



# **GCSE Chemistry**

## **Group 1 Elements**

### **Mark Scheme**

**Time available: 64 minutes**

**Marks available: 60 marks**

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## Mark schemes

- 1.** (a) 2,8,8,1 1
- (b) they have the same number of outer shell electrons 1
- (c) metallic 1
- (d) any **two** from:  
• bubbles (very) quickly  
• melts (into a ball)  
• floats  
• moves (very) quickly  
*allow flame* 2
- (e) (reactivity) increases (down the group) 1
- (f) any **two** from:  
• increasing speed of movement  
• increasing rate of bubble production  
• doesn't melt → melts  
• no flame → flame  
**or**  
flame → explosion 2
- (g) hydrogen 1

(h) sodium ion structure 2,8

1

fluoride ion structure 2,8

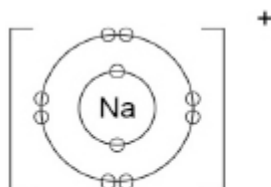
*allow any combination of circles, dots, crosses or e<sup>-</sup>*

1

+ charge on sodium ion **and**

- charge on fluoride ion

an answer of



sodium ion



fluoride ion

scores 3 marks

1

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2.

(a) any **one** from:

- more vigorous bubbling (for rubidium)
- bigger / brighter flame (for rubidium)

*allow converse statements for potassium*

*allow (rubidium) catches fire more quickly*

*allow (rubidium) moves around more quickly*

*allow (rubidium) explodes*

*allow (rubidium) disappears more quickly*

*allow (rubidium) melts more quickly*

1

(b) (rubidium's) outer shell / electron is further from the nucleus

*allow the (rubidium) atom is larger*

*allow (rubidium) has more shells*

1

(so) there is less (electrostatic) attraction between the nucleus and the outer electron (in rubidium)

*allow (so) there is more shielding between the outer electron and the nucleus (in rubidium)*

1

(so) the outer electron (in rubidium) is more easily lost

*allow (so) less energy is needed to remove the (outer) electron (in rubidium)*

1

*allow energy level for shell throughout*

*allow converse argument in terms of potassium*

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- (c)  $2 \text{Rb} + 2 \text{H}_2\text{O} \rightarrow 2 \text{RbOH} + \text{H}_2$   
*ignore state symbols*  
*allow multiples*  
*allow 1 mark for H<sub>2</sub>*  
*allow 1 mark for RbOH*

3

- (d) the noble gases have boiling points that increase going down the group

1

- (e) (relative atomic mass =)  $\frac{(90.48 \times 20) + (0.27 \times 21) + (9.25 \times 22)}{100}$   
 $\frac{1809.6 + 5.67 + 203.5}{100}$   
*allow (relative atomic mass =)  $\frac{1809.6 + 5.67 + 203.5}{100}$*

*allow (relative atomic mass =) 18.096 + 0.0567 + 2.035*

1

= 20.1877

1

= 20.2

*allow an answer correctly rounded to 3 significant figures from an incorrect calculation which uses all of the values in the table*  
*ignore units*

1

[11]

3.

- (a) any **two** from:
- (potassium) floats
  - (potassium) melts
  - (potassium) moves around
  - potassium becomes smaller  
*allow potassium disappears*
  - (lilac) flame
  - effervescence  
*allow fizzing*

2

- (b)  $2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2$   
*allow multiples*  
*allow 1 mark for KOH **and** H<sub>2</sub>*

2

(c) reactivity increases (going down the group)

1

(because) the outer electron / shell is further from the nucleus

*allow (because) there are more shells*

*allow (because) the atoms get larger*

1

(so) there is less attraction between the nucleus and the outer electron / shell

*allow (so) there is more shielding from the nucleus*

*do **not** accept incorrect attractions*

1

(so) the atom loses an electron more easily

1

(d) (dot and cross diagram to show) sodium atom **and** oxygen atom

*allow use of outer shells only*

1

two sodium atoms to one oxygen atom

*allow two sodium ions to one oxide ion*

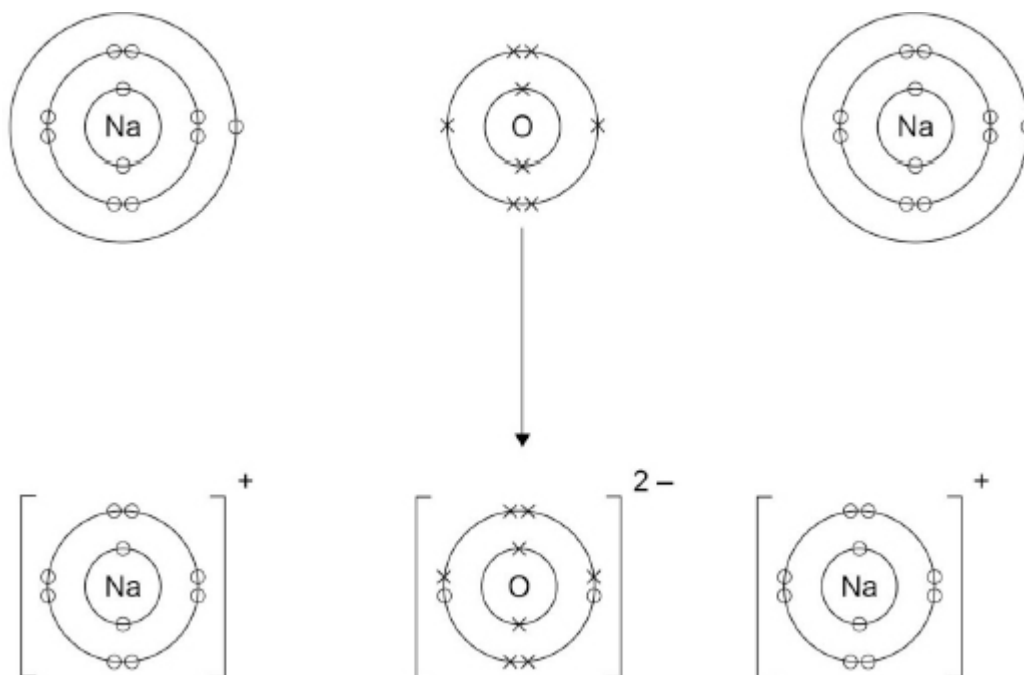
1

(to produce) sodium ion with a + charge

1

(to produce) oxide ion with a 2- charge

1



scores 4 marks

(e) (oxygen) gains electrons

1

- (f) giant structure  
*allow (giant ionic) lattice* 1
- (with) strong (electrostatic) forces of attraction between (oppositely charged) ions 1
- (so) large amounts of energy are needed to break the bonds / forces  
*allow (so) large amounts of energy are needed to separate the ions* 1

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4.

- (a) sodium oxide  
*allow Na<sub>2</sub>O* 1
- (b) oxidation 1
- (c) 13 1
- (d) sodium hydroxide 1
- (e) OH<sup>-</sup> 1
- (f) (volume =)  $\frac{250}{1000}$  or  $\frac{1}{4}$   
 or 0.25 (dm<sup>3</sup>) 1
- or**
- (mass per cm<sup>3</sup> =)  $\frac{40}{1000}$  (g)  
 or 0.04 (g)
- $(\frac{250}{1000} \times 40 =) 10$  (g) 1
- an answer of 10 (g) scores 2 marks*
- (g) all points correct  
*allow a tolerance of ±½ a small square*  
*allow 1 mark for 3 points correct*  
*ignore any attempt at a line of best fit* 2

(h) 39 °C

*allow any value from 34 to 46 (°C)*

1

[10]

5.

(a) atomic weights

*must be in this order*

1

electrons

1

proton numbers

1

(b) (i) H/hydrogen

*allow H<sub>2</sub> or h*

1

(ii) one / 1

*allow alkali metals*

1

(iii) Potassium (K)

1

(iv) Iron has a higher density than potassium

1

Iron forms ions that have different charges

1

(c) any **three** from:

- melts
- fizzes / bubbles / effervesces  
*allow gas produced*
- sodium floats
- size of the sodium decreases  
*allow dissolves / disappears*
- sodium moves

*allow two marks for moves around on the surface of the water*

3

[11]