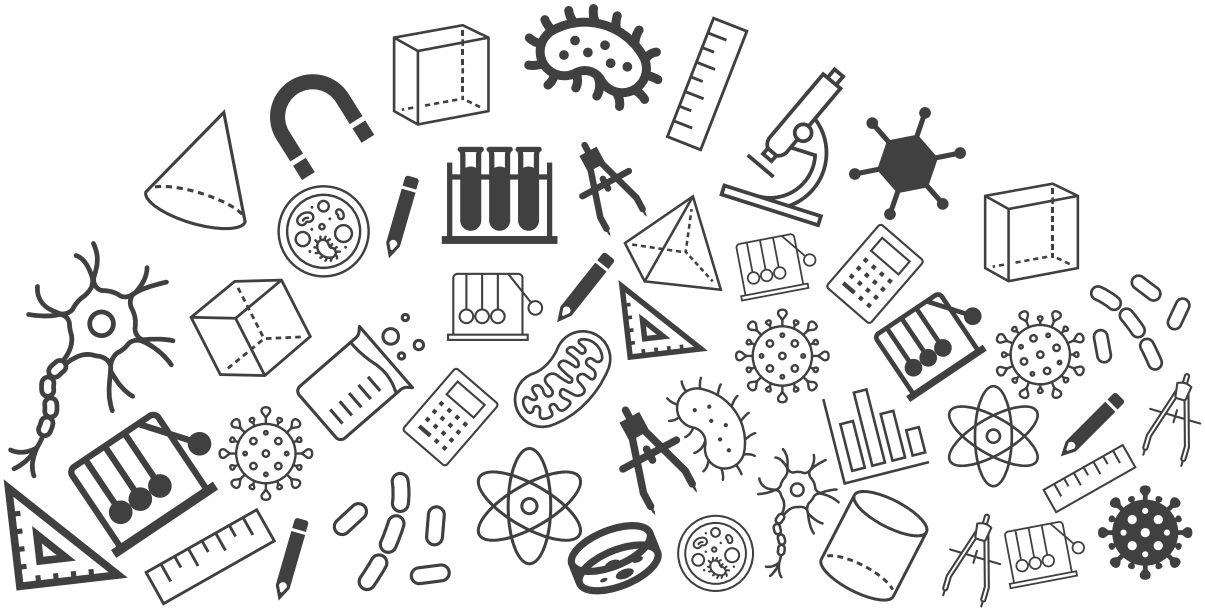
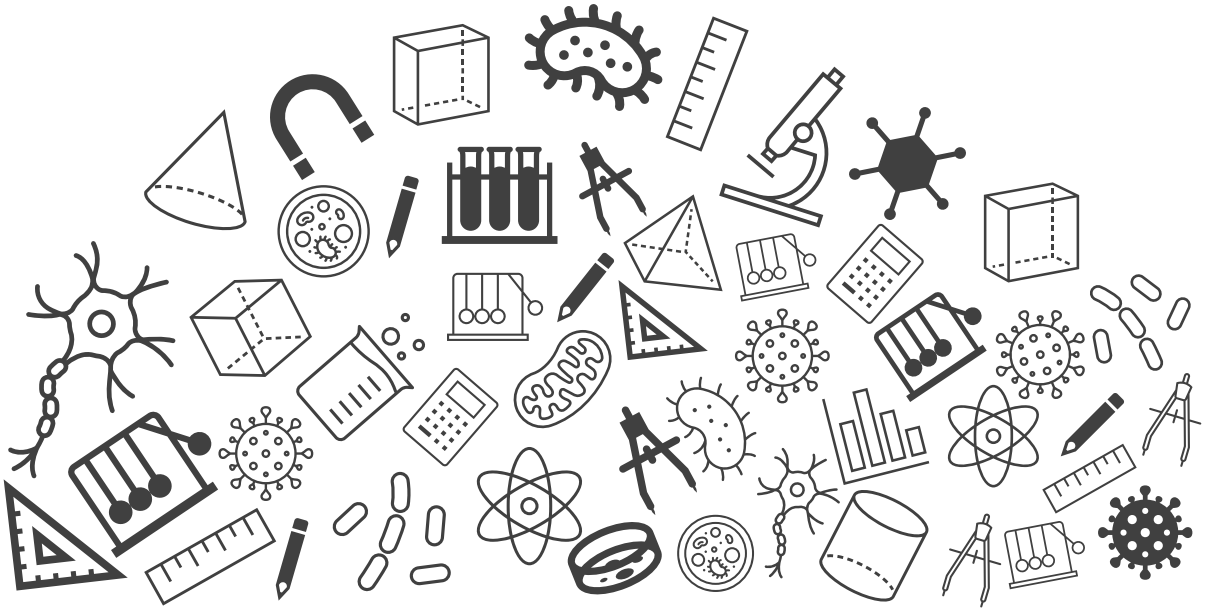
Grade 09
Science Chapter Notes



Atoms and Molecules



Atoms and Molecules

Topic : Exam Important Qustions

1. Which of the following symbols are incorrect? Give the correct symbols for the elements.

Elements	Symbols
a) Cobalt	CO
b) Carbon	C
c) Aluminium	AL
d) Potassium	Po
e) Argon	Ar
f) Sulphur	Sl

[2 Marks]

Solution:

Following are the elements with incorrect symbols:

- Cobalt
- Aluminium
- Potassium
- Sulphur

[1 Mark]

Elements	Correct symbols
a) Cobalt	Co
b) Carbon	C
c) Aluminium	Al
d) Potassium	K
e) Argon	Ar
f) Sulphur	S

[1 Mark]

Atoms and Molecules

2.

Define the term atomicity. Identify the atomicity of the following molecules.

a) CO

b) H_2O

c) S_8

d) O_3

e) He

f) H_2SO_4

g) PCl_3

h) P_4

[5 Marks]

The number of atoms constituting a molecule is known as its atomicity.

[1 Mark]

Molecule	Atomicity	
a) CO	2	[0.5 Marks]
b) H_2O	3	[0.5 Marks]
c) S_8	8	[0.5 Marks]
d) O_3	3	[0.5 Marks]
e) He	1	[0.5 Marks]
f) H_2SO_4	7	[0.5 Marks]
g) PCl_3	4	[0.5 Marks]
h) P_4	4	[0.5 Marks]

3. Classify the following as molecules of elements or molecules of compounds.

a) HNO_3

b) Ne

c) Br_2

d) CH_4

[2 Marks]

Molecule	Type of molecule	
a) HNO_3	Molecule of compound	[0.5 Marks]
b) Ne	Molecule of element	[0.5 Marks]
c) Br_2	Molecule of element	[0.5 Marks]
d) CH_4	Molecule of compound	[0.5 Marks]

4. What does the abbreviation 'amu' stand for? [1 Mark]

According to IUPAC recommendations, mass of the atoms is expressed in terms of atomic mass unit (amu).
1 amu is defined as mass equal to one-twelth the mass of a carbon-12 atom.
[1 Mark]

5. State the law of conservation of mass. Give one example to illustrate this law.
[2 Marks]

Law of conservation of mass:
The law of conservation of mass states that during a chemical reaction, mass is neither created nor destroyed.
In other words, the mass of the products in a chemical reaction must equal the mass of the reactants.
[1 Mark]
For example, when wood burns, the mass of the soot, ashes, and gases equals the original mass of the reatants i.e. wood and the oxygen.
[1 Mark]

6. State the postulates of Dalton's atomic theory.
[5 Marks]

The postulates of Dalton's atomic theory are:
(a) Matter is composed of minute particles called atoms, which take part in chemical reactions.
[1 Mark]

(b) Atoms cannot be further divided.
[1 Mark]

(c) The atoms of different elements differ from each other in their properties, while the atoms of the same element are identical in all respects.
[1 Mark]

(d) Atoms combine in the ratio of small whole numbers to form compounds.
[1 Mark]

(e) Atoms can be neither created nor be destroyed.
[1 Mark]

7. Write the chemical formula of nitrates formed by the following cations:
(i) Li^+
(ii) Ca^{2+}
(iii) K^+

[3 Marks]
[Exemplar]
[Formulae of Simple Compounds]

Solution:

The valency of nitrate ion (NO_3^-) is 1.

(i) The valency of Li^+ ion = 1

Symbol	Li	NO_3
Valency	1	1

By criss-crossing the valencies, we will get the chemical formula i.e. $LiNO_3$.

[1 Mark]

(ii) The valency of Ca^{2+} ion = 2

Symbol	Ca	NO_3
Valency	2	1

By criss-crossing the valencies, we will get the chemical formula i.e. $Ca(NO_3)_2$.

[1 Mark]

(iii) The valency of K^+ ion = 1

Symbol	K	NO_3
Valency	1	1

By criss-crossing the valencies, we will get the chemical formula i.e. KNO_3.

[1 Mark]

Atoms and Molecules

8. Write the chemical formula and formula unit masses of:
(i) magnesium carbonate
(ii) aluminium oxide

[5 Marks]

(i) Magnesium carbonate consists of magnesium ion and carbonate ion, i.e., $Mg^{2+}$and CO_3^{2-}. Both the ions have valency 2.

Symbol	Mg	CO_3
Valency	2	2

Upon criss-crossing the valencies and balancing the charges, we get the formula as $MgCO_3$.

[1.5 Marks]

The formula unit mass of $MgCO_3$ =
(1 $\times$ atomic mass of Mg) + (1 $\times$ atomic mass of C) + (3 $\times$ atomic mass of O) = (1 $\times$ 24 u) + (1 $\times$ 12 u) + (3 $\times$ 16 u) = 84 u

[1 Mark]

(ii) Aluminium oxide consists of aluminium ion and oxide ion, i.e., $Al^{3+}$and O^{2-}, having valency 3 and 2 respectively.

Symbol	Al	O
Valency	3	2

Upon criss-crossing the valencies, we get the formula as Al_2O_3.

[1.5 Marks]

The formula unit mass of Al_2O_3 =
(2 $\times$ atomic mass of Al) + (3 $\times$ atomic mass of O) = (2 $\times$ 27 u) + (3 $\times$ 16 u) = 102 u

[1 Mark]