



Class 9 Science Chapter 9 – Important MCQs

Atomic Foundations of Matter



New NCERT *Exploration* | 2026–27

These MCQs are based on the **new Chapter 9** of *Exploration*, covering the laws of chemical combination, Dalton's atomic theory, atoms and molecules, covalent and ionic compounds, ions, chemical formulae, molecular mass and formula unit mass.



SECTION A – LAWS OF CHEMICAL COMBINATION

1. The Law of Conservation of Mass states that matter:

- A. Can be created during a reaction
- B. Can be destroyed during a reaction
- C. Can neither be created nor destroyed in a chemical reaction
- D. Always changes into energy



Answer: C

2. The Law of Conservation of Mass was proposed by:

- A. John Dalton
- B. Antoine Lavoisier
- C. J. J. Thomson
- D. Rutherford



Answer: B. Antoine Lavoisier

The textbook identifies Lavoisier as the scientist who proposed this law in **1789**.

3. In a chemical reaction, the total mass of reactants is:

- A. Greater than the total mass of products
- B. Less than the total mass of products
- C. Equal to the total mass of products
- D. Always zero

 **Answer: C**

4. In an open vessel, the measured mass after a reaction may appear smaller if:

- A. A solid is formed
- B. A gas escapes
- C. Temperature decreases
- D. A liquid is formed

 **Answer: B. A gas escapes**

5. The Law of Constant Proportions states that a pure compound always contains its elements:

- A. In any proportion
- B. In a fixed proportion by mass
- C. In equal volumes
- D. In equal numbers

 **Answer: B**

6. Water obtained from different sources contains hydrogen and oxygen:

- A. In different mass ratios
- B. In a fixed mass ratio
- C. In equal masses
- D. Only when distilled

 **Answer: B**



SECTION B – DALTON'S ATOMIC THEORY

7. Dalton's atomic theory was proposed in:

- A. 1789
- B. 1808
- C. 1897
- D. 1932

☒ **Answer: B. 1808**

8. According to Dalton, atoms were considered:

- A. Divisible into electrons and protons
- B. Indivisible particles
- C. Made only of neutrons
- D. Made only of energy

☒ **Answer: B**

9. According to Dalton's theory, atoms of the same element:

- A. Have different properties
- B. Are identical in their properties
- C. Always have different masses
- D. Have different atomic numbers

☒ **Answer: B**

10. According to Dalton's theory, atoms combine to form compounds in:

- A. Random proportions
- B. Whole-number ratios

- C. Decimal ratios only
- D. Equal volumes only

✓ **Answer: B. Whole-number ratios**

11. Which discovery later showed that atoms are not indivisible?

- A. Discovery of subatomic particles
- B. Discovery of water
- C. Discovery of gravity
- D. Discovery of molecules only

✓ **Answer: A**



SECTION C – ATOMS, MOLECULES & COMPOUNDS

12. The smallest particle of an element that retains the properties of that element is:

- A. Molecule
- B. Atom
- C. Ion
- D. Compound

✓ **Answer: B. Atom**

13. A molecule is formed when:

- A. Two or more atoms are chemically bonded
- B. Two substances are physically mixed
- C. Only ions are present
- D. A single electron exists

✓ **Answer: A**

14. Which represents a molecule of oxygen?

- A. O
- B. O₂
- C. 2O₂
- D. O₃ only

 **Answer: B. O₂**

15. The number 2 in O₂ indicates:

- A. Atomic number
- B. Number of oxygen atoms in the molecule
- C. Mass number
- D. Valency

 **Answer: B**

16. Which of the following is a molecule of a compound?

- A. O₂
- B. N₂
- C. H₂
- D. H₂O

 **Answer: D. H₂O**

17. A molecule of carbon dioxide contains:

- A. 1 carbon atom and 1 oxygen atom
- B. 1 carbon atom and 2 oxygen atoms
- C. 2 carbon atoms and 1 oxygen atom
- D. 2 carbon atoms and 2 oxygen atoms

 **Answer: B**



SECTION D – COVALENT BONDING

18. A covalent bond is formed by:

- A. Transfer of electrons only
- B. Sharing of electrons
- C. Loss of protons
- D. Sharing of neutrons

☒ **Answer: B. Sharing of electrons**

19. Covalent compounds are generally formed between:

- A. Metals only
- B. Non-metals
- C. Metals and metals only
- D. Noble gases only

☒ **Answer: B. Non-metals**

20. In a covalent bond, atoms share:

- A. Protons
- B. Neutrons
- C. Electrons
- D. Nuclei

☒ **Answer: C. Electrons**

21. Which compound contains covalent bonding?

- A. H_2O
- B. NaCl
- C. MgO
- D. CaCl_2

☒ **Answer: A. H_2O**

22. Methane has the chemical formula:

- A. CH₃
- B. CH₄
- C. C₂H₄
- D. CH₂

 **Answer: B. CH₄**



SECTION E – IONIC BONDING

23. An ionic bond is generally formed by:

- A. Sharing electrons
- B. Transfer of electrons
- C. Sharing neutrons
- D. Transfer of protons

