found to have a mass of 22 g. The molecular mass of the gas is

A. 22

B. 44

C. 88

D. 33

Answer: C

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9. In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14^{th} general conference on weights and measurements in 1971. A mole contains as many elementary particles as the number of atoms present in 12 g of ^{12}C . 1 mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is not definite. Molar mass of a substance is also called gram-atomic mass or gram molecular mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1 mole of a substance contains 6.022×10^{23} elementary particles like atom or molecule. Atomic mass unit (amu) is the unit of atomic

mass, e.g., atomic mass of single carbon is 12 amu.

The mass of one molecule of water is approximately

A. 1 g

B. 0.5 g

C. $1.66 \times 10^{-24} g$

D. $3 \times 10^{-23} g$

Answer: D

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10. PASSAGE-IV : 10 g of NaOH required certain amount of H_2SO_4 for complete neutralisation.

Calculate the amount of H_2SO_4.

A. 10 g

B. 12.24 g

C. 24.5 g

D. 49 g

Answer: B

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11. PASSAGE-IV : 10 g of NaOH required certain amount of H_2SO_4 for complete neutralisation.

Calculate the number of mole of H_2SO_4 in it.

A. 1 mole

B. 0.1 mole

C. 0.5 mole

D. 0.125 mole

Answer: D

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12. PASSAGE-IV : 10 g of NaOH required certain amount of H_2SO_4 for complete neutralisation.

Calculate the absolute mass of one molecule of H_2SO_4.

A. $1.67 \times 10^{-27} g$

B. $9.2 \times 10^{-28} g$

C. $16.27 \times 10^{-23} g$

D. $3.4 \times 10^{-20} g$

Answer: C

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Exercise Integer Numerical Value Type

1. Molecular formula of acetic acid is CH_3COOH. The number of atoms present in its empirical formula is

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2. The value of n in molecular formula $Be_nAl_2Si_6O_{18}$ (molecular mass = 537) is

Given : Atomic mass of Be = 9, Al = 27

Si = 28 and O = 16

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3. If 1.8 g of glucose (molar mass = 180) is dissolved in 60 g of water the mole fraction of glucose is

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4. Mass of 3.011×10^{23} molecules of methane in grams is

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5. The normality (N) of 500 mL of 1 M hydrochloric acid is

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