CHEMISTRY YEAR 12 - MODULE 6 - LESSON 12

Ka, pKa & Comparing Acid Strengths

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

Every soft drink you consume contains carbonic acid — and the Ka values of its two successive ionisation steps explain exactly why carbonated drinks erode tooth enamel at pH 3.5 but not at pH 5.5, and why the second ionisation barely contributes to acidity at all.

- Larger Ka = stronger acid; smaller pKa = stronger acid
- Why successive Ka values decrease (electstatic explanation: harder to remove H^+ from increasingly negative ion)

2. Success Criteria

By the end, you should be able to:

- Larger Ka = stronger acid; smaller pKa = stronger acid
- Ka × Kb = Kw applies to any conjugate acid-base pair
- For polyprotic acids, $Ka_1 \gg Ka_2 \gg Ka_3$

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: "Larger Ka = stronger acid; smaller pKa = stronger acid". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "Ka × Kb = Kw applies to any conjugate acid-base pair". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Ka, pKa & Comparing Acid Strengths: "For polyprotic acids, $Ka_1 \gg Ka_2 \gg Ka_3$".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Ka, pKa & Comparing Acid Strengths 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, pKa & Comparing Acid Strengths?

- [ ] 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, pKa & Comparing Acid Strengths?

- [ ] 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: Larger Ka = stronger acid; smaller pKa = stronger acid

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Ka × Kb = Kw applies to any conjugate acid-base pair

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: For polyprotic acids, $Ka_1 \gg Ka_2 \gg Ka_3$

BAND 5 4 MARKS

One thing I still need help with: