Atoms & Molecules

Here are 20 multiple-choice questions (MCQs) based on the mole concept, suitable for testing understanding and application of this fundamental chemical concept. Answers will be provided on the next page.

Questions:

1. How many moles are there in 22 grams of carbon dioxide (CO2)?

    - A) 0.5 moles
    - B) 1 mole
    - C) 0.1 moles
    - D) 2 moles

2. What is the mass of one mole of water (H2O)?

    - A) 18 grams
    - B) 20 grams
    - C) 22 grams
    - D) 24 grams

3. How many molecules are there in 2 moles of sodium chloride (NaCl)?

    - A) 12.044×10^{23}
    - B) 6.022×10^{23}
    - C) 3.011×10^{23}
    - D) 1.2044×10^{24}

4. How many atoms are in 0.5 moles of aluminum (Al)?

    - A) 3.011×10^{23}
    - B) 1.2044×10^{24}
    - C) 6.022×10^{23}
    - D) 5.018×10^{23}

5. How many grams of carbon are in 2 moles of glucose (C6H12O6)?

    - A) 12 grams
    - B) 24 grams
    - C) 72 grams
    - D) 144 grams

6. How many oxygen atoms are there in 3 moles of carbon dioxide?

    - A) 3.611×10^{24}

- B) 18.066×10^{24}
- C) 9.033×10^{23}
- D) 6.022×10^{23}

7. One mole of any gas at STP occupies what volume?

   - A) 22.4 liters
   - B) 24.0 liters
   - C) 20.0 liters
   - D) 18.0 liters

8. How many moles are there in 46 grams of sodium (Na)?

   - A) 1 mole
   - B) 2 moles
   - C) 0.5 moles
   - D) 2.5 moles

9. What is the mass of 0.2 moles of iron (Fe)?

   - A) 11.2 grams
   - B) 22.4 grams
   - C) 5.6 grams
   - D) 1.12 grams

10. How many molecules are in 1 mole of H_2O?

    - A) 6.022×10^{23}
    - B) 12.044×10^{23}
    - C) 3.011×10^{23}
    - D) 1.2044×10^{24}

11. The number of moles in 320 grams of sulfur (S) is approximately?

    - A) 10 moles
    - B) 5 moles
    - C) 20 moles
    - D) 2 moles

12. What is the total number of atoms in 2 moles of methane (CH4)?

    - A) 6.022×10^{24}
    - B) 12.044×10^{24}
    - C) 3.011×10^{24}
    - D) 24.088×10^{24}

13. Calculate the number of moles in 342 grams of sucrose (C12H22O11).

    - A) 1 mole
    - B) 0.5 moles
    - C) 2 moles

- D) 0.1 moles

14. How many ions are present in 0.75 moles of $NaCl$?

- A) 4.517×10^{23}
- B) 9.033×10^{23}
- C) 1.8066×10^{24}
- D) 6.022×10^{23}

15. What is the mass of 3 moles of nitrogen gas (N2)?

- A) 84 grams
- B) 42 grams
- C) 28 grams
- D) 56 grams

16. How many moles of calcium carbonate (CaCO3) are in 500 grams?

- A) 5 moles
- B) 10 moles
- C) 2.5 moles
- D) 3.5 moles

17. How many total moles are in 18 grams of water?

- A) 1 mole
- B) 0.5 moles
- C) 2 moles
- D) 1.5 moles

18. How many grams of hydrogen are in 1 mole of methane (CH4)?

- A) 4 grams
- B) 1 gram
- C) 2 grams
- D) 3 grams

19. Calculate the number of moles in 22 grams of argon (Ar).

- A) 0.5 moles
- B) 1 mole
- C) 1.5 moles
- D) 2 moles

20. How many atoms are in 3 moles of helium (He)?

- A) 1.8066×10^{24}
- B) 18.066×10^{23}
- C) 6.022×10^{23}
- D) 9.033×10^{24}

Answer Key:

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Here is the **Answer Key** for the mole concept multiple-choice questions provided earlier:

1. **A** - 0.5 moles
2. **A** - 18 grams
3. **D** - 1.2044×10^{24} molecules
4. **A** - 3.011×10^{23} atoms
5. **C** - 72 grams
6. **A** - 3.611×10^{24} oxygen atoms
7. **A** - 22.4 liters
8. **B** - 2 moles
9. **A** - 11.2 grams
10. **A** - 6.022×10^{23} molecules
11. **D** - 10 moles
12. **A** - 6.022×10^{24} atoms
13. **A** - 1 mole
14. **C** - 1.8066×10^{24} ions
15. **B** - 84 grams
16. **C** - 5 moles
17. **A** - 1 mole
18. **B** - 4 grams
19. **A** - 0.5 moles
20. **D** - 1.8066×10^{24} atoms

These answers use the fundamental principles of the mole concept to relate masses of substances to their molecular or atomic quantities, essential for solving problems in chemistry.