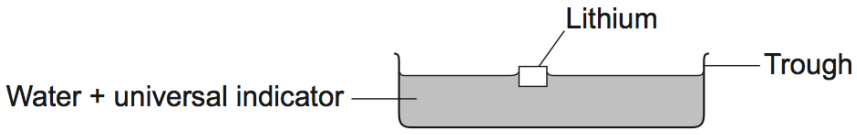
*Do not write outside the box*

1 A student did and experiment to investigate the reaction of group one metals in water.

He placed a small amount of lithium in a trough of water with universal indicator.




1 (a) (i) Other than lithium floating, state two observations the student would see.

**[2 marks]**

Bubbles or effervescence or fizzing [1 mark]

Lithium disappears / gets smaller [1 mark]

Lithium moves on the surface of the water [1 mark]

(universal indicator) turns blue / purple [1 mark]

Stating that hydrogen is produced wouldn't score a point and nor would saying that it melts or burns. You mustn't mention floating at that is stated in the question. Saying 'it dissolves' would be allowed.

1 (a) (ii) Lithium is an alkali metal.

Describe how the experiment shown above demonstrates that lithium is an alkali metal.

**[2 marks]**

Universal indicator turns blue or purple [1 mark]

Which is or shows alkali [1 mark]

1 (a) (ii) The student then did the experiment with another group one metal, potassium.

Balance the symbol equation for the reaction of potassium with with water.

**[2 marks]**

$$2K(s) + 2\ H_2O(l) \rightarrow 2\ KOH(aq) + H_2(g)$$

1 (b) Potassium is more reactive than lithium.

Explain, in terms of electrons, why potassium is more reactive than lithium.

**[3 marks]**

Bigger atom or the outer shell electron is further from nucleus or there are more shells [1 mark]

Don't just say 'the electrons are further away'.

There is less attraction to nucleus or more shielding [1 mark]

So the outer electron more easily lost [1 mark]

Its important to get the correct terminology used here. Also, you would get marks for the vice versa answer, in other words if you said lithium is less reactive because smaller atom, **outer** electron closer to the nucleus, etc.

The underlined bits are important because they show you are comparing which is what the question requires.

1 (c) Compare the properties of the transition metals with group one metals.

**[2 marks]**

Have higher melting and boiling points (except for mercury) [1 mark]
They (transition metals) are harder and stronger [1 mark]
They are much less reactive and so don't react as much with water and oxygen [1 mark]

2 The table shows some properties of one of the groups in the periodic table.

*Table 1 - Features of a group from the periodic table.*

| Element | Melting point | Boiling point | Electron structure |
|---|---|---|---|
| W | -220 | -188 | 2, 7 |
| X | -101 | -35 | 2, 8, 7 |
| Y | -7 | 58 | 2, 8, 18, 7 |
| Z | 114 | 183 | 2, 8, 18, 18, 7 |

2 (a) Name the group of the periodic table that is shown.

**[1 mark]**

Group 7 or the halogens [1 mark]

2 (a) (i) Explain why these elements are part of the group you have named.

**[2 marks]**

They have 7 electrons [1 mark]

In the outer or outermost shell [1 mark]

2 (a) (ii) Describe and explain the trend in reactivity of the elements in this group.

**[4 marks]**

The further down, the less reactive the element
or the higher up the more reactive. [1 mark]

Atoms of the higher elements or elements near the top or W are smaller or outer electron closer (to nucleus) or have fewer electron shells / energy levels [1 mark]

So have stronger/est attraction (to nucleus) or less screening [1 mark]

So electron gained more easily [1 mark]

Remember, you must write this as a comparison.

Students often make the mistake of talking about magnetic forces or intermolecular forces which is not relevant for this question.

2 (a) (iii) Use table 1 above to answer the following question.

Element X is reacted with an aqueous salt made from element Y.

**The letters are not the correct symbols for the elements.**

Explain what would happen in the reaction between element X and and an aqueous salt made from element Y.

**[2 marks]**

Element X would displace element Y or chlorine would displace bromine [1 mark]

Because it (element X or chlorine) is more reactive or is higher up in the group [1 mark]

You would also get a mark for talking about why element X (chlorine) is more reactive relating to its the distance of electrons from the nucleus.