CHEMISTRY YEAR 11 - MODULE 2 - LESSON 3

Empirical & Molecular Formulas

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

In the 1800s, chemists could burn a compound and weigh the products — but they had no way to know if glucose ($C_6H_{12}O_6$) and acetic acid (CH_2O, scaled up) were the same substance or different ones. The empirical formula was the tool they used to bring order to that chaos. It's still the first formula a chemist derives from experimental data today.

- Definition of empirical formula
- Why two compounds can share an empirical formula

2. Success Criteria

By the end, you should be able to:

- Definition of empirical formula
- Definition of molecular formula
- That molecular formula = empirical × n

3. Key Terms

Mole
The SI unit for amount of substance; contains exactly 6.022×10^{23} particles.

Avogadro's Number
6.022×10^{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: "Definition of empirical formula". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "Definition of molecular formula". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Empirical & Molecular Formulas: "That molecular formula = empirical × n".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Empirical & Molecular Formulas 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.

7. Multiple Choice

1. What is the best first step when answering a question about Empirical & Molecular Formulas?

☐ 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 Empirical & Molecular Formulas?

☐ 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: Definition of empirical formula

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Definition of molecular formula

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: That molecular formula = empirical × n

BAND 5 4 MARKS

One thing I still need help with: