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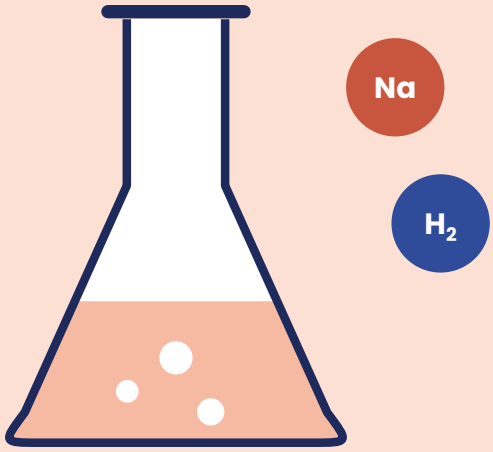
Year 10–11 • GCSE / IGCSE Chemistry

Periodic Table & Alkali Metals

Exam Practice Worksheet

Practise groups and periods, electronic structure, reactions of Group I with water, oxygen and chlorine, and reactivity trends.



Li	Na	K	Rb	Cs	Fr

◀ LEAST REACTIVE — REACTIVITY INCREASES DOWN THE GROUP — MOST REACTIVE ▶

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Basic questions: the Periodic Table & Group I	Q1–Q13 • 23 marks
Section B	Exam-style: structure, reactions with water & data	Q1–Q3 • 32 marks
Section C	Exam-style: reactivity, oxygen, chlorine & francium	Q4–Q6 • 22 marks

Instructions

- Answer all questions in the spaces provided.
- Use your class notes on the Periodic Table and Group I.
- Marks for each question are shown in [ ].
- Write balanced symbol equations where you are asked to.

Total score

/ 77

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Section A – Basic Questions

Answer all questions. Write your answers on the lines.

1 Elements in the Periodic Table are arranged in order of increasing _____. **[1]**

2 (a) What name is given to a vertical column in the Periodic Table? **[1]**

(b) What name is given to a horizontal row in the Periodic Table? **[1]**

3 Complete the table for the first three elements of Group I. **[3]**

Element name	Symbol

4 Why are the Group I elements called the **alkali** metals? **[2]**

5 How many electrons do Group I atoms have in their outer shell? **[1]**

6 Sodium has the electronic configuration **2,8,1**. Write the electronic configuration of: **[2]**

(a) lithium _____ (b) potassium _____

7 Why are the alkali metals stored under oil? **[1]**

8 Give **two** physical properties of the alkali metals. **[2]**

1.

.....

2.

.....

9 Complete the word equation. **[2]**

potassium + water → _____ + _____

10 Describe the test for hydrogen gas and give the result. **[2]**

.....

.....

11 Universal indicator is added to the solution left after an alkali metal reacts with water. **[2]**

(a) Colour: _____ (b) pH: _____

12 Put these metals in order of reactivity, starting with the **least** reactive: **potassium, lithium, sodium** **[1]**

.....

13 Put a tick in **one** box for each question.

(a) What colour flame does potassium burn with? **[1]**

☐ red ☐ yellow ☐ lilac ☐ green

(b) Which of these alkali metals is the most reactive? **[1]**

☐ lithium ☐ sodium ☐ potassium ☐ caesium

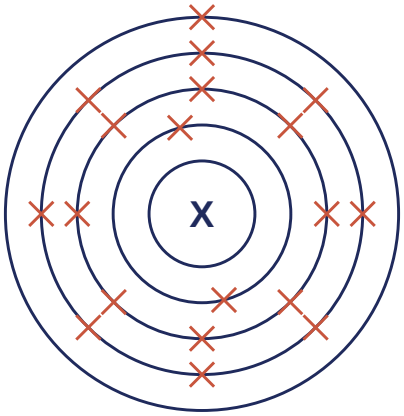
Total for this question: _____ / 23

Section B – Structure, Water & Data

GCSE / IGCSE exam-style questions. Use the number of marks as a guide to how much to write.

Question 1 — Atomic structure and the Periodic Table

The diagram shows the electronic structure of an atom of element **X**.



(a) How many electrons are in one atom of element X? **[1]**

.....

(b) In which **group** of the Periodic Table is element X? Give a reason for your answer. **[2]**

.....

.....

(c) In which **period** of the Periodic Table is element X? Give a reason for your answer. **[2]**

.....

.....

(d) Identify element X. **[1]**

.....

(e) Draw the electronic structure of a **lithium** atom in the box below. **[2]**

(f) Explain why lithium and element X have similar chemical properties. **[2]**

.....

.....

Total for this question: _____ / 10

Question 2 Reactions of the alkali metals with water

A teacher adds a small piece of sodium to a trough of water containing a few drops of universal indicator.

(a) Give **three** observations the students would make. **[3]**

1. .....
2. .....
3. .....

(b) The sodium melts into a small silver ball. What does this tell you about: **[2]**

(i) the melting point of sodium?

.....

(ii) the energy change in the reaction?

.....

(c) Write a **balanced symbol equation**, including state symbols, for the reaction of sodium with water. **[3]**

.....

.....

(d) The universal indicator turns purple. Explain why. **[2]**

.....

.....

(e) Give **two** safety precautions the teacher should take during this demonstration. **[2]**

.....

.....

Total for this question: _____ / 12

Question 3 — Using data: trends in Group I

The table shows some information about the Group I elements.

Element	Melting point (°C)	Density (g/cm^3)
lithium	181	0.53
sodium	98	0.97
potassium	63	0.86
rubidium	39	1.53
caesium	?	1.93

(a) Describe the trend in melting point down Group I. **[1]**

.....

(b) Predict the melting point of caesium. **[1]**

_____ °C

(c) Which element does **not** follow the general trend in density? **[1]**

.....

(d) The density of water is 1.00 g/cm^3. Use the table to explain why lithium floats on water but rubidium sinks. **[2]**

.....

.....

(e) A student says: *"Rubidium reacts less vigorously with water than potassium."* Is the student correct? Explain your answer. **[2]**

.....

.....

(f) Write the **word equation** for the reaction of rubidium with water. **[1]**

.....

(g) Give the formula of rubidium hydroxide. **[1]**

.....

(h) Suggest why rubidium is **not** reacted with water in school laboratories. **[1]**

.....

Total for this question: _____ / 10

Section C – Reactivity & Predictions

GCSE / IGCSE style. Explain your answers using electrons and ions where you can.

Question 4 — Explaining reactivity

(a) Alkali metals form ions when they react. State the charge on a sodium ion and explain how it forms. **[2]**

.....

.....

(b) Complete the half equation for potassium forming an ion. **[1]**

$K \rightarrow K^+ + _____$

(c) Is the change in (b) oxidation or reduction? Give a reason. **[2]**

(d) Explain why potassium is **more reactive** than sodium. Refer to the electronic structure of the atoms in your answer. **[3]**

Total for this question: _____ / 8

Question 5 — Reactions with oxygen and chlorine

A freshly cut piece of sodium is shiny, but the surface quickly becomes dull.

(a) Explain why the surface becomes dull. **[2]**

(b) Balance the equation for this reaction. **[1]**

_____ Na + O_2 → _____ Na_2O

(c) Hot sodium burns in chlorine gas to form a white solid. Name the white solid. **[1]**

(d) Write a balanced symbol equation for the reaction of sodium with chlorine. **[2]**

(e) The white solid is dissolved in water. Predict the pH of the solution and compare it with the pH of sodium hydroxide solution. **[2]**

Total for this question: _____ / 8

Question 6 — Predicting the properties of francium (IGCSE style)

Francium (Fr) is at the bottom of Group I.

(a) Predict how the reaction of francium with water compares with the reaction of caesium with water. **[1]**

.....

(b) Give the formula of: (i) francium chloride (ii) francium oxide **[2]**

(i) _____ (ii) _____

(c) Write a balanced symbol equation for the reaction of francium with water. **[2]**

.....

.....

(d) Suggest **one** reason why the reactions of francium are very rarely studied. **[1]**

.....

Total for this question: _____ / 6

END OF WORKSHEET – check your answers before handing in.