PRAADIS EDUCATION

CHEMISTRY XI

SOME BASIC CONCEPTS OF CHEMISTRY

OBJECTIVE QUESTIONS

Nature of Matter

1. The substances whose compositions are not uniform and different components are mixed are called _____
a) Homogenous substances
b) Heterogeneous substances
c) Pure substances
d) Elements

Answer: b
Explanation: Heterogeneous substance is a mixture of different components non-uniformly. Homogeneous substances is a uniform mixture of substances. A pure substance has a fixed composition. Whereas elements are composed of only one substance.

2. A _____ is made up of two or more pure substances which may be in any ratio.
a) Mixture
b) Element
c) Molecule
d) Atom

Answer: a
Explanation: Mixture is a combination of pure substances in a ratio. Pure substances which are in its composition are called its components. Atom is the basic unit of life.

3. Matter can be divided into two types i.e. mixture and pure substance.
a) True
b) False

Answer: a
Explanation: On a bulk level, the matter is divided as a mixture and pure substances.

4. Which of the following is not a pure substance?
a) Copper
b) Gold
c) Sugar solution
d) Water

Answer: c
Explanation: Copper, gold, and water are pure but sugar solution is a homogeneous mixture. Copper, gold, and water are made of the same elements but sugar solution contains sugar as solute and water as a solvent.

5. What are pure substances classified as?
a) Elements and Atoms
b) Molecules and Compounds
c) Elements and Compounds
d) Atoms and Molecules

Answer: c
Explanation: Elements and Compounds together make pure substances, as they have fixed compositions.

6. When two or more atoms of different elements combine with each other in a fixed ratio, the molecule of a ____ is obtained.
a) Compound
b) Element
c) Atom

d) Ion

Answer: a
Explanation: Compound is a combination of two or more elements in a fixed ratio. Element is made up of the same atoms. Atom is the basic unit of life. Ion is either positively or negatively charged.

7. Compounds cannot be separated by chemical methods.
a) True
b) False

Answer: b
Explanation: Compounds cannot be separated simply by physical methods, but they need chemical methods because when its components are mixed they change their chemical formulae and combine with each other to form a new chemical formula, resulting in a compound.

8. Point out an example of a compound.
a) Sugar solution
b) Hydrogen
c) Ammonia
d) Sodium

Answer: c
Explanation: Ammonia is made up of nitrogen and hydrogen in a ratio of 1:3 by atoms. The sugar solution is a homogeneous mixture. Hydrogen and Sodium are elements.

9. Which among the three states of matter has a definite shape and size?
a) Solids
b) Liquids
c) Gases
d) Vapor

Answer: a
Explanation: Solids occupy particular and definite shape and size. Liquids and gases do not, as they occupy the container's shape and size.

10. Water is a/an _____
a) Element
b) Compound
c) Pure substance
d) Mixture

Answer: b
Explanation: Water molecule consists of 2 Hydrogen and 1 Oxygen atoms. When two or more atoms of different elements combine with each other in a fixed ratio, the molecule of a compound is obtained

11. Patients suffering from AIDS can be helped using which of the following drugs?
a) Cisplatin
b) AZT (Azidothymidine)
c) Taxol
d) Codeine

Answer: b
Explanation: The drug AZT is used for preventing or treating AIDS, while cisplatin & taxol are for cancer and codeine is a sort of painkiller. The drug AZT is also known as Zidovudine. This drug AZT is an antiretroviral drug. It's used along with other drugs as a combination.

Properties of Matter and their Measurement

1. Which of the following may not be a physical property?
a) Odor
b) Color

c) Density
d) Composition

Answer: d
Explanation: Composition is a chemical property because we can't find a compound's composition just by looking at it. We need to run some chemical tests to find out. Odor, color, and density are physical properties, as we can find them just by looking at them.

2. The observation of _____ properties needs a chemical change to occur.
a) Chemical
b) Physical
c) Extrinsic
d) Intrinsic

Answer: a
Explanation: Chemical properties are combustibility, composition, reactivity with acids & bases, etc. So to observe them chemical change has to occur. Combustibility can be known only when extinguished with fire. Composition is a chemical property because we can't find a compound's composition just by looking at it. We need to run some chemical tests to find out etc

3. Candela is the S.I. unit of _____
a) Luminous intensity
b) Thermodynamic temperature
c) Amount of substance
d) Electric current

Answer: a
Explanation: Candela is an S.I. unit of luminous intensity with symbol cd. It's termed a source emitting monochromatic radiation at frequency 540×10^{12} Hertz with the radiant intensity of 1/683 watt per steradian provided in the same direction.

4. How many scientific fundamental quantities are given S.I. units?
a) 5
b) 7
c) 3
d) 9

Answer: b
Explanation: There are seven scientific fundamental quantities i.e. Length(l), Time(t), Mass(m), Electric current(I), Thermodynamic temperature(T), Amount of substance(n) & Luminous intensity(I_v). They can't be expressed as other quantities i.e. independent.

5. What is the symbol of the amount of substance's S.I. unit?
a) K
b) s
c) mol
d) kg

Answer: c
Explanation: As the S.I. unit of the amount of substance is a mole, it's denoted by "mol". A mole is defined as many elementary entities as there are atoms in 0.012 kilograms of carbon-12.

6. What are the multiples for the prefixes yocto, atto respectively?
a) 10^{-24}, 10^{-18}
b) 10^{-9}, 10^{-15}
c) 10^{-15}, 10^{-24}
d) 10^{-24}, 10^{-21}

Answer: a
Explanation: Yocto is 10 power (-24) and atto is 10 power (-18). These are the standard prefixes used in S.I. system.

7. 1Litre = _____ m^3.
a) 1000
b) 0.001

c) 1
d) 10

Answer: b
Explanation: As 1 litre is 1000ml
1000ml = 1000cm^3
1000cm^3 = 0.001m^3
Therefore 1L = 0.001m^3.

8. What is the difference in units between Kelvin and centigrade scales of temperature?
a) 212.15
b) 32
c) 298
d) 273.15

Answer: d
Explanation: Kelvin = Centigrade + 273.15. So the difference between in units between Kelvin and centigrade scales of temperature is 273.15.

9. What is the human body temperature in Fahrenheit?
a) 212
b) 98.6
c) 273.15
d) 32

Answer: b
Explanation: Our human body's temperature is 37°C = 98.6°F = 310K. It's a known fact and is the same for every human.

10. Convert 40°C to °F.
a) 104K
b) 313°F
c) 104°F
d) 313K

Answer: c
Explanation: 1 Fahrenheit = 9/5 Centigrade + 32.
9(40)/5 + 32 = 9 x 8 + 32 = 104°F.

11. S.I. unit of density is $kg.m^{-3}$.
a) False
b) true

Answer: b
Explanation: As density is the ratio of mass and volume, it's S.I. unit is $kg.m^{-3}$, as the S.I. unit of mass is kg and the S.I. unit of volume is m^3.

Uncertainty in Measurement

1. Write 6354000000 in scientific notation.
a) 6.354×10^9
b) 6354×10^6
c) 0.64×10^{10}
d) 6354000×10^3

Answer: a
Explanation: Scientific notation should have the least possible significant figures as the zeroes are made as to the power of ten. Or simply the power of ten in scientific notation is equal to the number of times the decimal point moved to produce a number between 1 and 10.

2. _____ is referred to as the closeness of different measurements for the same quantity.
a) Accuracy
b) Precision
c) Analysis
d) Dimension

Answer: b
Explanation: Precision is referred to as the closeness of different measurements for the same quantity. Accuracy is the degree to which it's taken as standard or almost equivalent to it.

3. How many seconds are there in a half day?
a) 86,400 seconds
b) 43,200 seconds
c) 172,800 seconds
d) 3660 seconds

Answer: b
Explanation: Half day means 12 hours. One hour means 60 seconds. And each minute is of 60 seconds. In the above question, we need the total number of seconds so 12 x 60 x 60 seconds = 43,200 seconds.

4. A piece of iron is 5 inches long. How much would it be in centimeters?
a) 12.7 cm
b) 6.35 cm
c) 5 cm
d) 500 cm

Answer: a
Explanation: 1 inch = 2.54 cm : 1 cm = 0.3931 inch. As we now know, how much is 1inch in centimeters, then we need to multiply 5 to 2.54 cm in order to convert it into centimeters. 5 x 2.54 cm = 12.7 cm.

5. How many significant figures does 0.057 have?
a) 2
b) 4
c) 3
d) 0

Answer: a
Explanation: The non-zero digits and any zeros between them are all

significant. Leading zeros are not significant. Counting all the significant digits gives us 2.

6. How many significant figures does 63180 have?
a) 5
b) 4
c) 1
d) 2

Answer: b
Explanation: The non-zero digits and any zeros between them are all significant. Since there is no decimal, zeros are not significant. Therefore, it's 4.

7. The exact value is 150m. A students record it as 140.1m in 1st turn and 140.8m in the 2nd turn. Comment his/her recordings.
a) precise
b) accurate
c) neither precise nor accurate
d) both precise and accurate

Answer: a
Explanation: These values are precise as they are close to each other but are not accurate. Precision is referred to as the closeness of different measurements for the same quantity. Accuracy is the degree to which it's taken as standard or almost equivalent to it.

