CHEMISTRY YEAR 11 - MODULE 4 - LESSON 4

Calorimetry — Dissolution of Ionic Substances

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

An instant cold pack gets icy the moment you crack it — no freezer, no ice. A bag of white powder and water, and suddenly your ankle is numb. Dissolution calorimetry measures exactly how much energy moves when an ionic lattice breaks apart and its ions disappear into water.

- Lattice energy (endothermic) and hydration energy (exothermic) as the two steps of dissolution
- Why ΔH soln sign follows from the temperature change direction

2. Success Criteria

By the end, you should be able to:

- Lattice energy (endothermic) and hydration energy (exothermic) as the two steps of dissolution
- Endothermic examples: NH_4NO_3, NH_4Cl, KNO_3 (cold packs)
- Exothermic examples: NaOH, $CaCl_2$ (warms solution)

3. Key Terms

negative
If the solution warms (ΔT > 0), dissolution is exothermic → ΔHsoln is negative.

positive
If you measured a temperature drop, your answer must be a positive ΔHsoln.

Enthalpy change (ΔH)
The heat energy exchanged at constant pressure during a reaction.

Exothermic
A reaction releasing heat to surroundings (ΔH < 0).

Endothermic
A reaction absorbing heat from surroundings (ΔH > 0).

Calorimetry
The experimental measurement of heat changes during chemical processes.

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: "Lattice energy (endothermic) and hydration energy (exothermic) as the two steps of dissolution". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "Endothermic examples: NH_4NO_3, NH_4Cl, KNO_3 (cold packs)". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Calorimetry — Dissolution of Ionic Substances: "Exothermic examples: NaOH, $CaCl_2$ (warms solution)".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Calorimetry — Dissolution of Ionic Substances 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 Calorimetry — Dissolution of Ionic Substances?

☐ 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 Calorimetry — Dissolution of Ionic Substances?

☐ 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: Lattice energy (endothermic) and hydration energy (exothermic) as the two steps of dissolution

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Endothermic examples: NH_4NO_3, NH_4Cl, KNO_3 (cold packs)

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: Exothermic examples: NaOH, $CaCl_2$ (warms solution)

BAND 5 4 MARKS

One thing I still need help with: