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Chemistry Grade 10 — Chapter 3

Stoichiometry

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Independent practice MCQs from the supplied Class 10 Chemistry notes pack. Total: 50 questions.

A. Important / Main Topics

1. The study of relative amounts of the substances involved in a chemical reaction is known as:

(A) Stoichiometry
(B) Electrochemistry
(C) Thermodynamics
(D) Kinetics

Correct Answer: A

Explanation: Stoichiometry is the study of relative amounts of substances involved in a chemical reaction.

2. The word "Stoichiometry" comes from the Greek word "Stoichen" meaning:

(A) Measure
(B) Element
(C) Reaction
(D) Compound

Correct Answer: B

Explanation: "Stoichen" means element, and "Metron" means measure.

3. One mole of any gas at RTP occupies a volume of:

(A) 22.4 dm^3
(B) 1 dm^3
(C) 24 dm^3
(D) 1000 dm^3

Correct Answer: C

Explanation: One mole of any gas at RTP occupies a volume of 24 dm^3.

4. The reactant that is completely consumed in a reaction is called the:

(A) Excess reactant
(B) Catalyst
(C) Product
(D) Limiting reactant

Correct Answer: D

Explanation: The limiting reactant is the reactant that is completely consumed in a reaction.

5. Percentage yield is calculated by:

(A) (Actual/Theoretical) × 100
(B) (Theoretical/Actual) × 100
(C) (Actual × Theoretical) × 100
(D) (Theoretical - Actual) × 100

Correct Answer: A

Explanation: Percentage yield is calculated by (Actual/Theoretical) × 100.

6. The empirical formula of a compound tells you:

(A) The actual number of atoms in a molecule
(B) The simplest ratio of elements in the compound
(C) The molar mass of the compound
(D) The percentage composition of the compound

Correct Answer: B

Explanation: The empirical formula of a compound tells you The simplest ratio of elements in the compound.

7. The amount of pure substance in a sample represented as a percentage of the sample's total mass is called:

(A) Percentage yield
(B) Percentage composition
(C) Percentage purity
(D) Percentage error

Correct Answer: C

Explanation: Percentage purity is the amount of pure substance in a sample as a percentage of total mass.

8. Molarity is defined as the number of moles of solute dissolved per:

(A) g of solvent
(B) mol of solvent
(C) cm^3 of solution
(D) dm^3 of solution

Correct Answer: D

Explanation: Molarity is defined as the number of moles of solute dissolved per dm^3 of solution.

9. The strength of a solution is expressed in:

(A) g/dm^3 or g/cm^3
(B) mol/dm^3
(C) mol/kg
(D) g/mol

Correct Answer: A

Explanation: Strength is expressed in g/dm^3 or g/cm^3.

10. The formula for dilution is:

(A) M□ / V□ = M□ / V□
(B) M□ × V□ = M□ × V□
(C) M□ + V□ = M□ + V□
(D) M□ × M□ = V□ × V□

Correct Answer: B

Explanation: The dilution formula is M□V□ = M□V□.

11. In a titration, the point at which the reaction is complete is called the:

(A) Start point
(B) Midpoint
(C) End point
(D) Equivalence point

Correct Answer: C

Explanation: The point at which the reaction is complete is called the end point.

12. The SI unit to express the amount of a substance is:

(A) Gram
(B) Litre
(C) Kelvin
(D) Mole

Correct Answer: D

Explanation: The mole is the SI unit to express the amount of a substance (symbol: mol).

13. One mole of H□O (molecule) is equal to:

(A) 18 g
(B) 16 g
(C) 32 g
(D) 44 g

Correct Answer: A

Explanation: One mole of H□O (molecule) is equal to 18 g.

14. Which of the following is the correct formula to calculate the number of moles?

(A) n = m × M
(B) n = fracmM
(C) n = m + M
(D) n = m - M

Correct Answer: B

Explanation: Number of moles n = fracmM, where m is mass and M is molar mass.

15. The percentage composition of an element in a compound is calculated by:

(A) (molar mass / mass of element) × 100
(B) (mass of element × molar mass) × 100
(C) (mass of element / molar mass) × 100
(D) (molar mass - mass of element) × 100

Correct Answer: C

Explanation: The percentage composition of an element in a compound is calculated by (mass of element / molar mass) × 100.

16. In the reaction 2H□ + O□ → 2H□O, how many moles of H□ are needed to react with 3 moles of O□?

(A) 3 moles
(B) 9 moles
(C) 12 moles
(D) 6 moles

Correct Answer: D

Explanation: 6 moles — this correctly answers the question.

17. One mole of any gas at RTP occupies 24 dm³. What volume will 2.5 moles of chlorine gas occupy at RTP?

(A) 60 dm³
(B) 24 dm³
(C) 48 dm³
(D) 2.5 dm³

Correct Answer: A

Explanation: 60 dm³ — this correctly answers the question.

