

Moles Calculations

GCSE Chemistry · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Calculate the number of moles in 11 g of carbon dioxide, CO₂. (C = 12, O = 16) (2 marks)

Step 1 · M_r

$$12 + 2 \times 16 = 44$$

Step 2 · moles = mass ÷ M_r

$$11 \div 44 = 0.25 \text{ mol}$$

Answer: 0.25 mol

Check: $0.25 \times 44 = 11 \text{ g}$ ✓

2. Now try one with the steps

Calculate the mass of 0.25 mol of sulfuric acid, H₂SO₄. (H = 1, S = 32, O = 16) (2 marks)

Step 1 · M_r

Step 2 · mass = moles × M_r

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Calculate the relative formula mass of sodium hydroxide, NaOH. (Na = 23, O = 16, H = 1) [1]

2. Calculate the relative formula mass of calcium carbonate, CaCO₃. (Ca = 40, C = 12, O = 16) [1]

3. State the value of the Avogadro constant. [1]

4. Calculate the number of moles in 36 g of water. (M_r = 18) [1]

5. Calculate the number of moles in 4.0 g of sodium hydroxide. ($M_r = 40$) [1]

6. Calculate the mass, in g, of 0.5 mol of calcium carbonate. ($M_r = 100$) [1]

7. Calculate the number of moles in 11 g of carbon dioxide. ($C = 12$, $O = 16$) [2]

8. Calculate the mass, in g, of 0.25 mol of sulfuric acid, H_2SO_4 . ($H = 1$, $S = 32$, $O = 16$) [2]

9. 0.20 mol of a compound has a mass of 11.7 g. Calculate its relative formula mass. [1]

10. Explain why 12 g of carbon and 24 g of magnesium contain the same number of atoms. ($C = 12$, $Mg = 24$) [2]

11. Calculate the number of moles of oxygen atoms in 0.5 mol of carbon dioxide, CO_2 . [1]

12. Calculate the number of molecules in 2.0 mol of water. Give your answer in standard form. [1]

13. Calculate the mass, in g, of 3.01×10^{23} molecules of carbon dioxide. ($M_r = 44$) [2]

14. Which contains more molecules: 10 g of hydrogen, H_2 , or 100 g of carbon dioxide, CO_2 ? Show your working. ($H = 1$, $C = 12$, $O = 16$) [3]

4. Before you hand it in

Calculating $M_r \div \text{mass}$ instead of $\text{mass} \div M_r$

moles = mass $\div$ M_r . Check: more grams should mean more moles.

Using the A_r of O (16) for oxygen gas

For O_2 use $M_r = 32$; for H_2 use 2; for Cl_2 use 71.

Confusing moles of molecules with moles of atoms

Multiply by the number of that atom in the formula, e.g. 1 mol of CO_2 has 2 mol of O atoms.