8. The exact value is 150m. A students record it as 149.1m in 1st turn and 150.8m in the 2nd turn. Comment his/her recordings.
a) precise
b) accurate
c) neither precise nor accurate
d) both precise and accurate

Answer: b
Explanation: These values are accurate as they are nearer to the exact

value. Precision is referred to as the closeness of different measurements for the same quantity. Accuracy is the degree to which it's taken as standard or almost equivalent to it.

9. Multiply 1.2 and 3.91. Obtain the result as per the rules of significant figures.
a) 4.692
b) 4.69
c) 5
d) 4.7

Answer: d
Explanation: 1.2 x 3.91 = 4.692. Since 1.2 has two significant figures, the result should not have more than two significant figures, thus, it is 4.7. As per the rules of significant figures, the resultant answer should not have more significant figures the number with a less significant figured number.

10. How many significant figures are there in 60.6?
a) 4
b) 2
c) 3
d) 1

Answer: c
Explanation: The non-zero digits and any zeros between them are all significant. Leading zeros are not significant. Counting all the significant digits gives us 3.

Laws of Chemical Combination

1. How many basic laws are required to govern the combination of elements to form compounds?
a) 6
b) 5

c) 4
d) 1

2. Who proposed Law of Conservation of Mass?
a) Antoine Lavoisier
b) Joseph Proust
c) Lorenzo Romano
d) Joseph Louis

Answer: a
Explanation: Antoine Lavoisier conducted many experiments regarding combustion and noticed various physical and chemical changes and there is no change in overall mass. Hence he came to a conclusion that mass can neither be created nor destroyed i.e. Law of Conservation of Mass.

3. What did Joseph Proust state regarding Law of Definite Proportions?
a) A given mixture always contains absolutely the same proportion of elements by weight
b) A given compound always contains absolutely the same proportion of moles by weight
c) A given compound always contains absolutely the same proportion of elements by volume
d) A given compound always contains absolutely the same proportion of elements by weight

Answer: d
Explanation: When Joseph Proust worked about the composition of elements present in a compound experimentally, he found out that it was the same for all the samples he took. Joseph Louis concluded that from any source, a particular compound always contains the same elements in the same proportion by mass/weight.

4. What did Dalton propose?
a) Law of Multiple Proportions
b) Avogadro’s Law

c) Law of Definite Composition
d) Law of Conservation of Mass

Answer: a
Explanation: Two or more elements those are given, may combine to form more than one compound, the masses of one element that will combine with the given mass of the other elements, would be in the ratio of whole numbers is the law of Multiple Proportions.

5. Who proposed the Law of Definite Composition?
a) Joseph Proust
b) Lorenzo Romano
c) Joseph Louis
d) Antoine Lavoisier

Answer: a
Explanation: Joseph Proust worked about the composition of elements present in a compound experimentally, he concluded that from any source, a particular compound always contains the same elements in the same proportion by mass/weight.

6. Law of Definite Composition is also known as _____
a) Law of Multiple Proportions
b) Avogadro's Law
c) Law of Definite Proportion
d) Law of Conservation of Mass

Answer: c
Explanation: Joseph Proust worked about the composition of elements present in a compound experimentally, he concluded that from any source, a particular compound always contains the same elements in the same proportion by mass/weight. Hence it can also be known as the Law of Definite Proportion.

7. The volumes of hydrogen & oxygen when combined bear a simple ratio of 2:1.This is explained by _____

a) Law of Multiple Proportions
b) Avogadro's Law
c) Law of Definite Proportion
d) Gay Lussac's Law of Gaseous Volumes

Answer: d
Explanation: When gases combine or as written in a chemical reaction they combine in a simple ratio by volume, provided that all gases are at the same temperature and given pressure, this is called Gay Lussac's Law of Gaseous Volumes and is proposed by Joseph Louis.

8. Who proposed that equal volumes of all gases at the same temperature & given pressure should contain an equal number of molecules?
a) Antoine Lavoisier
b) Joseph Proust
c) Avogadro
d) Joseph Louis

Answer: c
Explanation: Avogadro's law is an experimental gas law combining & relating the volume of a gas to the amount of substance of gas present i.e' directly proportional. This law is valid only for ideal gases. And also only when the pressure and temperature of the given substance are constant.

9. Which of the following is not a law of chemical combination?
a) Law of Multiple Proportions
b) Avogadro's Law
c) Law of Definite Proportion
d) Law of Conservation of volume

Answer: d
Explanation: Five basic laws are required to govern the combination of elements to form compounds. They are Law of Conservation of Mass, Law of Definite Proportions, Law of Multiple Proportions, Gay Lussac's Law of Gaseous Volumes, and Avogadro's Law.

10. Which of the following may be an incorrect statement?
a) Law of Definite Composition is also known as Law of Definite composition
b) Mass can neither be created nor destroyed is Law of Conservation of Volume
c) Antoine Lavoisier conducted many experiments regarding combustion
d) Five basic laws are required to govern the combination of elements to form compounds

Answer: b
Explanation: The correct statement is mass can neither be created nor destroyed is the Law of Conservation of Mass. On conducting many experiments regarding combustion and noticing various physical and chemical changes, there is no change in overall mass hence conservation of mass

Dalton's Atomic Theory

1. According to Dalton's Atomic Theory, matter consists of indivisible _____
a) Molecules
b) Atoms
c) Ions
d) Mixtures

Answer: b
Explanation: Atom is the basic unit of life. A molecule is a compound made up of 2 or more atoms held by chemical bonds. The mixture is a combination of pure substances in a ratio. Ion is either positively or negatively charged.

2. Atoms of different elements differ in mass.
a) True
b) False

Answer: a
Explanation: Each and every element has a different mass. For example, carbon's molecular weight is 12.0107 u, oxygen's molecular weight is 15.999 u and nitrogen's molecular weight is 14.0067 u. Hence it's different for different elements.

3. What did Dalton's Theory couldn't explain?
a) gaseous volumes
b) conservation of mass
c) chemical philosophy
d) indivisible atoms

Answer: a
Explanation: Dalton's atomic theory couldn't explain gaseous volumes, because as per his view, different elements have different mass but this isn't true. This is explained by Gay lussac's law. This is one of the major limitations of Dalton's atomic theory.

4. What is the name of Dalton's publication?
a) A New system of atomic Philosophy
b) An old system of Chemical Philosophy
c) A New System of Chemical Philosophy
d) A New System of Chemical Prophecy

Answer: c
Explanation: Dalton published " A New System of Chemical Philosophy" in 1808. He proposed a theory in that, that is Dalton's atomic theory. It also has some limitations like it couldn't explain how molecules combine i.e. their driving force.

5. Which of the following may not be explained by Dalton's atomic theory?
a) reason for combining atoms
b) conservation of mass
c) chemical philosophy

d) indivisible atoms

Answer: a
Explanation: Dalton's atomic theory couldn't explain the reason for combining atoms. This is one of the major limitations of Dalton's atomic theory. Though it could explain the conservation of mass, indivisible atoms and definite proportions.

6. Law of conservation of mass isn't explained in Dalton's atomic theory.
a) True
b) False

Answer: b
Explanation: Law of conservation of mass is explained in Dalton's atomic theory. He said that reorganization of atoms is involved in chemical reactions. This means mass is neither created nor destroyed in a chemical reaction i.e. explained.

7. What is 1 Dalton?
a) a unified mass unit, $1.360539040(20)\times10^{-27}$kg
b) a unified mass unit, $1.640539040(20)\times10^{-27}$kg
c) a unified mass unit, $1.660539040(20)\times10^{-27}$kg
d) a unified mass unit, $1.660539040(20)\times10^{-27}$kg

Answer: d
Explanation: Dalton is also known as the unified mass unit that is equal to $1.660539040(20)\times10^{-27}$kg or $931.4940954(57)\text{MeV}/c^2$ or $1822.888486192(53)m_e$ (symbol: u, or Da or AMU). It's a standard unit of mass on the molecular and atomic scale.

8. Could Dalton's atomic theory explain the laws of chemical combinations?
a) No
b) Yes
c) Only a few

d) Except one

Answer: b
Explanation: Yes, it could explain all the laws of chemical combinations i.e. Law of Conservation of Mass, Law of Definite Proportions, Law of Multiple Proportions, Gay Lussac's Law of Gaseous Volumes, and Avogadro's Law.

9. They are no limitations to Dalton's atomic theory.
a) True
b) False

Answer: b
Explanation: There are limitations to Dalton's atomic theory. Dalton's atomic theory couldn't explain the reason for combining atoms. He also couldn't explain gaseous volumes, because as per his view, different elements have different mass but this isn't true. This is explained by Gay lussac's law.

10. All atoms of a given element have identical _____ including identical _____
a) Properties, mass
b) Weight, volume
c) Volume, properties
d) Temperature, pressure

Answer: a
Explanation: According to Dalton's Atomic Theory, All atoms of a given element have identical properties, including identical mass. The reason behind this is that they belong to the same element (here "they" is about atoms).

Atomic and Molecular Masses

1. As, per the current system, carbon-12 has been taken as the standard for measuring atomic masses.
a) True
b) False

Answer: a
Explanation: 1 amu is defined as a mass that is almost equal to one-twelfth of the mass of one carbon – 12 atom. It is a unit to measure atomic and molecular mass. The carbon atom is taken relatively here. And also 1 amu = 1.66056×10^{-24} g.

2. What is the mass of hydrogen in terms of amu?
a) 1.0020 amu
b) 1.0180 amu
c) 1.0070 amu
d) 1.0080 amu

Answer: d
Explanation: The mass of a hydrogen atom is 1.6736×10^{-24} g. When converted in terms of amu, 1.6736×10^{-24} g should be divided by 1.66056×10^{-24} g. 1.6736×10^{-24} g/1.66056×10^{-24} g = 1.0078 amu = 1.008 amu. This the process to measure any atomic mass in amu.

3. What is the abbreviation of amu?
a) Atomic matter unit
b) Atomic mass unified
c) Atomic mass unit
d) At mass unity

Answer: c
Explanation: The Atomic mass unit is a standard unit of mass that measures mass on an atomic or molecular scale. One unit of it is practically equal to 1.66056×10^{-24} g. 1 amu is defined as a mass that is almost equal to one-twelfth of the mass of one carbon – 12 atom.

4.

ISOTOPE	ABUNDANCE	ATOMIC MASS
^{14}N	99.69%	14.0031 amu
^{15}N	0.39%	15.0001 amu

Nowadays, “amu” is replaced by _____
a) u
b) g
c) kg
d) am

Answer: a

Explanation: Presently, “amu” has been replaced by “u”. Atomic mass unit is “amu”, but now as it has been changed to “u”, & now known as unified mass. One unified atomic mass unit is the mass of one nucleon and is also equal to 1 g/mol.

5. Calculate the average atomic mass of nitrogen present in the atmosphere?

a) 14.007 amu
b) 15.001 amu
c) 14.000 amu
d) 14.0031 amu

Answer: a
Explanation: The formula for finding the average atomic mass of an element is given by Avg. Atomic Mass = ∑Abundance of isotope x Mass of isotope. So for nitrogen, avg atomic mass = 99.69 x 14.0031 + 0.39% x 15.0001 = 14.007.

6. A sample of carbon that contains 70% carbon-12 and 30% carbon-14. What do you think is the average atomic mass of this sample?
a) 14.5
b) 14.14
c) 14
d) 12

Answer: c
Explanation: Given that, carbon-12 is of 70% and carbon-14 is of 30%. In order to find avg atomic mass, you should add the products of multiplications 12 with 70/100 and 14 with 30/100. 12 x 0. 7 = 9.8; 14 x 0.3 = 4.2. Now adding them 9.8 + 4.2 = 14.

7. _____ is the sum of atomic masses of the elements present in a molecule.
a) Average atomic mass
b) Atomic mass
c) Gram formula mass
d) Molecular mass

Answer: d
Explanation: Molecular mass is the sum of atomic masses of the elements present in a molecule. Gram formula mass is the amount of a compound with the exact mass in grams as the formula mass in amu. The standard unit of mass that measures mass on the molecular scale or an atomic scale is “amu”.

8. What’s the molecular mass of carbon dioxide?
a) 43
b) 28
c) 44
d) 40

Answer: c
Explanation: The individual mass of carbon is 12 amu and the individual mass of oxygen is 16 amu. The formula for carbon dioxide is CO_2. Thus

one carbon and two oxygens. 12(carbon M.wt) + 2 x 16(oxygen M.wts) = 12 + 32 = 44. Therefore the molecular mass of carbon dioxide is 44.

9. What's the formula mass of NaCl?
a) 23 u
b) 35.5 u
c) 58 u
d) 58.5 u

Answer: d
Explanation: As Cl in NaCl can't exist in the solid state, we can only calculate it's formula mass. the individual mass of sodium is 23 u, whereas that of chlorine is 35.5 u. Together formula mass f Sodium chloride is the sum of individual masses, 23 + 35.5 = 58.5 u.

10. Calculate the molecular mass of sucrose($C_{12}H_{22}O_{11}$) molecule?
a) 342 amu
b) 343 amu
c) 341 amu
d) 340 amu

Answer: a
Explanation: The individual mass of carbon is 12 amu, the individual mass of hydrogen is 1 amu & the individual mass of oxygen is 16 amu. But sucrose has 12 carbons, 22 hydrogens and 11 oxygens, that is 12 x 12 + 22 x 1 + 11 x 16 = 342 amu.

Mole Concept and Molar Masses

1. According to S.I. the system, _____ was used to measure the amount of substance.
a) mole
b) weight machine
c) weight

d) mass

Answer: a
Explanation: One mole is the amount of a substance that contains as many particles as there are atoms in exactly 12 g of the carbon atom. So S.I. the system took mole as the seventh base fundamental quantity (symbol = mol).

2. What's the number of entities or particles together in mole concept known as?
a) Boltzmann constant
b) Avogadro's number
c) Universal gas constant
d) Reynold's number

Answer: b
Explanation: Avogadro number denoted by N_A. Its value is 602213670000000000000000, also written as 6.022×10^{23}. It's the number of entities in 1 mol of a substance. The units may be electrons, atoms, ions, or molecules, depending on the nature of the substance.

3. $1\ u = M_a/N_A$.
a) True
b) False

Answer: a
Explanation: In the above given equation $1\ u = M_u/N_A$; "u" refers to the atomic mass unit, M_u refers to molar mass constant(Its value is defined to be 1 g/mol in SI units). $1\ u = M_a/N_A = 1.660539040 \times 10^{-27}$ kg. Hence the above statement is true.

4. A mole of any substance contains _____
a) 6.022×10^{26} particles
b) 6.022×10^{22} particles
c) 6.022×10^{23} particles

d) 3.022 x 10^{22} particles

Answer: c
Explanation: The answer is Avogadro's number. One mole of any substance contains Avogadro's number of particles. Avogadro number denoted by N_A. Its value is 602213670000000000000000, also written as 6.022×10^{23}.

5. 12.044 x 10^{23} atoms of oxygen contains _____
a) 1 mole of oxygen
b) 2 moles of oxygen
c) 3 moles of oxygen
d) 4 moles of oxygen

Answer: b
Explanation: One mole of any substance contains Avogadro's number of particles. Its value is 6.022×10^{23} atoms. But here it's given 12.044 x 10^{23} atoms, thereby dividing it by Avogadro's number; 12.044 x 10^{23} atoms/6.022×10^{23} atoms = 2 moles. Hence it contains 2 moles of oxygen.

6. If one mole of ammonia contains "y" number of particles, then how many particles do 1 mole of glucose contain?
a) 2y
b) 0.5y
c) 3y
d) y

Answer: d
Explanation: Let it be any compound, but one mole of a substance always contains Avogadro's number of particles. In the above question, Avogadro's number (6.022×10^{23}) is given by the letter "y". so, in 1 mole of glucose, there is y number of particles.

7. What's the number of particles in 10 moles of hydrochloric acid?
a) 6.022 x 10^{22} particles

b) 6.022×10^{23} particles
c) 6.22×10^{23} particles
d) 3.22×10^{22} particles

Answer: a
Explanation: One mole of any substance contains Avogadro's number of particles. Its value is 6.022×10^{23} atoms. But here the question is about 10 moles of a substance. So multiply the Avogadro's number by 10. Therefore $6.022 \times 10^{23} \times 10 = 6.022 \times 10^{22}$.

8. Which of the following statement is correct?
a) The value of Avogadro's number is 6.022×10^{22} atoms
b) One molecule of any substance contains Avogadro's number of particles
c) One mole is the amount of a substance that contains as many particles as there are atoms in exactly 12 g of the carbon atom
d) 1 u is not equal to M_a/N_A

Answer: c
Explanation: The corrected statements are as follows: the value of Avogadro's number is 6.022×10^{23} atoms, one molecule of any substance contains Avogadro's number of particles & 1 u = M_a/N_A. The correct option is that one mole is the amount of a substance that contains as many particles as there are atoms in exactly 12 g of the carbon atom.

9. One mole of sucrose contains how many grams of sucrose?
a) 342g
b) 343g
c) 341g
d) 340g

Answer: a
Explanation: One mole of sucrose is $C_{12}H_{22}O_{11}$ The individual mass of carbon is 12 amu, the individual mass of hydrogen is 1 amu & the individual mass of oxygen is 16 amu. But sucrose has 12 carbons, 22 hydrogens and 11 oxygens, that is 12 x 12 + 22 x 1 + 11 x 16 = 342g.

10. 1 mole of ammonia is of 17 g. Then what is the mass of 0.3 moles of ammonia?
a) 21g
b) 2.1g
c) 17g
d) 1g

Answer: b
Explanation: Given that, 1 mole of ammonia is of 17 g. 0.3 mole of ammonia contains 17 x 0.3g of mass. IT's because the molecular weight of a given pcompound is directly proportional to the number of moles of the given compound

Percentage Composition

1. A _____ formula represents a whole number ratio to the simplest form.
a) Molecular
b) Empirical
c) Simpler
d) Shorter

Answer: b
Explanation: An empirical formula is the simplest whole number ratio of various atoms present in a compound. The molecular formula is the exact number of different types of atoms present in the molecule of a compound.

2. Even without knowing the mass percent of each element, we can calculate the empirical formula.
a) True
b) False

Answer: b
Explanation: One must know the mass percent of each and every element of a compound to calculate an empirical formula. As an

empirical formula is the simplest whole number ratio of various atoms present in a compound.

3. _____ formula can be calculated if the molar mass is known after having an empirical formula.
a) Molecular
b) Empirical
c) Simpler
d) Shorter

Answer: a
Explanation: The molecular formula is the exact number of different types of atoms present in the molecule of a compound. An empirical formula is the simplest whole number ratio of various atoms present in a compound. Therefore we can calculate the molecular formula if the molar mass is known.

4. Which of the following is an empirical formula?
a) $C_6H_{12}O_6$
b) H_2O_2
c) CH_4
d) C_2H_6

Answer: c
Explanation: An empirical formula is the simplest whole number ratio of various atoms present in a compound. Only CH_4 has satisfied the conditions of an empirical formula as it is the simplified whole number ratio compound.

5. The molecular formula of a compound is $C_6H_{12}O_6$. What's the empirical formula for this compound?
a) $C_6H_{12}O_6$
b) CHO
c) $C_2H_6O_2$
d) CH_2O

Answer: d
Explanation: In the molecular formula of glucose that is $C_6H_{12}O_6$, the carbon, hydrogen, and oxygen are in the ratio of 6:12:6 respectively. So by simplifying them into simpler whole numbers, we obtain 1:2:1. Therefore the empirical formula is CH_2O.

6. A compound consists of 52.17% of carbon, 13.04% of hydrogen and 34.78% of oxygen. Find the molecular formula if the given molecular weight of the compound is 46g.
a) C_2H_5OH
b) C_2H_6
c) $C_6H_{12}O_6$
d) CH_2O

Answer: a
Explanation: As per the above question, the compounds consist of carbon, hydrogen, and oxygen in the ratio of 52.17:13.04:34.78 respectively. Now multiply the ratio with the molecular mass that is 46 g. Hence we obtain it as 2400:600:1600 that is 24:6:16 (2 atoms of carbon + 6 atom of hydrogen + 1 atom of oxygen). The required compound is C_2H_5OH.

7. Which of the following cannot be a molecular formula for an empirical formula HO?
a) H_2O
b) H_2O_2
c) HO
d) HO_2

Answer: b
Explanation: The molecular formula is the exact number of different types of atoms present in the molecule of a compound. The rest compounds are not in the same ratio as of empirical formula ones. Though HO is possible, it can’t exist.

8. In glucose simplest ratio between C, H and O is _____
a) 6:12:6
b) 3:4:3
c) 1:2:1
d) 2:3:2

Answer: c
Explanation: the molecular formula of glucose is $C_6H_{12}O_6$. The ratio in the molecular formula is 6:12:6; carbon, hydrogen, and oxygen respectively. So by simplifying them into simpler whole numbers, we obtain 1:2:1.

9. Which of the following is true regarding molecular formula?
a) actual whole numbered ratio
b) rational numbered ratio
c) simplest possible whole numbered ratio
d) the same as the empirical ratio

Answer: a
Explanation: Actual whole numbered ratio is correct because the molecular formula is the exact number of different types of atoms present in the molecule of a compound. Rational may be fractional or decimal, simplest possible whole numbered is empirical.

10. Which of the following cannot be an empirical formula?
a) NH_3
b) C_5H_{10}
c) H_2O
d) NaCl

Answer: b
Explanation: C_5H_{10} cannot be an empirical formula because of the carbon and hydrogen ratio in this compound is 5:10 respectively. They are not in the simplest possible whole numbered ratio (1:2 is the simplest for this compound). Hence it cannot be an empirical compound.

Stoichiometry and Stoichiometric Calculations

1. In a particular reaction, one of the reactants limits the number of products formed. That is called as _____
a) Limiting reagent
b) Limiting product
c) Excessive reagent
d) Excessive reactant

Answer: a
Explanation: Though the other substances are excess in amount than the required, each and every reactant needs to be in a fixed ratio to attain the desired product. So, thereby, the reactant that limits the quantity of the product formed is called limiting reagent and this reactant gets consumed first completely.

2. Which of the following is not true regarding balanced chemical equations?
a) They contain the same number of atoms on each side
b) Electrons are also balanced
c) An equal number of molecules on both the side
d) Follows the law of conservation of mass

Answer: c
Explanation: A balanced reaction may not have an equal number of molecules on both the sides, because molecules may combine into one or a single molecule may breakdown into two or more. IT can disassociate or undergo double decomposition.

3. Which of the given reactions are counted as balanced reactions?
a) $H_2 + O_2 \rightarrow 2H_2O$
b) $4Al + 3O_2 \rightarrow 2Al_2O_3$
c) $Mg(OH)_2 + 2HNO_3 \rightarrow 2Mg(NO_3)_2 + 2H_2O$
d) $N_2 + 3H_2 \rightarrow NH_3$

Answer: b
Explanation: $4Al + 3O_2 \rightarrow 2Al_2O_3$ is a balanced reaction because the number of atoms of different elements on both sides is equal. The correctly balanced equations of the rest are $2H_2 + O_2 \rightarrow 2H_2O$; $Mg(OH)_2 + 2HNO_3 \rightarrow Mg(NO_3)_2 + 2H_2O$ and $N_2 + 3H_2 \rightarrow 2NH_3$.

4. What is the amount of water produced when 8g of hydrogen is reacted with 32g of oxygen?
a) 2moles
b) 1mole
c) 3 moles
d) 0.5mole

Answer: a
Explanation: The chemical equation of water formation is $2H_2 + O_2 \rightarrow 2H_2O$. Though we have 8g of hydrogen, here oxygen is the limiting reagent. So the only 4g of hydrogen can be used to produce water i.e. 36g of water. That is 2 moles.

5. Calculate the mass percent of magnesium in the formation of magnesium oxide.
a) 0.3
b) 1.5
c) 0.67
d) 0.6

Answer: d
Explanation: The chemical equation of formation of magnesium oxide is $2\ Mg_{(s)} + O_{2(g)}$ ® $2MgO_{(s)}$. The formula for calculation of mass percent is (mass of solute/mass of solution) x 100. Therefore 2(24)/2(24+16) = 0.6.

6. A and B are two solutions that are mixed. Calculate the resultant solution's molarity.

Initial Solutions	**Molarity**	**Volume**

A	1.3	100ml
B	0.8	500ml

a) 0.8 mol/L
b) 0.88 mol/L
c) 1.3 mol/L
d) 1.05 mol/L

Answer: b
Explanation: When two solutions are combined, the resultant molarity is $M_1V_1 + M_2V_2/V_1 + V_2$. Consider $M_1 = 1.3$, $M_2 = 0.8$, $V_1 = 100ml$ and $V_2 = 500ml$. Now resultant molarity = 1.3(100) + 0.8(500)/100 + 500 = 0.88 mol/L.

7. A solution contains 8 moles of solute and the mass of the solution is 4 kg. What's the molality of this solution?
a) 5 mol/kg
b) 8 mol/kg
c) 4 mol/kg
d) 0.5 mol/kg

Answer: d
Explanation: Molality of a solution is given y the formula; molality = number of moles of the solute/mass of the solution. So here the number of moles is 8 and the mass of the solution is 4 kg. Molality is 8/4 = 0.5 mol/kg.

8. In a container, there are 4 moles of nitrogen, 3 moles of oxygen and 7 moles of hydrogen; find out the mole fraction of oxygen in this reaction.
a) 0.2143
b) 0.2142
c) 0.1234
d) 0.2434

Answer: a
Explanation: Mole fraction of a substance is given by the formula: Mole fraction = No. of moles of that substances/No. of total moles of solution. Mole fraction of oxygen here = 3/4 + 3 + 7 = 3/14 = 0.2143.

9. Find the amount of carbon dioxide produced by the combustion of 20g of methane.
a) 44g
b) 20g
c) 66g
d) 22g

Answer: c
Explanation: The chemical balanced equation for combustion of methane is $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$. From the above equation, 1 mole of methane gives 1 mole of carbon dioxide. But 20g of methane = 1.25 moles, therefore it gives 1.25 moles of carbon dioxide = 44(1.5) = 66g.

10. What's the balanced equation of $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$?
a) $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$
b) $6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + 6\ O_2$
c) $6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + 2\ O_2$
d) $3\ CO_2 + 2H_2O \rightarrow C_6H_{12}O_6 + O_2$

Answer: b
Explanation: $6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + 6\ O_2$ is the balanced equation because the number of atoms of different elements is the same on both sides. Rest of them do not have an equal number of atoms of different elements on both sides.