



1 What is the mass of one mole of CO₂?

$$M_r = 12 + 2(16) = 44$$

$$\text{mass of 1 mole of CO}_2 = 44 \text{ g}$$

2 How many moles are there in 99 g of H₂O?

$$M_r = 2(1) + 16 = 18$$

$$\text{moles} = \frac{\text{mass}}{M_r} = \frac{99}{18} = 5.5 \text{ moles}$$

3 What is the mass of 0.250 moles of N₂?

$$M_r = 2(14) = 28$$

$$\text{mass} = M_r \times \text{moles} = 28 \times 0.250 = 7.0 \text{ g}$$

4 How many moles are there in 1.2 kg of Mg?

$$M_r = 24$$

$$\text{moles} = \frac{\text{mass}}{M_r} = \frac{1200}{24} = 50 \text{ moles}$$

5 Calculate the relative formula mass (M_r) of each of the following substances.

a Mg(NO₃)₂ $M_r = 24 + 2(14) + 6(16) = 148$

b oxygen O_2 $M_r = 2(16) = 32$

c potassium sulfate K_2SO_4 $M_r = 2(39) + 32 + 4(16) = 174$

6 Calculate the mass in grams of one atom of ³¹P. Give your answer in standard form to 3 significant figures.
(the Avogadro constant = $6.022 \times 10^{23} \text{ mol}^{-1}$)

$$\text{mass of one atom} = \frac{31}{6.022 \times 10^{23}} = 5.15 \times 10^{-23} \text{ g}$$