CHEMISTRY YEAR 12 - MODULE 6 - LESSON 7

Conjugate Pairs, Amphiprotic Substances & Water's Role

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

Pure water is neither just an acid nor just a base — it is both simultaneously, and the tiny fraction of water molecules that react with each other at any given instant is the foundation of every pH calculation in this module.

- A conjugate acid-base pair differs by one H^+
- The inverse strength relationship: stronger acid → weaker conjugate base

2. Success Criteria

By the end, you should be able to:

- A conjugate acid-base pair differs by one H^+
- Amphiprotic substances can act as both acids and bases (e.g. HSO_4^-, HCO_3^-, H_2O)
- Water self-ionises with Kw = $[H_3O^+][OH^-]$ = 10^{-14} at 25°C

3. Key Terms

Dynamic equilibrium
A state where forward and reverse reaction rates are equal.

Le Chatelier's Principle
A system at equilibrium shifts to minimise applied disturbances.

Equilibrium constant (Keq)
The ratio of product to reactant concentrations at equilibrium.

Reaction quotient (Q)
The ratio of product to reactant concentrations at any instant.

Closed system
A system where neither matter nor energy can escape to surroundings.

Reversible reaction
A reaction that can proceed in both forward and reverse directions.

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: "A conjugate acid-base pair differs by one H^+". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "Amphiprotic substances can act as both acids and bases (e.g. HSO_4^-, HCO_3^-, H_2O)". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Conjugate Pairs, Amphiprotic Substances & Water's Role: "Water self-ionises with Kw = $[H_3O^+][OH^-] = 10^{-14}$ at 25°C".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Conjugate Pairs, Amphiprotic Substances & Water's Role 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 Conjugate Pairs, Amphiprotic Substances & Water's Role?

☐ 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 Conjugate Pairs, Amphiprotic Substances & Water's Role?

☐ 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: A conjugate acid-base pair differs by one H^+

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Amphiprotic substances can act as both acids and bases (e.g. HSO_4^-, HCO_3^-, H_2O)

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: Water self-ionises with $K_w = [H_3O^+][OH^-] = 10^{-14}$ at 25°C

BAND 5 4 MARKS

One thing I still need help with: