

Task I

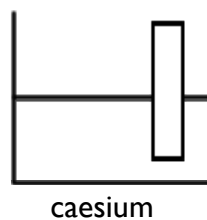
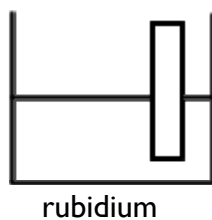
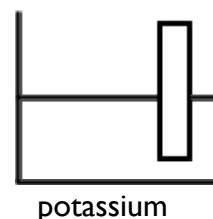
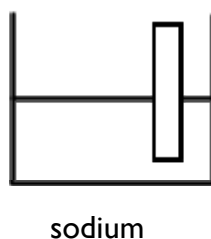
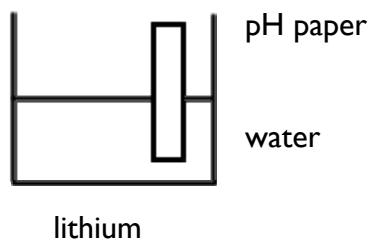
Answer the following questions about alkali metals.

- How many outer electrons do their atoms have?
- Why do the alkali metals have to be stored in oil?
- What is formed when an atom loses an electron?
- Give three ways that Group I metals are different from other metals.
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- Which gas is made when alkali metals react with water?
- How would you test for this gas?
- Complete each chemical equation.
 - sodium (Na) + water → sodium hydroxide +
 - (H₂O) (NaOH) (H₂)
 - potassium (.....) + water → +
 - (.....) (KOH)
 - (Li) + → +
 - (H₂O)
- In each of the above equations one of the substances will turn universal indicator from green to purple, what does this tell us about the substance?
- Colour the appropriate substance purple in each of the equations in question 7.

Task 2

Before watching a demonstration of the reaction of alkali metals with water predict the following.

1. Which metal's reaction would you expect to be most vigorous?
2. Which one would be the least vigorous?
3. Suggest reasons for your answers to questions 1 and 2.
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4. Draw your observations of each reaction in the troughs. Include as much detail as you can.



Task 3

The table below gives data on some of the physical properties of the alkali metals.

Alkali metal	Symbol	Atomic number	Atomic mass	Boiling point °C	Melting point °C	Density g/cm ³
Lithium		3		1342	181	0.535
Sodium				880	98	0.971
Potassium					63	0.862
Rubidium	Rb			688		1.53
Caesium	Cs		133	671	28	1.87

- a) Complete the symbol, atomic number and atomic mass columns.
- b) Use the table to predict the boiling point of potassium.
- c) Why did you choose this value?
- d) Use the table to predict the melting point of rubidium.
- e) Why did you choose this value?
.....
- f) Use the table and what you know about the reactivity of the alkali metals to make 4 generalisations about the trends in Group I metals.
 - i) As you move down the table the
 - ii)
 - iii)
 - iv)
- g) Suggest why the alkali metals become more reactive as you move down the table.
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Teaching notes

The following links show the reactions of alkali metals with water including the reactions of rubidium and caesium. The links were available at the time of publishing.

<http://www.open.edu/openlearn/science-maths-technology/science/chemistry/alkali-metals>

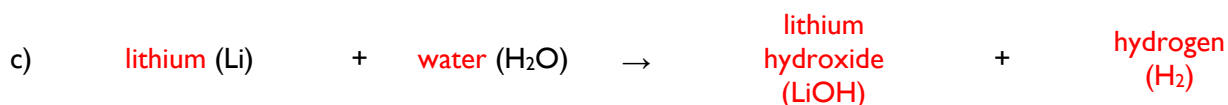
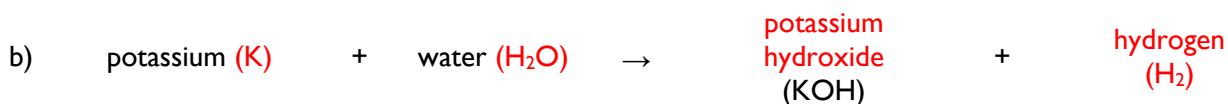
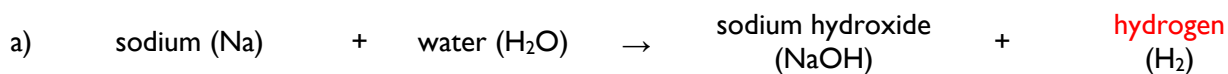
<http://www.youtube.com/watch?v=PyFLvSg6ZDw>

<https://www.youtube.com/watch?v=eaChisV5uR0>

Suggested answers

Task 1

- 1) 1
- 2) They are very reactive and the oil stops them reacting with oxygen and water vapour in the air.
- 3) Ions
- 4) Very soft, low density, low melting point
- 5) Hydrogen
- 6) Makes a loud pop with a lighted splint.
- 7)



8. It is an alkali.
9. The metal hydroxides should be coloured purple.

Task 2

Students make predictions and suggest reasons which can be discussed before watching a demonstration or video of the reactions. Lithium is least reactive, caesium is most reactive.

Observations could include if the metal moves on surface, if metal sinks or floats, colour of pH paper, hydrogen gas given off, if the metal burns etc.

Task 3

Alkali metal	Symbol	Atomic number	Atomic mass	Boiling point °C	Melting point °C	Density g/cm ³
Lithium	Li	3	7	1342	181	0.535
Sodium	Na	11	23	880	98	0.971
Potassium	K	19	39	760	63	0.862
Rubidium	Rb	37	85	688	39	1.53
Caesium	Cs	55	133	671	28	1.87

- f) As you move down the table atomic number, atomic mass and density increase. Melting and boiling points tend to decrease.
- g) As atomic number increases the outer electron is further away from the nucleus which means it is lost more readily making the metals more reactive further down the table.