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Chemistry Grade 9 — Chapter 6

Stoichiometry

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Practice MCQs extracted from the supplied Class 9 Chemistry chapter tests (Section A). Total: 30 questions.

A. Important / Main Topics

1. The chemical formula that gives the simplest whole-number ratio of atoms in a compound is called the:

(A) Empirical formula
(B) Molecular formula
(C) Structural formula
(D) Formula unit

Correct Answer: A

Explanation: The chemical formula that gives the simplest whole-number ratio of atoms in a compound is called the Empirical formula.

2. A mole of any substance contains:

(A) \(3.011 \times 10^{23}\) particles
(B) \(6.022 \times 10^{23}\) particles
(C) \(6.022 \times 10^{22}\) particles
(D) \(1.0 \times 10^{23}\) particles

Correct Answer: B

Explanation: A mole of any substance contains \(6.022 \times 10^{23}\) particles.

3. What is the molecular mass of glucose, C□H□□O□? (Atomic masses: C=12, H=1, O=16)

(A) 180 g
(B) 180 kg
(C) 180 amu
(D) 180 mg

Correct Answer: C

Explanation: "180 amu" is correct: it matches the idea asked in the question ("What is the molecular mass of glucose, C□H□□O□? (Atomic masses: C=12, H=1, O=16)"), while the other choices do not.

4. The mass of one mole of a substance is called its:

(A) Atomic mass
(B) Molecular mass
(C) Formula mass
(D) Molar mass

Correct Answer: D

Explanation: The mass of one mole of a substance (in g/mol) is called its molar mass.

5. How many moles of water are present in 36 g of H□O? (Molar mass of H□O = 18 g/mol)

(A) 2 moles
(B) 1 mole
(C) 3 moles
(D) 4 moles

Correct Answer: A

Explanation: "2 moles" is correct: it matches the idea asked in the question ("How many moles of water are present in 36 g of H□O? (Molar mass of H□O = 18 g/mol)"), while the other choices do not.

6. In the balanced chemical equation \(2H_2 + O_2 \rightarrow 2H_2O\), what is the coefficient of \(O_2\)?

(A) 2
(B) 1
(C) 3
(D) 4

Correct Answer: B

Explanation: In the balanced equation, the coefficient of \(O_2\) is 1 (understood, not written).

7. The empirical formula of hydrogen peroxide (H□O□) is:

(A) H□O
(B) HO□
(C) HO
(D) H□O□

Correct Answer: C

Explanation: The simplest ratio of H to O in H□O□ is 1:1, so the empirical formula is HO.

8. According to the law of conservation of mass, in a chemical reaction:

(A) Mass can be created
(B) Mass can be destroyed
(C) Mass changes into energy
(D) Total mass remains constant

Correct Answer: D

Explanation: The law of conservation of mass states that matter cannot be created or destroyed; the total mass of reactants equals the total mass of products.

9. Which of the following is the correct formula mass of NaCl? (Atomic masses: Na=23, Cl=35.5)

(A) 58.5 amu
(B) 58.5 g
(C) 23 amu
(D) 35.5 amu

Correct Answer: A

Explanation: "58.5 amu" is correct: it matches the idea asked in the question ("Which of the following is the correct formula mass of NaCl? (Atomic masses: Na=23, Cl=35.5)"), while the other choices do not.

10. The number of moles in \(3.011 \times 10^{23}\) atoms of carbon is:

(A) 1 mole
(B) 0.5 mole
(C) 2 moles
(D) 0.25 mole

Correct Answer: B

Explanation: The number of moles in \(3.011 \times 10^{23}\) atoms of carbon is 0.5 mole.

11. A compound has the empirical formula CH□O and a molar mass of 180 g/mol. What is its molecular formula?

(A) CH□O
(B) C□H□O□
(C) C□H□□O□
(D) C□H□O□

Correct Answer: C

Explanation: C□H□□O□ — this correctly answers the question.

12. Which of the following contains the **largest number of molecules?**

(A) 1 mole of H□O
(B) 1 mole of CO□
(C) 1 mole of CH□
(D) All contain the same number of molecules

Correct Answer: D

Explanation: All contain the same number of molecules — this correctly answers the question.

13. The mass of 3.011×10^{23} molecules of CO_2 (molar mass = 44 g/mol) is:

(A) 22 g
(B) 44 g
(C) 11 g
(D) 88 g

Correct Answer: A

Explanation: The mass of 3.011×10^{23} molecules of CO_2 (molar mass = 44 g/mol) is 22 g.

14. In the reaction $2H_2 + O_2 \rightarrow 2H_2O$, how many moles of water are produced from 4 moles of H_2?

(A) 2 moles
(B) 4 moles
(C) 8 moles
(D) 1 mole

Correct Answer: B

Explanation: 4 moles — this correctly answers the question.

15. Which of the following is the correct formula for the ionic compound formed between Al^{3+} and SO_4^{2-}?

(A) $AlSO_4$
(B) $Al(SO_4)_2$
(C) $Al_2(SO_4)_3$
(D) $Al_3(SO_4)_2$

Correct Answer: C

Explanation: The charges must balance: 2 Al^{3+} ions (total +6) and 3 SO_4^{2-} ions (total −6) give a neutral compound, $Al_2(SO_4)_3$.

B. Less Important / Secondary Topics

16. When the equation $Fe + O_2 \rightarrow Fe_2O_3$ is balanced, the coefficients are:

(A) 4, 3 → 2
(B) 2, 3 → 1
(C) 3, 2 → 1
(D) 1, 1 → 1

Correct Answer: A

Explanation: When the equation $Fe + O_2 \rightarrow Fe_2O_3$ is balanced, the coefficients are 4, 3 → 2.

17. The number of moles of NaCl in 117 g of NaCl (molar mass = 58.5 g/mol) is:

(A) 1 mole
(B) 2 moles
(C) 3 moles
(D) 0.5 mole

Correct Answer: B

Explanation: The number of moles of NaCl in 117 g of NaCl (molar mass = 58.5 g/mol) is 2 moles.

18. Which of the following has a mass of 1 amu?

(A) One hydrogen atom
(B) One carbon-12 atom
(C) 1/12 of a carbon-12 atom
(D) One electron

Correct Answer: C

Explanation: 1 amu is defined as exactly 1/12 the mass of one carbon-12 atom.

19. In the ionic equation for the reaction between HCl and NaOH, the spectator ions are:

(A) H□ and OH□
(B) H□ and Na□
(C) OH□ and Cl□
(D) Na□ and Cl□

Correct Answer: D

Explanation: In the reaction \(H^+ + Cl^- + Na^+ + OH^- \rightarrow Na^+ + Cl^- + H_2O\), Na□ and Cl□ appear on both sides unchanged, so they are spectator ions.

20. The empirical formula of a compound is CH□. If its molecular mass is 42 amu, the molecular formula is:

(A) C□H□
(B) CH□
(C) C□H□
(D) C□H□

Correct Answer: A

Explanation: The empirical formula of a compound is CH□. If its molecular mass is 42 amu, the molecular formula is C□H□.

21. A compound has the empirical formula CH and a molar mass of 78 g/mol. What is its molecular formula?

(A) C□H□
(B) C□H□
(C) C□H□
(D) C□H□

Correct Answer: B

Explanation: C□H□ — this correctly answers the question.

22. In the reaction \(N_2 + 3H_2 \rightarrow 2NH_3\), how many moles of \(NH_3\) are produced from 6 moles of \(H_2\)?

(A) 2 moles
(B) 3 moles
(C) 4 moles
(D) 6 moles

Correct Answer: C

Explanation: The balanced equation shows 3 moles of \(H_2\) produce 2 moles of \(NH_3\). So, 6 moles of \(H_2\) produce \((6/3) \times 2 = 4\) moles of \(NH_3\).

23. A sample contains \(1.2044 \times 10^{24}\) atoms of sodium. What is the mass of this sample? (Molar mass of Na = 23 g/mol)

(A) 23 g
(B) 11.5 g
(C) 92 g
(D) 46 g

Correct Answer: D

Explanation: "46 g" is correct: it matches the idea asked in the question ("A sample contains \(1.2044 \times 10^{24}\) atoms of sodium. What is the mass of this sample? (Molar mass of Na = 23 g/mol)"), while the other choices do not.

24. Which of the following is the correct net ionic equation for the reaction between silver nitrate (AgNO□) and sodium chloride (NaCl)?

(A) \(Ag^+ + Cl^- \rightarrow AgCl\)
(B) \(AgNO_3 + NaCl \rightarrow AgCl + NaNO_3\)
(C) \(Na^+ + NO_3^- \rightarrow NaNO_3\)
(D) \(Ag^+ + Na^+ \rightarrow AgNa\)

Correct Answer: A

Explanation: The spectator ions (Na□ and NO□□) are removed, leaving the net ionic equation \(Ag^+_{(aq)} + Cl^-_{(aq)} \rightarrow AgCl_{(s)}\).

25. What is the mass of 0.25 moles of calcium carbonate (CaCO□)? (Atomic masses: Ca=40, C=12, O=16)

(A) 50 g
(B) 25 g
(C) 100 g
(D) 125 g

Correct Answer: B

Explanation: "25 g" is correct: it matches the idea asked in the question ("What is the mass of 0.25 moles of calcium carbonate (CaCO□)? (Atomic masses: Ca=40, C=12, O=16)"), while the other choices do not.

26. The relative atomic mass of an element is 24 amu. What is the mass of \(1.5\) moles of this element?

(A) 24 g
(B) 48 g
(C) 36 g
(D) 12 g

Correct Answer: C

Explanation: 36 g — this correctly answers the question.

27. Which of the following is **not a valid molecular formula if the empirical formula is CH□O and the molar mass is 60 g/mol?**

(A) C□H□O□
(B) C□H□O□
(C) CH□O
(D) C□H□O□

Correct Answer: D

Explanation: The empirical formula mass is 30 g/mol. For a molar mass of 60 g/mol, \(n = 60/30 = 2\), so the molecular formula is C□H□O□. C□H□O□ would have a molar mass of 120 g/mol, not 60.

28. How many molecules are there in 44 g of carbon dioxide (CO□)? (Molar mass of CO□ = 44 g/mol)

(A) \(6.022 \times 10^{23}\)
(B) \(1.2044 \times 10^{24}\)
(C) \(3.011 \times 10^{23}\)
(D) \(1.0 \times 10^{23}\)

Correct Answer: A

Explanation: "\(6.022 \times 10^{23}\)" is correct: it matches the idea asked in the question ("How many molecules are there in 44 g of carbon dioxide (CO□)? (Molar mass of CO□ = 44 g/mol)"), while the other choices do not.

29. A hydrocarbon contains 92.3% carbon and 7.7% hydrogen by mass. Its empirical formula is:

(A) CH□
(B) CH
(C) CH□
(D) C□H□

Correct Answer: B

Explanation: A hydrocarbon contains 92.3% carbon and 7.7% hydrogen by mass. Its empirical formula is CH.

30. In the reaction \(2KClO_3 \rightarrow 2KCl + 3O_2\), how many moles of oxygen gas are produced from 4 moles of KClO□?

(A) 2 moles
(B) 4 moles
(C) 6 moles
(D) 8 moles

Correct Answer: C

Explanation: The balanced equation shows 2 moles of KClO□ produce 3 moles of O□. So, 4 moles of KClO□ produce \((4/2) \times 3 = 6\) moles of O□.