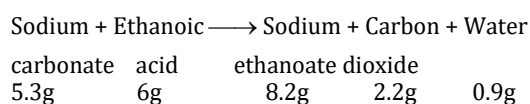


NCERT QUESTIONS WITH SOLUTION

1. In a reaction, 5.3 g of sodium carbonate reacted with 6 g of ethanoic acid. The products were 2.2 g of carbon dioxide, 0.9 g water and 8.2 g of sodium ethanoate. Show that these observations are in agreement with the law of conservation of mass.

Ans. Sodium carbonate reacts with ethanoic acid converted into sodium ethanoate, carbon dioxide, and water.



$$(5.3 + 6)\text{g} = 11.3\text{g}$$

$$\longrightarrow (8.2 + 2.2 + 0.9)\text{g} = 11.3\text{g}$$

∴ Total mass before the reaction

= Total mass after the reaction

Hence, the given observations are in agreement with the law of conservation of mass.

2. Hydrogen and oxygen combine in the ratio of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g of hydrogen gas?

Ans. It is given that the ratio of hydrogen and oxygen by mass to form water is 1: 8.

Then, the mass of oxygen gas required to react completely with 1 g of hydrogen gas is 8 g.

Therefore, the mass of oxygen gas required to react completely with 3 g of hydrogen gas is $8 \times 3 \text{ g} = 24 \text{ g}$.

3. Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?

Ans. The postulate of Dalton's atomic theory is, atoms are indivisible particles, which can neither be created nor destroyed in a chemical reaction.

4. Which postulate of Dalton's atomic theory can explain the law of definite proportions?

Ans. The postulate of Dalton's atomic theory based on the law of definite proportion is:

"The relative number and kind of atoms in a given compound remains constant."

5. Define atomic mass unit.

Ans. Atomic mass unit equal to exactly one-twelfth the mass of one atom of carbon-12 is called one atomic mass unit. It is written as 'u'.

6. Why is it not possible to see an atom with naked eyes?

Ans. The size of an atom is too small that's why it is not possible to see it with naked eyes.

7. Write down the formulae of

- (i) sodium oxide
- (ii) aluminium chloride
- (iii) sodium sulphide
- (iv) magnesium hydroxide

Ans. (i) Sodium oxide : Na_2O
 (ii) Aluminium chloride : AlCl_3
 (iii) Sodium sulphide : Na_2S

(iv) Magnesium hydroxide : $\text{Mg}(\text{OH})_2$

8. Write down the names of compounds represented by the following formulae:

- (i) $\text{Al}_2(\text{SO}_4)_3$
- (ii) CaCl_2
- (iii) K_2SO_4
- (iv) KNO_3
- (v) CaCO_3

- Ans.** (i) $\text{Al}_2(\text{SO}_4)_3$: Aluminium sulphate
 (ii) CaCl_2 : Calcium chloride
 (iii) K_2SO_4 : Potassium sulphate
 (iv) KNO_3 : Potassium nitrate
 (v) CaCO_3 : Calcium carbonate

9. What is meant by the term chemical formula?

Ans. The chemical formula of a compound means the symbolic representation of the composition of a compound. For example, from the chemical formula CO_2 of carbon dioxide, we come to know that one carbon atom and two oxygen atoms are chemically bonded together to form one molecule of the compound, carbon dioxide.

10. How many atoms are present in a

- (i) H_2S molecule and
 (ii) PO_4^{3-} ion?

Ans. (i) In a H_2S molecule, three atoms are present: two of hydrogen and one of sulphur.

(ii) In a PO_4^{3-} ion, five atoms are present: one of phosphorus and four of oxygen.

11. Calculate the molecular masses of H_2 , O_2 , Cl_2 , CO_2 , CH_4 , C_2H_6 , C_2H_4 , NH_3 , CH_3OH .

Ans. Molecular mass of H_2
 $= 2 \times \text{Atomic mass (H)} = 2 \times 1 = 2 \text{ u}$
 Molecular mass of O_2
 $= 2 \times \text{Atomic mass (O)} = 2 \times 16 = 32 \text{ u}$
 Molecular mass of Cl_2
 $= 2 \times \text{Atomic mass (Cl)} = 2 \times 35.5 = 71 \text{ u}$
 Molecular mass of CO_2
 $= \text{Atomic mass (C)} + 2 \times \text{Atomic mass (O)}$
 $= 12 + 2 \times 16 = 44 \text{ u}$

Molecular mass of CH_4
 $= \text{Atomic mass (C)} + 4 \times \text{Atomic mass (H)}$
 $= 12 + 4 \times 1 = 16 \text{ u}$

Molecular mass of C_2H_6
 $= 2 \times \text{Atomic mass of C} + 6 \times \text{Atomic mass of H}$
 $= 2 \times 12 + 6 \times 1 = 30 \text{ u}$

Molecular mass of C_2H_4
 $= 2 \times \text{Atomic mass (C)} + 4 \times \text{Atomic mass (H)}$
 $= 2 \times 12 + 4 \times 1 = 28 \text{ u}$

Molecular mass of NH_3
 $= \text{Atomic mass of N} + 3 \times \text{Atomic mass of H}$
 $= 14 + 3 \times 1 = 17 \text{ u}$

Molecular mass of $\text{CH}_3\text{OH} = \text{Atomic mass (C)} + 4 \times \text{Atomic mass (H)} + \text{Atomic mass (O)}$
 $= 12 + 4 \times 1 + 16 = 32 \text{ u}$

12. Calculate the formula unit masses of ZnO , Na_2O , K_2CO_3 , given atomic masses of $\text{Zn} = 65 \text{ u}$, $\text{Na} = 23 \text{ u}$, $\text{K} = 39 \text{ u}$, $\text{C} = 12 \text{ u}$, and $\text{O} = 16 \text{ u}$.

Ans. Formula unit mass is defined as the sum of the atomic masses of all atoms that are present in a formula unit of the given compound.

Atomic mass of $\text{Zn} = 65 \text{ u}$

Atomic mass of $\text{Na} = 23 \text{ u}$

Atomic mass of $\text{K} = 39 \text{ u}$

Atomic mass of $\text{C} = 12 \text{ u}$

Atomic mass of $\text{O} = 16 \text{ u}$

Calculating the formula unit masses of the given compounds:

$\text{ZnO} = \text{Zn} + \text{O}$

$\text{ZnO} = (65 + 16) \text{ u} = 81 \text{ u}$

$\text{Na}_2\text{O} = 2\text{Na} + \text{O}$

$\text{Na}_2\text{O} = [(2 \times 23) + 16] \text{ u}$

$\text{Na}_2\text{O} = (46 + 16) \text{ u} = 62 \text{ u}$

$\text{K}_2\text{CO}_3 = 2 \text{ K} + \text{C} + 3 \text{ O}$

$\text{K}_2\text{CO}_3 = [(2 \times 39) + 12 + (3 \times 16)]$

$\text{K}_2\text{CO}_3 = (78 + 12 + 48) \text{ u} = 138 \text{ u}$

- 13.** A 0.24 g sample of compound of oxygen and boron was found by analysis to contain 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound by weight.

Ans. Mass of boron = 0.096 g (Given)
 Mass of oxygen = 0.144 g (Given)
 Mass of sample = 0.24 g (Given)

Percentage of boron

$$= \frac{\text{Mass of boron}}{\text{Mass of sample}} \times 100$$

$$= \frac{0.096}{0.24} \times 100 = 40\%$$

Percentage of O₂

$$= \frac{\text{Mass of oxygen}}{\text{Mass of sample}} \times 100$$

$$= \frac{0.144}{0.24} \times 100 = 60\%$$

Thus, percentage of boron by weight in the compound = 40%

And, percentage of oxygen by weight in the compound = 60%

- 14.** When 3.0 g of carbon is burnt in 8.00 g oxygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combinations will govern your answer?

Ans. Carbon + Oxygen → Carbon dioxide
 3 g of carbon reacts with 8 g of oxygen to produce 11 g of carbon dioxide.
 If 3 g of carbon is burnt in 50 g of oxygen, then 3 g of carbon will react with 8 g of oxygen. The remaining 42 g of oxygen will be left unreactive.
 In this case also, only 11 g of carbon dioxide will be formed.

The above answer is governed by the law of constant proportions.

- 15.** What are polyatomic ions? Give examples?

Ans. A polyatomic ion is a group of atoms carrying a charge (positive or negative). For example, ammonium ion, hydroxide ion (OH⁻), carbonate ion (CO₃²⁻), sulphate ion (SO₄²⁻).

- 16.** Write the chemical formulae of the following:

- (a) Magnesium chloride
- (b) Calcium oxide
- (c) Copper nitrate
- (d) Aluminium chloride
- (e) Calcium carbonate

Ans. (a) Magnesium chloride: MgCl₂
 (b) Calcium oxide: CaO
 (c) Copper nitrate : Cu (NO₃)₂
 (d) Aluminium chloride : AlCl₃
 (e) Calcium carbonate: CaCO₃

- 17.** Give the names of the elements present in the following compounds:

- (a) Quick lime
- (b) Hydrogen bromide
- (c) Baking powder
- (d) Potassium sulphate

Compound	Chemical formula	Elements present
Quick lime	CaO	Calcium, oxygen
Hydrogen bromide	HBr	Hydrogen, bromine
Baking powder	NaHCO ₃	Sodium, hydrogen, carbon, oxygen
Potassium sulphate	K ₂ SO ₄	Potassium, sulphur, oxygen

EXERCISE-01**Multiple choice questions**

1. Hydrogen reacts with oxygen to form water (H_2O). The ratio between masses of hydrogen and oxygen is
(1) 1: 8 (2) 6.5: 8
(3) 2: 1 (4) 6.5: 16
2. In carbon dioxide, carbon and oxygen are present in the ratio of _____.
(1) 3:8 (2) 2:12
(3) 2:3 (4) 1:2
3. The quantity of matter present in an object is called its _____.
(1) mass
(2) volume
(3) density
(4) vapour pressure
4. Which of the following is not correct according to Dalton's atomic theory?
(1) Matter is made up of atoms.
(2) Atoms of all substances are identical in all respects.
(3) Atoms combine in a simple whole number ratio.
(4) Atoms of two elements can combine to form more than one compound.
5. Indivisibility of an atom was proposed by _____.
(1) Dalton (2) Rutherford
(3) Thomson (4) Bohr
6. Which of the following does not change when a chemical reaction takes place?
(1) Volume
(2) Mass
(3) Physical properties
(4) Chemical properties
7. All samples of carbon dioxide contain carbon and oxygen in the mass ratio of 3:8. This is in agreement with the Law of _____.
(1) conservation of Mass
(2) constant Proportion
(3) multiple Proportion
(4) reciprocal Proportion
8. Which of the following statements is not true about an atom?
(1) Atoms are not able to exist independently.
(2) Atoms are the basic units from which molecules and ions are formed.
(3) Atoms are always neutral in nature.
(4) Atoms aggregate in large numbers to form the matter that we can see, feel or touch.
9. The first scientist to use the symbols of elements was
(1) Dalton (2) Berzelius
(3) Kanad (4) Proust
10. The chemical symbol for barium is
(1) B (2) Ba
(3) Be (4) Bi
11. The chemical symbol P stands for
(1) phosphorus (2) potassium
(3) polonium (4) promethium
12. Kalium is the Latin name of _____.
(1) potassium (2) krypton
(3) calcium (4) phosphorus

