

# Gases & Molar Volume

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name \_\_\_\_\_

Date \_\_\_\_\_

Class \_\_\_\_\_

## 1. Key Ideas

Imagine you have one mole of golf balls and one mole of beach balls. They both contain the same number of objects — but they take up very different amounts of space. Now imagine the opposite: one mole of hydrogen gas and one mole of oxygen gas. At the same temperature and pressure, they take up exactly the same volume. This is one of the most surprising facts in chemistry — and it's the foundation of all gas calculations.

- Molar volume at STP =  $22.71 \text{ L mol}^{-1}$  ( $0^\circ\text{C}$ , 100 kPa — NESA standard)
- Why all ideal gases have the same molar volume

## 2. Success Criteria

By the end, you should be able to:

- Molar volume at STP =  $22.71 \text{ L mol}^{-1}$  ( $0^\circ\text{C}$ , 100 kPa — NESA standard)
- Molar volume at SATP =  $24.8 \text{ L mol}^{-1}$
- The formula  $V = n \times V_m$

## 3. Key Terms

### Mole

The SI unit for amount of substance; contains exactly  $6.022 \times 10^{23}$  particles.

### Avogadro's Number

$6.022 \times 10^{23}$  — the number of particles in one mole of a substance.

### Molar Mass

The mass of one mole of a substance, measured in g/mol.

### Limiting Reagent

The reactant that is completely consumed first, limiting the amount of product formed.

### Empirical Formula

The simplest whole-number ratio of atoms in a compound.

### Molecular Formula

The actual number of atoms of each element in a molecule of a compound.

## 4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

## 5. Short Answer Questions

1. Explain this lesson goal in your own words: "Molar volume at STP =  $22.71 \text{ L mol}^{-1}$  ( $0^\circ\text{C}$ ,  $100 \text{ kPa}$  — NESAS standard)". Use one specific example from the lesson.

**BAND 3** **2 MARKS**

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2. Apply this idea to a new example: "Molar volume at SATP =  $24.8 \text{ L mol}^{-1}$ ". Show your reasoning clearly.

**BAND 4** **3 MARKS**

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3. Analyse why this idea matters for understanding Gases & Molar Volume: "The formula  $V = n \times V_m$ ".

**BAND 5** **4 MARKS**

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## 6. Extend: Apply the Idea

BAND 5/6

5 MARKS

**A student gives a memorised answer about Gases & Molar Volume but does not use evidence or reasoning.**

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

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## 7. Multiple Choice

1. What is the best first step when answering a question about Gases & Molar Volume?

- A. Identify the key concept being tested
- B. Write every fact from memory
- C. Ignore the command word
- D. Skip examples and evidence

2. Which answer would show stronger understanding of Gases & Molar Volume?

- A. An answer with accurate terms and reasoning
- B. A copied definition only
- C. A single-word response
- D. An answer with no example

3. What should you do if a question asks you to explain?

- A. Link the idea to a reason or cause
- B. List unrelated facts
- C. Only draw a diagram
- D. Write the shortest possible answer

## 8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

### SUCCESS CRITERION 1

Prove that you can: Molar volume at STP =  $22.71 \text{ L mol}^{-1}$  ( $0^\circ\text{C}$ ,  $100 \text{ kPa}$  — NESAs standard)

**BAND 3** **2 MARKS**

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### SUCCESS CRITERION 2

Prove that you can: Molar volume at SATP =  $24.8 \text{ L mol}^{-1}$

**BAND 4** **3 MARKS**

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### SUCCESS CRITERION 3

Prove that you can: The formula  $V = n \times V_m$

**BAND 5** **4 MARKS**

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One thing I still need help with:

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