 **Answer: B. Transfer of electrons**

24. Ionic compounds are generally formed between:

- A. Two non-metals
- B. A metal and a non-metal
- C. Two noble gases
- D. Two gases only

 **Answer: B**

25. Sodium chloride (NaCl) contains:

- A. Covalent bonds only
- B. Ionic bonding
- C. Metallic bonding only
- D. Hydrogen bonding only

 **Answer: B. Ionic bonding**

26. Sodium forms Na^+ by:

- A. Gaining one electron
- B. Losing one electron
- C. Gaining two electrons
- D. Losing two electrons

☒ **Answer: B. Losing one electron**

27. Chlorine forms Cl^- by:

- A. Losing one electron
- B. Gaining one electron
- C. Losing two electrons
- D. Gaining two protons

☒ **Answer: B. Gaining one electron**

28. A positively charged ion is called:

- A. Anion
- B. Cation
- C. Molecule
- D. Neutron

☒ **Answer: B. Cation**

29. A negatively charged ion is called:

- A. Cation
- B. Anion
- C. Proton
- D. Atom

☒ **Answer: B. Anion**

SECTION F – PROPERTIES OF IONIC & COVALENT COMPOUNDS

30. Ionic compounds generally have:

- A. Very low melting points
- B. High melting and boiling points
- C. No melting point
- D. No boiling point

 **Answer: B**

31. Ionic compounds generally have high melting points because of:

- A. Weak forces between ions
- B. Strong attractions between oppositely charged ions
- C. Absence of ions
- D. Covalent bonds only

 **Answer: B**

32. Ionic compounds conduct electricity when:

- A. Always in the solid state
- B. Molten or dissolved in water
- C. Completely dry only
- D. Frozen

 **Answer: B**

33. Ionic compounds generally do not conduct electricity well in the solid state because:

- A. They contain no ions
- B. Their ions are fixed in the crystal lattice
- C. They have no charges
- D. They contain only electrons

✓ Answer: B

34. Covalent compounds generally have:

- A. High melting and boiling points
- B. Low melting and boiling points
- C. No physical properties
- D. Infinite melting points

✓ Answer: B

The textbook contrasts ionic compounds' generally high melting/boiling points with the generally lower values of covalent compounds.



SECTION G – CHEMICAL FORMULAE

35. The chemical formula of magnesium oxide is:

- A. MgO
- B. Mg₂O
- C. MgO₂
- D. Mg₂O₃

✓ Answer: A. MgO

36. The chemical formula of sodium chloride is:

- A. Na₂Cl
- B. NaCl₂
- C. NaCl
- D. Na₂Cl₂

✓ Answer: C. NaCl

37. The formula of calcium chloride is:

- A. CaCl
- B. CaCl_2
- C. Ca_2Cl
- D. Ca_2Cl_2

✓ Answer: B. CaCl_2

38. The formula of aluminium oxide is:

- A. AlO
- B. Al_2O
- C. AlO_2
- D. Al_2O_3

✓ Answer: D. Al_2O_3

39. The formula of sodium oxide is:

- A. NaO
- B. Na_2O
- C. NaO_2
- D. Na_2O_2

✓ Answer: B. Na_2O

40. The formula of magnesium chloride is:

- A. MgCl
- B. Mg_2Cl
- C. MgCl_2
- D. Mg_2Cl_2

✓ Answer: C. MgCl_2



SECTION H – VALENCY & IONS

41. The valency of sodium is:

- A. 1
- B. 2
- C. 3
- D. 0

☒ Answer: A. 1

42. The valency of magnesium is:

- A. 1
- B. 2
- C. 3
- D. 4

☒ Answer: B. 2

43. The valency of aluminium is:

- A. 1
- B. 2
- C. 3
- D. 4

☒ Answer: C. 3

44. The valency of oxygen is generally:

- A. 1
- B. 2
- C. 3
- D. 4

☒ Answer: B. 2

45. The valency of chlorine in chloride ion is:

- A. 1
- B. 2
- C. 3
- D. 7

✓ Answer: A. 1

46. Which ion has a +2 charge?

- A. Na^+
- B. Mg^{2+}
- C. Cl^-
- D. O^{2-}

✓ Answer: B. Mg^{2+}

47. Which ion has a -2 charge?

- A. Na^+
- B. Mg^{2+}
- C. O^{2-}
- D. Al^{3+}

✓ Answer: C. O^{2-}



SECTION I – MOLECULAR MASS

48. Molecular mass is calculated by:

- A. Multiplying all atomic masses
- B. Adding the atomic masses of all atoms present in a molecule
- C. Subtracting atomic masses
- D. Dividing atomic masses

✓ Answer: B

49. The molecular mass of H₂O is:

Given: H = 1 u, O = 16 u

- A. 16 u
- B. 17 u
- C. 18 u
- D. 20 u

 **Answer: C. 18 u**

$$\text{H}_2\text{O} = (1 \times 2) + 16 = 18 \text{ u}$$

The textbook gives the same calculation for water.

50. The molecular mass of CO₂ is:

Given: C = 12 u, O = 16 u

- A. 28 u
- B. 32 u
- C. 44 u
- D. 48 u

 **Answer: C. 44 u**

$$\text{CO}_2 = 12 + (16 \times 2) = 44 \text{ u}$$

51. The molecular mass of CH₄ is:

Given: C = 12 u, H = 1 u

- A. 13 u
- B. 14 u
- C. 16 u
- D. 18 u

 **Answer: C. 16 u**

52. The molecular mass of HNO₃ is:

H = 1 u, N = 14 u, O = 16 u

- A. 47 u
- B. 63 u
- C. 64 u
- D. 65 u

✓ Answer: B. 63 u

$$\text{HNO}_3 = 1 + 14 + (16 \times 3) = 63 \text{ u}$$



SECTION J – FORMULA UNIT MASS

53. Ionic compounds do not form individual molecules. Therefore, their mass is expressed as:

- A. Molecular mass
- B. Formula unit mass
- C. Atomic number
- D. Mass number

✓ Answer: B. Formula unit mass

54. A formula unit represents:

- A. One electron
- B. The simplest whole-number ratio of ions in an ionic compound
- C. One proton
- D. One molecule of every compound

✓ Answer: B

55. The formula unit mass of Na_2O is:

Na = 23 u, O = 16 u

- A. 39 u
- B. 46 u

- C. 55 u
- D. 62 u

✓ Answer: D. 62 u

$$\text{Na}_2\text{O} = (23 \times 2) + 16 = 62 \text{ u}$$

This is the calculation given in the textbook.

56. The formula unit mass of MgO is:

$$\text{Mg} = 24 \text{ u}, \text{O} = 16 \text{ u}$$

- A. 24 u
- B. 32 u
- C. 40 u
- D. 48 u

✓ Answer: C. 40 u

SECTION K – APPLICATION-BASED MCQs

57. An element has electronic configuration 2, 8, 2. It is most likely to:

- A. Gain 6 electrons
- B. Lose 2 electrons
- C. Gain 2 protons
- D. Share 8 neutrons

✓ Answer: B. Lose 2 electrons

58. An element has electronic configuration 2, 8, 7. It is most likely to:

- A. Lose 7 electrons
- B. Gain 1 electron

- C. Lose 1 electron
- D. Gain 7 protons

✓ **Answer: B. Gain 1 electron**

59. An element with configuration 2, 8, 5 combines with an element having configuration 2, 8, 7. The bond between them is most likely:

- A. Ionic
- B. Covalent
- C. Metallic
- D. No bond

✓ **Answer: B. Covalent**

The new textbook uses this type of configuration-based question to test whether students can predict bonding and formulae.

60. A compound does not conduct electricity in the solid state but conducts electricity when molten. It is most likely:

- A. A covalent compound
- B. An ionic compound
- C. An element
- D. A mixture

✓ **Answer: B. An ionic compound**



QUICK ANSWER KEY

Q	Ans.	Q	Ans.	Q	Ans.
1	C	21	A	41	A
2	B	22	B	42	B
3	C	23	B	43	C

4	B	24	B	44	B
5	B	25	B	45	A
6	B	26	B	46	B
7	B	27	B	47	C
8	B	28	B	48	B
9	B	29	B	49	C
10	B	30	B	50	C
11	A	31	B	51	C
12	B	32	B	52	B
13	A	33	B	53	B
14	B	34	B	54	B
15	B	35	A	55	D
16	D	36	C	56	C
17	B	37	B	57	B
18	B	38	D	58	B
19	B	39	B	59	B
20	C	40	C	60	B

MUST-REMEMBER FORMULAS & RULES

Law of Conservation of Mass

Mass of reactants = Mass of products

Law of Constant Proportions

A pure compound always contains the same elements in a **fixed proportion by mass**.

Molecular Mass

Molecular mass = Sum of atomic masses of all atoms in a molecule

Formula Unit Mass

Formula unit mass = Sum of atomic masses of all ions in the formula unit

Covalent Bond

Electrons are shared

Ionic Bond

Electrons are transferred

Cation

Positively charged ion

Anion

Negatively charged ion

Most Important Topics for Revision

 **Law of Conservation of Mass**

 **Law of Constant Proportions**

 **Dalton's Atomic Theory**

 **Atoms and molecules**

 **Covalent bonding**

 **Ionic bonding**

 **Cations and anions**

 **Writing chemical formulae**

 **Molecular mass**

 **Formula unit mass**

 **Properties of ionic and covalent compounds**

These are the central concepts explicitly covered in the supplied Chapter 9 study material and textbook.