

High School Chemistry Practice Problems - Mole Concept

1. What is the molar mass of water (H_2O)? Use atomic masses of H = 1.01 g/mol and O = 16.00 g/mol.
 - A) 17.01 g/mol
 - B) 18.02 g/mol
 - C) 19.02 g/mol
 - D) 20.02 g/mol
2. How many moles are present in 72.08 grams of water (H_2O)?
 - A) 1 mol
 - B) 2 mol
 - C) 3 mol
 - D) 4 mol
3. What is the mass of 0.5 moles of carbon dioxide (CO_2)? Use atomic masses of C = 12.01 g/mol and O = 16.00 g/mol.
 - A) 11.01 g
 - B) 22.01 g
 - C) 33.01 g
 - D) 44.01 g
4. Avogadro's number is 6.02×10^{23} particles per mole. How many molecules are in 2 moles of water?
 - A) 1.204×10^{24}
 - B) 3.01×10^{23}
 - C) 6.02×10^{23}
 - D) 1.204×10^{23}
5. A sample contains 9.03×10^{23} molecules of water. How many moles is this?
 - A) 0.5 mol
 - B) 1.0 mol
 - C) 1.5 mol
 - D) 2.0 mol

Answer Key

1. This problem asks for the molar mass of water using given atomic masses.
Step 1: Identify the formula H_2O , which contains 2 hydrogen atoms and 1 oxygen atom.
Step 2: Apply the definition of molar mass as the sum of the atomic masses of all atoms in the formula.
Step 3: Calculate $2 \times 1.01 + 1 \times 16.00 = 18.02 \text{ g/mol}$.
The correct answer is B.
2. This problem asks to convert grams of water to moles.
Step 1: Recall that $\text{moles} = \text{mass} \div \text{molar mass}$.
Step 2: Use the molar mass of water found in Problem 1 (18.02 g/mol).
Step 3: Divide $72.08 \div 18.02 = 4 \text{ moles}$.
The correct answer is D.
3. This problem asks to convert moles of CO_2 to mass.
Step 1: Calculate molar mass of CO_2 : $12.01 + (2 \times 16.00) = 44.01 \text{ g/mol}$.
Step 2: Apply $\text{mass} = \text{moles} \times \text{molar mass}$.
Step 3: Multiply $0.5 \times 44.01 = 22.005 \text{ g}$, which rounds to 22.01 g .
The correct answer is B.
4. This problem asks to convert moles to number of molecules using Avogadro's number.
Step 1: Recall that 1 mole contains 6.02×10^{23} particles.
Step 2: Multiply the given moles (2) by Avogadro's number: $2 \times 6.02 \times 10^{23} = 1.204 \times 10^{24}$.
The correct answer is A.
5. This problem asks to convert number of molecules to moles.
Step 1: Divide the given number of molecules by Avogadro's number: $9.03 \times 10^{23} \div 6.02 \times 10^{23}$.
Step 2: Perform the division to get 1.5 moles.
The correct answer is C.