CHEMISTRY YEAR 12 - MODULE 5 - LESSON 14

Ka, Kb & Gibbs Free Energy

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

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- Ka is Keq for acid dissociation — the same concept with a specific context
- Why aspirin solubility and stomach irritation can be explained using Ka and pH

2. Success Criteria

By the end, you should be able to:

- Ka is Keq for acid dissociation — the same concept with a specific context
- Strong acids have large Ka; weak acids have small Ka
- The Kw relationship: Ka × Kb = Kw for conjugate acid-base pairs

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: "Ka is Keq for acid dissociation — the same concept with a specific context". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "Strong acids have large Ka; weak acids have small Ka". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Ka, Kb & Gibbs Free Energy: "The Kw relationship: Ka × Kb = Kw for conjugate acid-base pairs".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Ka, Kb & Gibbs Free Energy 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 Ka, Kb & Gibbs Free Energy?

☐ 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 Ka, Kb & Gibbs Free Energy?

☐ 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: Ka is Keq for acid dissociation — the same concept with a specific context

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Strong acids have large Ka; weak acids have small Ka

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: The Kw relationship: Ka × Kb = Kw for conjugate acid-base pairs

BAND 5 4 MARKS

One thing I still need help with: