

Mole Calculations – Practice Question Set

Scenario:

6.00 g of zinc is added to 250 cm³ of 0.200 mol·dm⁻³ hydrochloric acid (HCl) at room temperature and pressure (RTP). Answer the following step by step:

- 1 Write the balanced chemical equation with state symbols.
- 2 Identify the limiting reagent and the excess reagent. (Show calculations for moles of each reactant.)
- 3 Calculate the number of moles of the substance that is left unreacted. (Hint: find how much Zn reacts and subtract from initial moles.)
- 4 Calculate the volume of hydrogen gas produced at RTP. (Take molar gas volume as 24.0 dm³·mol⁻¹.)
- 5 Calculate the mass of a single H₂ molecule. (Use Avogadro's number 6.022×10^{23} .) 6
Calculate the theoretical mass of ZnCl₂ produced.
- 7 If 2.70 g of ZnCl₂ is actually obtained, calculate the percentage yield.
- 8 Calculate the atom economy for ZnCl₂ in this reaction.
- 9 Calculate the mass of H₂ produced.