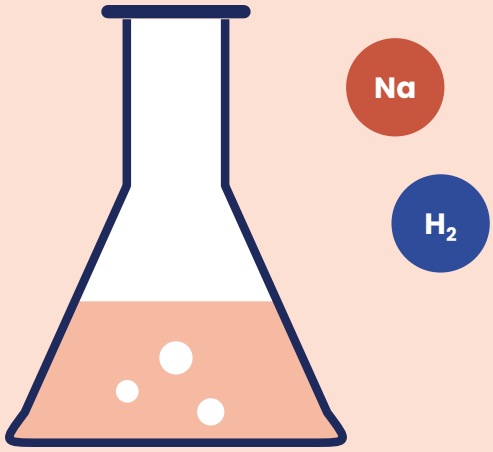
YOUR SCIENCE ONLINE
yourscienceonline.com

Year 10–11 • GCSE / IGCSE Chemistry

Periodic Table & Alkali Metals

Mark Scheme – Teacher Copy

Answers, mark points and marking guidance for the Periodic Table & Alkali Metals exam practice worksheet.



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**

Marking notes

- / separates alternative answers worth the same mark.
- ( ) words in brackets are not needed for the mark.
- ORA = or reverse argument; ECF = error carried forward.
- Accept any correct, clearly expressed alternative.

Total marks

77

© Your Science Online • yourscienceonline.com • For personal and single-classroom use only. Please do not share or resell.

Section A – Basic Questions

Q	Answer	Mark	Guidance
1	atomic number / proton number	1	Do not accept atomic mass / mass number.
2(a)	group	1	
2(b)	period	1	
3	lithium – Li sodium – Na potassium – K	3	1 mark per correct row (name and symbol both correct).
4	They react with water to form an **alkali** / alkaline solution (1) and they are metals (1)	2	Accept: their hydroxides are alkalis / form a solution with pH above 7.
5	one / 1	1	
6	(a) lithium: 2,1 (1) (b) potassium: 2,8,8,1 (1)	2	
7	To stop them reacting with oxygen / air / water (vapour)	1	Must mention air, oxygen or water.
8	Any **two** from: soft / can be cut with a knife; low density / float on water; low melting point; shiny when freshly cut; conduct electricity / heat	2	1 mark each.
9	potassium hydroxide (1) + hydrogen (1)	2	Either order.
10	(Hold a) lighted / burning splint (at the mouth of the tube) (1) (burns with a) squeaky pop (1)	2	Do not accept glowing splint.
11	(a) purple / blue (1) (b) any value from 10 to 14 (1)	2	Accept dark blue / violet.
12	lithium, sodium, potassium	1	All three in correct order.
13(a)	lilac	1	Only one box ticked.
13(b)	caesium	1	Only one box ticked.
	Total	**23**	

Section B – Exam-Style Questions (Q1–Q3)

Question 1 – Atomic structure and the Periodic Table

Q	Answer	Mark	Guidance
1(a)	19	1	
1(b)	Group I / 1 (1) It has one electron in its outer shell (1)	2	
1(c)	Period 4 (1) It has four (occupied) electron shells (1)	2	
1(d)	potassium / K	1	
1(e)	Two shells drawn around the nucleus (1) 2 electrons on the inner shell and 1 on the outer shell (1)	2	Accept dots or crosses. Nucleus may be labelled Li.
1(f)	Both have one electron in the outer shell (1) so they react in the same way / both lose one electron to form a 1+ ion (1)	2	Same group = 1 mark only if no reference to electrons.
	Total	**10**	

Question 2 – Reactions with water

Q	Answer	Mark	Guidance
2(a)	Any **three** from: fizzes / bubbles / effervescence; floats; moves (quickly) around on the surface; melts into a ball; gets smaller / disappears / dissolves; indicator changes colour (to purple / blue)	3	Do not accept 'hydrogen is made' – this is a conclusion, not an observation.
2(b)(i)	Sodium has a low melting point	1	
2(b)(ii)	The reaction is exothermic / gives out heat (energy)	1	
2(c)	$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$ correct formulae (1); balanced (1); state symbols (1)	3	State symbol mark only if formulae are correct.
2(d)	Sodium hydroxide is formed (1) which is an alkali / contains OH^- ions / pH above 7 (1)	2	
2(e)	Any **two** from: use a small piece of sodium; use a safety screen; wear safety goggles; students stand well back; use forceps / tongs (not hands); large volume of water	2	1 mark each.
	Total	**12**	

Question 3 – Using data

Q	Answer	Mark	Guidance
3(a)	Melting point decreases down the group	1	Accept gets lower.
3(b)	Any value from 20 to 35 °C	1	Actual value is about 28.5 °C.
3(c)	potassium	1	
3(d)	Lithium has a density lower than water / less than 1.00 g/cm^3 so it floats (1) Rubidium has a density higher than water / 1.53 g/cm^3 so it sinks (1)	2	Must use data or compare to water for each mark.
3(e)	No / the student is not correct (1) Reactivity increases down the group and rubidium is below potassium (so it reacts more vigorously) (1)	2	No mark for 'no' without a reason.
3(f)	rubidium + water → rubidium hydroxide + hydrogen	1	
3(g)	RbOH	1	
3(h)	The reaction is too violent / explosive / dangerous	1	Accept rubidium is too expensive / rare.
	Total	**10**	

Section C – Exam-Style Questions (Q4–Q6)

Question 4 – Explaining reactivity

Q	Answer	Mark	Guidance
4(a)	1+ / Na^+ (1) The atom loses its one outer electron (1)	2	
4(b)	e^-	1	Accept 'an electron'.
4(c)	Oxidation (1) because electrons are lost (1)	2	Accept OIL RIG used correctly. No reason mark without 'oxidation'.
4(d)	Potassium atom is larger / has more shells (1) the outer electron is further from the nucleus / more shielding (1) so the attraction to the nucleus is weaker and the electron is lost more easily (1)	3	Answers must refer to the outer electron. ORA for sodium.
	Total	**8**	

Question 5 – Reactions with oxygen and chlorine

Q	Answer	Mark	Guidance
5(a)	Sodium reacts with oxygen / air (1) to form sodium oxide (on the surface) (1)	2	Accept 'it tarnishes / oxidises' for the first mark.
5(b)	**4**Na + O_2 → **2**Na_2O	1	Both numbers needed.
5(c)	sodium chloride	1	Accept NaCl.
5(d)	2Na + Cl_2 → 2NaCl correct formulae (1); balanced (1)	2	State symbols not required.
5(e)	pH 7 / neutral (1) sodium hydroxide has a higher pH / is alkaline / pH about 13–14 (1)	2	
	Total	**8**	

Question 6 – Predicting francium

Q	Answer	Mark	Guidance
6(a)	Francium reacts more vigorously / more violently / faster than caesium	1	Accept explodes.
6(b)	(i) FrCl (1) (ii) Fr_2O (1)	2	
6(c)	2Fr + 2H_2O → 2FrOH + H_2 correct formulae (1); balanced (1)	2	
6(d)	It is radioactive / very rare / only tiny amounts exist / decays very quickly	1	
	Total	**6**	

Sections B + C: 54 | Worksheet total: 77

Suggested grade boundaries (guide only)

Marks	Percentage	Guide
62 – 77	80% +	Excellent – secure on this topic
46 – 61	60 – 79%	Good – review the weaker questions
31 – 45	40 – 59%	Developing – revisit notes and retry
0 – 30	below 40%	Needs support – reteach key ideas