- 13.** The chemical symbol for sodium is
 (1) So (2) Sd
 (3) NA (4) Na
- 14.** The chemical symbol for nitrogen gas is
 (1) Ni (2) N₂
 (3) N⁺ (4) N
- 15.** The atomicity of K₂Cr₂O₇ is
 (1) 9 (2) 11
 (3) 10 (4) 12
- 16.** A group of atoms chemically bonded together is a/an
 (1) molecule (2) ion
 (3) salt (4) element
- 17.** An atom is 15 times heavier than $\frac{1}{12}$ th of the mass of carbon atom (C-12 isotope). The mass in a.m.u is _____.
 (1) 1.25 (2) 15
 (3) 14 (4) 12
- 18.** The number of atoms in a molecule of the elementary substance is called _____.
 (1) atomic number
 (2) avogadro number
 (3) atomic mass
 (4) atomicity
- 19.** The unit of atomic mass is
 (1) gm (2) u
 (3) litre (4) mp
- 20.** A substance in which all atoms are alike is called a/an
 (1) molecule (2) ion
 (3) homogeneous (4) element
- 21.** An example of a triatomic molecule is _____.
 (1) ozone (2) nitrogen
 (3) carbon monoxide (4) hydrogen
- 22.** The smallest particle of a substance that is capable of independent existence is _____.
 (1) atom (2) molecule
 (3) electron (4) proton
- 23.** One atomic mass unit is equal to weight of
 (1) one atom of hydrogen
 (2) 1/16th of oxygen atom
 (3) 1/12th of natural carbon atom
 (4) 1/12th of C-12 isotope of carbon.
- 24.** The formula of sulphuric acid is
 (1) H₂SO₃ (2) H₂SO₄
 (3) H₂SO₅ (4) H₂S₂O₇
- 25.** The chemical formula of the copper (II) nitrate
 (1) Cu(NO₃)₂ (2) CuNO₃
 (3) Cu₂(NO₃)₃ (4) Cu₂NO₃
- 26.** The correct formula of aluminium sulphate is
 (1) AlSO₄ (2) Al₂SO₄
 (3) Al₃(SO₄)₂ (4) Al₂(SO₄)₃
- 27.** Formula of Calcium phosphate is
 (1) CaPO₄ (2) Ca₂(PO₄)₃
 (3) Ca(PO₄)₂ (4) Ca₃(PO₄)₂
- 28.** Select the ionic compound
 (1) Sulphur molecule, S₈
 (2) Phosphorous molecule, P₄
 (3) Methane, CH₄
 (4) Copper nitrate, Cu(NO₃)₂
- 29.** Which of the following elements are mono-atomic?
 (1) Iron (2) Sodium
 (3) Helium (4) Chlorine
- 30.** Formula unit mass is used for the mass of the following compound
 (1) CaO (2) H₂S
 (3) CCl₄ (4) CH₄

31. Which one of the following does not represent correct molecular formula of a compound?

- (1) 2CH_3 (2) CH_4
(3) CH_3OH (4) $(\text{CH}_3)_2$

32. Formula mass is not used in case of

- (1) NaCl (2) MgCl_2
(3) CCl_4 (4) CaO

33. Formula mass but not molecular mass is used for substance whose constituent particles are

- (1) ions (2) similar
(3) uniform (4) none of these

34. The overall charge on an ionic compound is equal to

- (1) charge of the cation present
(2) zero
(3) charge of the anion present
(4) sum of charges of the cation and anion

35. 1u or 1amu means

- (1) $\frac{1}{12^{\text{th}}}$ mass of C-12 atoms
(2) mass of C-12 atoms
(3) mass of O-16 atoms
(4) mass of hydrogen molecule

True or False

- Democritus called the indivisible particles of matter as 'atoms'.
- Proust gave the law of conservation of mass.
- A molecule is unstable while an atom is quite stable.
- Dalton's symbol for ZnSO_4 is. 
- Atomic mass when expressed in grams is known as gram atomic mass.

6. Molecules of an element are homoatomic while that of a compound are heteroatomic.

7. Latin name of tin is stannum.

8. Symbol of mercury is Me.

9. $\text{C}_{17}\text{H}_{35}\text{COONa}$ has the atomicity of 52.

10. The molecular formula of potassium nitrate is KNO_3 .

Fill in the blanks

- During a chemical reaction, the sum of the _____ of the reactants and products remains unchanged.
- In a pure chemical compound, elements are always present in a _____ proportion by mass.
- Latin name of mercury is _____.
- The abbreviation used for lengthy names of elements are termed as their _____.
- In ionic compounds, the charge on each ion is used to determine the _____ of the compound.
- The number of atoms in a molecule of the elementary substance is called its _____.
- Those ions which are formed from single atoms are called _____.
- Clusters of atoms that act as an ion are called _____ ions.
- A chemical formula is also known as _____.
- In $^{16}_8\text{O}$, the number 16 stands for _____.

Match the column

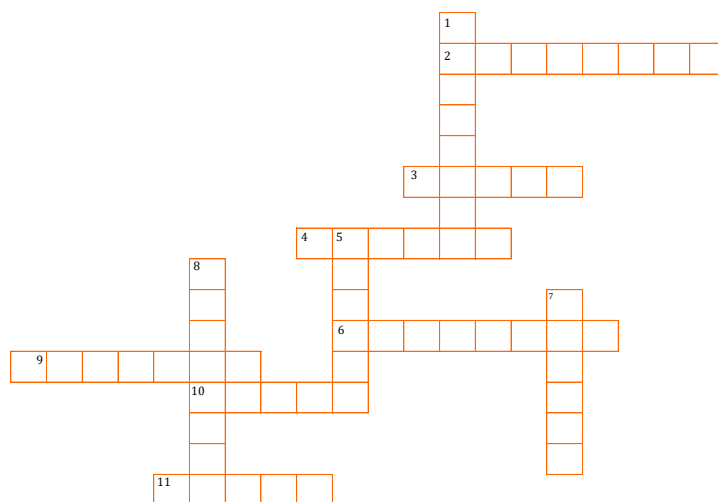
1. Match the following elements and compounds given in column-A with the value of their atomicity given in column-B

Column-A Elements/compound		Column-B Atomicity	
1	Argon	a	8
2	Sulphur	b	4
3	Oxygen	c	2
4	Phosphorous	d	1
5	Ozone	e	3
6	Bromine	f	5
7	Carbon monoxide	g	6
8	Hydrogen peroxide	h	7
9	Lime water		
10	Ammonia		
11	Quick Lime		
12	Baking Powder		
13	Limestone		
14	Common salt		
15	Sodium Sulphate		

Crossword puzzle

1. In this crossword puzzle, name of 11 elements are hidden. Symbols of these are given below. Complete the puzzle.

1. Cl 2. H 3. Ar 4. O 5. Xe 6. N 7. He 8. F
9. Kr 10. Rn 11. Ne



ANSWER KEY

Multiple choice questions

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	1	1	1	2	1	2	2	1	1	2	1	1	4	2	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	1	2	4	2	4	1	2	4	2	1	4	4	4	3	1
Question	31	32	33	34	35										
Answer	1	3	1	2	1										

True or False

- | | | | | |
|---------|----------|----------|----------|----------|
| 1. True | 2. False | 3. False | 4. True | 5. True |
| 6. True | 7. True | 8. False | 9. False | 10. True |

Fill in the blanks

- | | |
|----------------------|-----------------|
| 1. masses | 2. definite |
| 3. hydrargyrum | 4. symbol |
| 5. chemical formula | 6. atomicity |
| 7. simple ions | 8. poly-atomic |
| 9. molecular formula | 10. mass number |

Match the column

1. (1) → d ; (2) → a ; (3) → c ; (4) → b ; (5) → e ; (6) → c ; (7) → c ; (8) → b ; (9) → f ; (10) → b ;
 (11) → c ; (12) → g ; (13) → f ; (14) → c ; (15) → h

Crossword puzzle

Try your self

EXERCISE-02

Very short answer type questions

- What is the ratio between masses of
(i) hydrogen and oxygen in H_2O
(ii) nitrogen and hydrogen in NH_3 ?
[Atomic mass of H = 1 u, O = 16 u, N = 14 u]
- 10 g silver nitrate solution is added to 10 g of sodium chloride solution. What change in mass do you expect after the reaction?
- Name the building block of all matter.
- What are the symbols of copper and cobalt?
- Give symbols for the following elements: Aluminium, Tin, Bromine, Neon.
- Why is copper represented by the symbol 'Cu' while there is no letter 'u' in the name?
- What do you understand by the 'atomicity' of the substance?
- Give two examples each of bivalent cations and bivalent anions.
- What is 1u?
- What is meant by formula unit mass?

Short answer type questions

- What is the first law of chemical combination?
- What is the conclusion of the Dalton's atomic theory?

- Define the "law of constant proportions". How does Dalton's atomic theory explain the truth of the law?
- What are poly atomic ions? Give example.
- What is the difference between the actual mass of a molecule and gram molecular mass?
- What is meant by the term chemical formula?
- Give the names of the elements present in the following compounds.
(i) Sodium bicarbonate
(ii) Calcium carbonate
(iii) Hydrogen bromide
- Write the molecular formula of the following and give the ratio by mass of atoms present in
(i) Ammonia (ii) Water (iii) Methane
- Write down the names of the compound represented by the following formula
(i) $\text{Al}_2(\text{SO}_4)_3$ (ii) CaCl_2
(iii) K_2SO_4 (iv) KNO_3
- What is the necessity of mole concept?

Long answer type questions

- What are the postulates and limitations of Dalton's atomic theory?
- State and explain the following:
(i) Atom
(ii) Molecule
(iii) Atomic mass
(iv) Molecular mass

3. Write the formulae for the following and calculate the molecular mass for each one of them.	5. Valencies or the charge numbers of some ions are given below:
(a) Potassium hydroxide (b) Sodium bicarbonate (c) Calcium carbonate (d) Magnesium chloride (e) Sodium chloride	Aluminium ion 3⁺ Magnesium ion 2⁺ Potassium ion 1⁺ Nitride ion 3⁻ Sulphate ion 2⁻ Fluoride ion 1⁻
4. Write the formula and names of compounds formed by (a) Na⁺ and HCO₃⁻ (b) K⁺ and CO₃²⁻ (c) Cu²⁺ and SO₄²⁻ (d) Cu²⁺ and O²⁻ (e) Na⁺ and SO₄²⁻ (f) NH₄⁺ and CO₃²⁻	Using the above information, write down the chemical formulae of the following: (i) Aluminium fluoride (ii) Magnesium nitride (iii) Aluminium sulphate (iv) Potassium fluoride (v) Magnesium fluoride (vi) Potassium nitride

Exercise-01 Solutions

Multiple choice questions

1. **Option (1)**
 $H : O \Rightarrow 2 \times 1 : 16 \Rightarrow 1 : 8$
2. **Option (1)**
 $C : O \Rightarrow 12 : 16 \times 2 \Rightarrow 3 : 8$
3. **Option (1)**
 The quantity of matter present in an object is called its mass.
4. **Option (2)**
 Atoms of all substances are identical in all respects.
 Above statement is not in accordance with Daltons Atomic theory.
5. **Option (1)**
 Dalton : Indivisibility of atom was proposed by Dalton.
6. **Option (2)**
 Mass : According to law of conservation of mass "mass can neither be created nor be destroyed".
7. **Option (2)**
 Law of constant proportions: "In a given substance, all the constituent elements remain present in a definite proportion by mass irrespective of their sources".
8. **Option (1)**
 Atoms may (e.g., He, Ne, Ar, etc) or may not exist independently.
9. **Option (1)**
 John Dalton was the first scientist to use symbol for element.
10. **Option (2)**
 The chemical symbol for barium is $^{137}_{56}\text{Ba}$.
11. **Option (1)**
 Phosphorus is a chemical element and with symbol P and atomic number 15.
12. **Option (1)**
 Some symbols have been taken from the names of elements in Latin, German or Greek.
 Ex. Symbol of potassium is K from its Latin name is "Kalium".
13. **Option (4)**
 The chemical symbol of sodium is $^{23}_{11}\text{Na}$
 It is derived from Latin name "Natrium".
14. **Option (2)**
 Nitrogen gas is a diatomic molecule composed of two nitrogen atoms. Therefore it exists as N_2 .
15. **Option (2)**
 $(K = 2) + (Cr = 2) + (O = 7) = 11$
16. **Option (1)**
 A group of atoms chemically bonded together is a molecule.
17. **Option (2)**
 15
 Mass in amu is the number of times an atom or molecule heavier than $1/12^{\text{th}}$ of the mass of $^{12}_6\text{C}$ atom.
18. **Option (4)**
 The number of atoms present in 1 molecule of elementary substance is called its atomicity.
 Ex. In H_2O molecule 2 Hydrogen atoms and 1 Oxygen atom are present hence atomicity of H_2O is 3.

19. Option (2)

The unit of atomic mass "U" (Unified mass) or amu.

20. Option (4)

Simplest chemical substance where all the atoms are exactly same.

21. Option (1)

In ozone molecule 3 atoms are present Ozone (O_3); Nitrogen (N_2) contains two atoms; Carbonmonoxide (CO) contain two atoms; Hydrogen (H_2) contain two atoms.

22. Option (2)

The smallest particle of substance that is capable of independent existence is molecule.

23. Option (4)

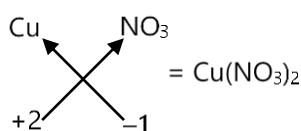
One atomic mass unit is equal to $1.66 \times 10^{-24}g$. it is equal to $1/12^{th}$ of the mass of an atom of carbon -12, it is abbreviated as amu.

24. Option (2)

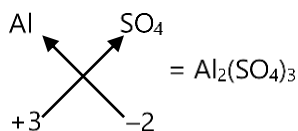
The formula of sulphuric acid is H_2SO_4 .

25. Option (1)

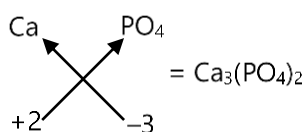
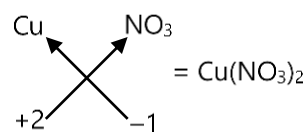
$Cu(NO_3)_2$

**26. Option (4)**

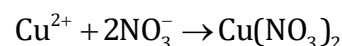
$Al_2(SO_4)_3$

**27. Option (4)**

$Ca_3(PO_4)_2$

**28. Option (4)**

Copper nitrate $Cu(NO_3)_2$

**29. Option (3)**

All the inert gases are monoatomic.

30. Option (1)

Formula unit mass is used for ionic compounds. Among the options only CaO is the ionic compound rest all are molecular covalent compounds.

31. Option (1)

$2CH_3$

Option one represents two methyl radicals whereas other three options represents methane, methanol and ethane, respectively.

32. Option (3)

Formula unit mass is always used for ionic compounds, among the options only CCl_4 is covalent compound.

33. Option (1)

Formula unit mass is always used for ionic compounds.

34. Option (2)

During the representation of formula unit, ions are arranged in such a number that total charge on the Ionic compound is equal to zero.

35. Option (1)

1u or 1amu means $\frac{1}{12^{th}}$

mass of C-12 atoms

Exercise-02 Solutions

Very short answer type questions

- (1) H_2O $\text{H} : \text{O} \Rightarrow 2 : 16 \Rightarrow 1 : 8$
 NH_3 $\text{N} : \text{H} \Rightarrow 14 : 3$
 $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$
- $$10\text{g} + 10\text{g} = 20\text{g} \quad \underline{\hspace{2cm}} \quad 20\text{g}$$

Mass change = 0; According to law of conservation of mass.
- Atoms are the building block of all the atoms.
- Copper Cu Cobalt Co
- Al; Sn; Br; Ne
- Cu derived from greek letter Cuprum.
- Atomicity : Total count of ingredient atoms present in the given molecule.
- Cu^{2+} , Mg^{2+} , Sn^{2+} , Sm^{2+} , Cu^{2+} , Hg^{2+} , Fe^{2+} , O^{2-} , S^{2-} , SO_4^{2-} , CO_3^{2-} , SO_3^{2-}
- $1\text{u} = \frac{1}{12} \times \text{mass of } {}_6^{12}\text{C}$
- Sum of the masses of ingredient ions present in the molecular formula of given compound.

Short answer type questions

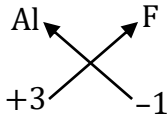
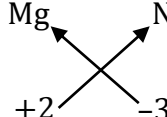
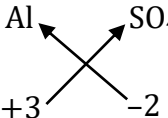
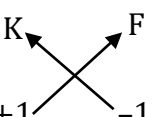
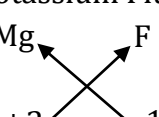
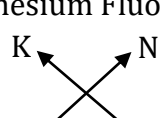
- Law of conservation of masses "During any chemical process, mass neither be created nor be destroyed."
- Dalton's atomic theory : -
 - Every matter is made up of very small particles known as **atoms**.
 - Atoms are the ultimate particles of matter which cannot be created or destroyed in a chemical reaction and cannot be further subdivided into smaller particles.
- All atoms of a particular element are identical in all respects. This means that they have same mass, size and also same chemical properties
- Atoms of different elements have different masses, sizes and also chemical properties.
- Atoms are the smallest particles of matter which can take part in chemical combination.
- Atoms of the same or different elements combine in small whole number ratios to form molecules of a element/compound.
- The relative number and kinds of atoms are constant in a given compound.
- Atoms of two different elements may combine in different ratios to form more than one compound. For example, carbon and oxygen may combine to form carbon monoxide (CO) and carbon dioxide (CO_2) in which the ratios of the combining atoms (C and O) are 1 : 1 and 1 : 2 respectively.
- Explanation of law of constant proportion:** According to one of the postulates of Dalton's atomic theory, the number and kind of atoms in a compound is fixed.

This implies that a compound is always made up of the same elements and the ratio of the atoms in the compounds is fixed. As atoms have fixed masses, this means that in the compound, the elements are combined in a fixed ratio by mass.

4. Polyatomic Ions : Ions which are constituted by ≥ 3 atoms. e.g. NH_4^+ ; HSO_4^- ; PO_4^{3-} etc.
5. Actual mass : Exact mass of a molecule
Gram molecular mass. Sum of the masses of 6.023×10^{23} molecules.
6. Chemical formula : A set of atomic symbols which shows type and number of constituent elements.
7. (i) Baking powder
 NaHCO_3 Sodium Bicarbonate
Sodium + Hydrogen + Carbon + Oxygen
(ii) Calcium carbonate = CaCO_3
Calcium + Carbon + Oxygen
(iii) Hydrogen bromide = HBr
Hydrogen + Bromine
8. (i) Ammonia NH_3
 $\text{N} : \text{H} \Rightarrow 14:3$
(ii) Water H_2O $\text{H} : \text{O} \Rightarrow 2:16 \Rightarrow 1 : 8$
(iii) Methane CH_4 $\text{C} : \text{H} \Rightarrow 12 : 4 \Rightarrow 3 : 1$
9. (i) $\text{Al}_2(\text{SO}_4)_3$ Aluminium Sulphate
(ii) CaCl_2 Calcium Chloride
(iii) K_2SO_4 Potassium Sulphate
(iv) KNO_3 Potassium nitrate
10. It relates number of atoms/particles /molecules/mass of the substance.

Long answer type questions

1. Dalton Atomic Theory:
Postulates of Dalton's atomic theory
The important features of the Dalton's Atomic theory are listed,
 1. Every matter is made up of very small particles known as **atoms**.
 2. Atoms are the ultimate particles of matter which cannot be created or destroyed in a chemical reaction and cannot be further subdivided into smaller particles.
 3. All atoms of a particular element are identical in all respects. This means that they have same mass, size and also same chemical properties.
 4. Atoms of different elements have different masses, sizes and also chemical properties.
 5. Atoms are the smallest particles of matter which can take part in chemical combination.
 6. Atoms of the same or different elements combine in small whole number ratios to form molecules of a element/compound.
 7. The relative number and kinds of atoms are constant in a given compound.
 8. Atoms of two different elements may combine in different ratios to form more than one compound. For example, carbon and oxygen may combine to form carbon monoxide (CO) and carbon dioxide (CO_2) in which the ratios of the combining atoms (C and O) are 1 : 1 and 1 : 2 respectively.
- Drawbacks:**
- (i) Atom is no more indivisible, instead of fact it is composed of $-1e$, $+1p$, $0n$.

(ii) Atoms of same element may have different masses i.e., isotopes. (iii) Different atoms may have same masses, i.e., isobars. (iv) Substances having same element may have different physical properties i.e., Allotropes. (v) Atoms may combine in fixed and integral ratio but not simple always. 2. 1. Atom: Basic unit and smallest part of any matter is made up of electron, protons and neutrons. 2. Molecule: A group of atoms bonded together, representing the smallest fundamental unit of a chemical compound that take part in a chemical reaction. 3. Atomic mass = No. of protons + No. of neutrons. 4. Molecular mass: Sum of atomic masses of constituting element of a given molecule. 3. (a) Caustic Potash (potassium hydroxide): KOH $K + O + H = 39 + 16 + 1 = 56u$ (b) Baking Powder (sodium bicarbonate): NaHCO₃ $Na + H + C + 3 \times O$ $= 23 + 1 + 12 + 3 \times 16 = 84u$ (c) Lime Stone (calcium carbonate): CaCO₃ $Ca + C + 3 \times O$ $= 40 + 12 + 3 \times 16 = 100u$ (d) Magnesium chloride MgCl₂ $Mg + 2 \times Cl$ $= 24 + 2 \times 35.5 = 95u$	(e) Common Salt (sodium chloride) NaCl $23 + 35.5 = 58.5u$ 4. (a) NaHCO₃ – sodium bicarbonate (b) K₂CO₃ – potassium carbonate (c) CuSO₄ – copper sulphate (d) CuO – copper oxide (e) Na₂SO₄ – sodium sulphate (f) (NH₄)₂CO₃ – ammonium carbonate 5. (i)  AlF₃ Aluminium Fluoride (ii)  Mg₃N₂ Magnesium Nitride (iii)  Al₂(SO₄)₃ Aluminium Sulphate (iv)  KF Potassium Fluoride (v)  MgF₂ Magnesium Fluoride (vi)  K₃N Potassium Nitride
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