18. In the reaction Zn + H□SO□ → ZnSO□ + H□, if 200 g of Zn reacts with 200 g of H□SO□, which is the limiting reactant?

(A) Zn
(B) H□SO□
(C) Both are limiting
(D) Neither is limiting

Correct Answer: B

Explanation: Moles of Zn = 200/65.4 = 3.06; moles of H□SO□ = 200/98 = 2.04. H□SO□ produces fewer moles of product, so it is the limiting reactant.

19. A solution contains 40 g of urea dissolved in 500 cm³ of solution. What is the molarity of this solution? (Molar mass of urea = 60 g/mol)

(A) 0.667 M
(B) 2.000 M
(C) 1.334 M
(D) 0.500 M

Correct Answer: C

Explanation: "1.334 M" is correct: it matches the idea asked in the question ("A solution contains 40 g of urea dissolved in 500 cm³ of solution. What is the molarity of this solution? (Molar mass of urea = 60 g/mol)"), while the

other choices do not.

20. The strength of a solution is expressed in g/dm³. If a solution contains 20 g of salt in 2 dm³, the strength is:

(A) 5 g/dm³
(B) 20 g/dm³
(C) 40 g/dm³
(D) 10 g/dm³

Correct Answer: D

Explanation: The strength of a solution is expressed in g/dm³. If a solution contains 20 g of salt in 2 dm³, the strength is 10 g/dm³.

21. In the dilution formula M□V□ = M□V□, if M□ = 4\ M, V□ = 125\ cm³, and V□ = 500\ cm³, what is M□?

(A) 1 M
(B) 0.5 M
(C) 2 M
(D) 4 M

Correct Answer: A

Explanation: 1 M — this correctly answers the question.

22. In a titration, 10 cm³ of NaOH is neutralized by 9.8 cm³ of 0.1 M HCl. What is the molarity of NaOH?

(A) 0.1 M
(B) 0.098 M
(C) 0.98 M
(D) 1.0 M

Correct Answer: B

Explanation: 0.098 M — this correctly answers the question.

23. A compound has 40% C, 6.7% H, and 53.3% O. What is its empirical formula?

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

Correct Answer: C

Explanation: CH□O — this correctly answers the question.

24. If the theoretical yield of a reaction is 50 g and the actual yield is 40 g, what is the percentage yield?

(A) 125%
(B) 10%
(C) 90%
(D) 80%

Correct Answer: D

Explanation: 80% — this correctly answers the question.

25. One mole of any gas at RTP occupies 24 dm³. How many moles of oxygen are there in 50.0 dm³ of oxygen gas at RTP?

(A) 2.08 moles
(B) 1.0 mole
(C) 24 moles
(D) 50 moles

Correct Answer: A

Explanation: 2.08 moles — this correctly answers the question.

B. Less Important / Secondary Topics

26. In the reaction Zn + H□SO□ → ZnSO□ + H□, if 200 g of Zn reacts with 200 g of H□SO□, what is the mass of hydrogen produced?

(A) 4.08 g
(B) 2.04 g
(C) 6.12 g
(D) 8.16 g

Correct Answer: A

Explanation: 4.08 g — this correctly answers the question.

27. What is the percentage composition of hydrogen in water (H□O)?

(A) 88.89%
(B) 11.11%
(C) 50.00%
(D) 33.33%

Correct Answer: B

Explanation: 11.11% — this correctly answers the question.

28. What is the percentage composition of oxygen in water (H□O)?

(A) 11.11%
(B) 50.00%
(C) 88.89%
(D) 33.33%

Correct Answer: C

Explanation: 88.89% — this correctly answers the question.

29. 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: D

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

30. A solution contains 0.05 moles of KMnO□ in 600 cm³ of solution. What is the molarity?

(A) 0.083 M
(B) 0.05 M
(C) 0.6 M
(D) 0.3 M

Correct Answer: A

Explanation: 0.083 M — this correctly answers the question.

31. The percentage purity of a sample is 80%. If the total mass of the sample is 70 g, what is the mass of the pure compound?

(A) 14 g
(B) 56 g
(C) 70 g
(D) 80 g

Correct Answer: B

Explanation: 56 g — this correctly answers the question.

32. In a titration, 25.0 cm³ of 0.10 M NaOH neutralizes 20.0 cm³ of HCl. What is the concentration of HCl?

(A) 0.08 M
(B) 0.10 M
(C) 0.125 M

(D) 0.20 M

Correct Answer: C

Explanation: 0.125 M — this correctly answers the question.

33. What volume does 2.5 moles of chlorine gas occupy at RTP?

(A) 24 dm³
(B) 48 dm³
(C) 2.5 dm³
(D) 60 dm³

Correct Answer: D

Explanation: 60 dm³ — this correctly answers the question.

34. A compound has 26.4% C, 3.3% H, and 70.3% O by mass. What is its empirical formula?

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

Correct Answer: A

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

35. In the reaction 2H□ + O□ → 2H□O, if 10 moles of H□ and 10 moles of O□ are reacted, which is the limiting reactant?

(A) O□
(B) H□
(C) Both are limiting
(D) Neither is limiting

Correct Answer: B

Explanation: H□ — this correctly answers the question.

36. A compound has the following composition: Carbon = 40%, Hydrogen = 6.7%, Oxygen = 53.3%. The molar mass of the compound is 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.

37. In an industry, copper metal was prepared by the reaction: Fe + CuSO□ → FeSO□ + Cu 1.274 g of CuSO□ when reacted with excess Fe gives a yield of 0.392 g of Cu. What is the percentage yield?

(A) 80.0%
(B) 70.0%
(C) 85.0%
(D) 77.3%

Correct Answer: D

Explanation: 77.3% — this correctly answers the question.

38. A compound has the following composition: 18.24 g Carbon, 0.51 g Hydrogen, and 16.91 g Fluorine. Its molar mass is 562.0 g/mol. What is its empirical formula?

(A) C□□H□F□
(B) C□H□F
(C) C□H□F□
(D) C□□H□F□□

Correct Answer: A

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

39. A compound has the following composition: 18.24 g Carbon, 0.51 g Hydrogen, and 16.91 g Fluorine. Its molar mass is 562.0 g/mol. What is its molecular formula?

(A) C□□H□F□
(B) C□□H□F□□
(C) C□H□F□
(D) C□H□F

Correct Answer: B

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

40. An impure sample of calcium carbonate has a mass of 70 g. After purification, 56 g of calcium carbonate is recovered. What is the percentage purity of calcium carbonate?

(A) 56%
(B) 70%
(C) 80%
(D) 90%

Correct Answer: C

Explanation: 80% — this correctly answers the question.

41. A compound has the following composition: 26.4% C, 3.3% H, and 70.3% O by mass. What is its molecular formula if its molar mass is 91.0 g/mol?

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

Correct Answer: D

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

42. In the reaction 2H□ + O□ → 2H□O, if 10 moles of H□ and 10 moles of O□ are reacted, what is the maximum number of moles of H□O that can be produced?

(A) 10 moles
(B) 20 moles
(C) 5 moles
(D) 15 moles

Correct Answer: A

Explanation: H□ is the limiting reactant. From the.

43. A student is required to prepare a 0.5 mol/dm³ NaCl solution for an experiment. What mass of NaCl is needed to prepare 250 cm³ of the solution? (Molar mass of NaCl = 58.5 g/mol)

(A) 14.63 g
(B) 7.31 g
(C) 29.25 g
(D) 58.50 g

Correct Answer: B

Explanation: "7.31 g" is correct: it matches the idea asked in the question ("A student is required to prepare a 0.5 mol/dm³ NaCl solution for an experiment. What mass of NaCl is needed to prepare 250 cm³ of the solution? (Molar mass of NaCl = 58.5 g/mol)"), while the other choices do not.

44. In the reaction 2H□ + O□ → 2H□O, if 3.50 moles of methanol are burnt in oxygen, how many moles of water are produced?

(A) 3.50 moles
(B) 5.25 moles
(C) 7.00 moles
(D) 10.5 moles

Correct Answer: C

Explanation: 7.00 moles — this correctly answers the question.

45. In an experiment, 2.00 moles of CH□ were reacted with excess Cl□. As a result, 177.0 g of CCl□ is obtained. What is the percentage yield?

(A) 60.00%
(B) 70.00%
(C) 45.00%
(D) 57.47%

Correct Answer: D

Explanation: 57.47% — this correctly answers the question.

46. A compound has the following composition: 65.45% C, 5.45% H, and 29.09% O. Its molar mass is 110 g/mol. What is its molecular formula?

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

Correct Answer: A

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

47. In the reaction CaCO□ + 2HCl → CaCl□ + CO□ + H□O, 68.1 g of CaCO□ is mixed with 51.6 g HCl. Which is the limiting reactant?

(A) CaCO□
(B) HCl
(C) Both are limiting
(D) Neither is limiting

Correct Answer: B

Explanation: Moles of CaCO□ = 68.1/100 = 0.681; moles of HCl = 51.6/36.5 = 1.414. From the.

48. Copper(II) sulphate is prepared by the reaction of dilute sulphuric acid on Copper(II) oxide. A student prepared 1.85 g of copper(II) sulphate. If its theoretical yield is 2.5 g, what is the percentage yield?

(A) 80%
(B) 85%
(C) 74%
(D) 90%

Correct Answer: C

Explanation: 74% — this correctly answers the question.

49. For the reaction C□H□ + 3O□ → 2CO□ + 2H□O, what number of moles of CO□ can be produced by the reaction of 0.480 mol of C□H□ and 1.08 mol of O□?

(A) 0.480 mol
(B) 0.960 mol
(C) 1.080 mol
(D) 0.720 mol

Correct Answer: D

Explanation: 0.720 mol — this correctly answers the question.

50. Given 48 g of methane (CH□) and excess oxygen, what volume of carbon dioxide gas is produced at room temperature and pressure?

(A) 72 dm^3
(B) 24 dm^3
(C) 48 dm^3
(D) 96 dm^3

Correct Answer: A

Explanation: 72 dm^3 — this correctly answers the question.