

# Chemistry

Original practice in 11 topic units, with explanations, worked examples and answer guidance. Use alongside the prescribed texts and syllabus.



**11 practice units**

**66 tasks with answer guidance**

Name / नाम: \_\_\_\_\_

Original selected-topic practice. Use alongside school lessons and the prescribed textbook. The contents define this book's scope.

CBSE course 043 · 2026–27 · Selected practice, not a complete syllabus or official examination paper.

## UNIT 01 / 11 · LEARN &amp; TRY

# Mole workshop: particles, mass and reaction ratios

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Goal:** Calculate amount, entity count, limiting reactant and percentage yield.

## Learn

A mole is an amount of substance containing Avogadro's number of specified entities. Always state whether those entities are atoms, molecules, ions or formula units. Molar mass converts between mass and amount:  $n = m/M$ . A balanced chemical equation gives ratios of amounts in moles, not equal masses of reactants. For example, a coefficient two means twice as many specified entities or twice as many moles. To find a limiting reactant, calculate how much product each available reactant could form; the smaller amount controls the possible yield. The other reactant can remain in excess. A theoretical yield assumes the stated reaction occurs completely and the product is collected without loss; actual yield may be smaller. Keep a chain of units visible: grams to moles, equation ratio to product moles, then product grams. The particles in these calculations are models rather than samples to handle.

## Worked example

For  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ , take  $\text{H}_2$  molar mass  $2 \text{ g mol}^{-1}$  and  $\text{O}_2$   $32 \text{ g mol}^{-1}$ . Available masses are  $4 \text{ g H}_2$  and  $16 \text{ g O}_2$ :  $2 \text{ mol H}_2$  and  $0.50 \text{ mol O}_2$ . The oxygen can form  $1.0 \text{ mol H}_2\text{O}$ , using  $1.0 \text{ mol H}_2$ . Oxygen limits the reaction. Theoretical water mass is  $1.0 \times 18 = 18 \text{ g}$ ;  $2 \text{ g H}_2$  remains.

1. Calculate the amount in  $9.0 \text{ g}$  water using  $M = 18 \text{ g mol}^{-1}$ . [2 marks]

2. Find the number of molecules in  $0.25 \text{ mol}$  water, using  $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$ . [2 marks]

## UNIT 01 · PRACTISE · 5–6

## Mole workshop: particles, mass and reaction ratios

**5.** For the same reaction, mix 1.0 mol  $\text{N}_2$  and 2.0 mol  $\text{H}_2$ . Identify the limiting reagent and maximum  $\text{NH}_3$  amount. [3 marks]

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**6.** Theoretical product mass is 25.0 g but 20.0 g is collected. Find percentage yield and give two possible reasons. [4 marks]

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Explain one answer. Choose a question to revisit after a few days.

## UNIT 01 · ANSWER GUIDANCE

## Mole workshop: particles, mass and reaction ratios

1.  $n = m/M = 9.0/18 = 0.50 \text{ mol}$ .
2.  $N = nN_A = 1.5055 \times 10^{23}$  molecules, approximately  $1.5 \times 10^{23}$ .
3.  $m = nM = 11.7 \text{ g}$ . NaCl is counted in formula units, not isolated covalent molecules.
4.  $0.60 \times 2/3 = 0.40 \text{ mol NH}_3$ .
5.  $\text{H}_2$  limits:  $1.0 \text{ mol N}_2$  would need  $3.0 \text{ mol H}_2$ . Maximum  $\text{NH}_3 = 2.0 \times 2/3 = 4/3 \text{ mol} \approx 1.33 \text{ mol}$ .
6. Yield =  $20.0/25.0 \times 100 = 80.0\%$ . Incomplete reaction, side reactions or product loss during separation can reduce yield; any two distinct reasons.

**Teaching note**

Convert masses to moles before applying equation coefficients.

Curriculum reference: [https://cbseacademic.nic.in/web\\_material/CurriculumMain27/SecPart2/Chemistry\\_SecP2\\_2026-27.pdf](https://cbseacademic.nic.in/web_material/CurriculumMain27/SecPart2/Chemistry_SecP2_2026-27.pdf)

Selected practice; outcomes are publisher-defined. School practicals, projects and prescribed readings require separate preparation.