

Teaching notes and answers

This resource is designed to be used by students to record observations during a teacher demonstration to show the reaction of alkali metals and water.

N.B. These reactions should only be carried out as a teacher demonstration. It is important to see advice from CLEAPPS on how to conduct the demonstration and to carry out your own risk assessment beforehand.

If a demonstration is not possible then there are several videos available to show students instead for example: <http://www.youtube.com/watch?v=uixxJtJPVXk> (link available at time of publishing).

1. hydrogen
2. metal hydroxide
3. sodium + water \rightarrow sodium hydroxide + hydrogen
4. $2 \text{K(s)} + 2 \text{H}_2\text{O (l)} \rightarrow 2 \text{KOH (aq)} + \text{H}_2\text{(g)}$
5. potassium (most reactive) , sodium, lithium (least reactive)
6. They react with water to produce hydroxides which are alkaline.
7. Rubidium would react violently. It would produce rubidium hydroxide and hydrogen.
8. Lithium has one full shell of electrons whereas potassium has three. The metals become more reactive down the group due to more electron shells. The electron shells shield the outer electron (negative) from the nucleus, which is positive. This means that the outer electron is more easily lost making the atom more reactive.

Reactions of group 1 metals with water

In this demonstration, small pieces of lithium, sodium and potassium will be placed into a trough of water. You need to observe the reaction carefully, looking for colours and trying to describe the behaviour of the metal. You will also need to observe what happens when a lighted splint is placed near the reacting piece of metal.

Observations

Metal	reaction of metal in water	What happens when a lighted splint is placed near reacting metal?	Colour of universal indicator paper in water after reaction
lithium			
sodium			
potassium			

Questions

1. Which gas is produced when these metals react with water?

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2. What else is produced in the water during this reaction?

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3. Write a word equation for the reaction of sodium with water.

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4. Write a symbol equation for the reaction of potassium with water.

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5. Put these metals into a reactivity series – from the most reactive to the least reactive.

most reactive least reactive

6. Why do you think that these metals are known as the alkali metals?

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7. Look at a copy of the periodic table. Predict how rubidium would behave if added to water.

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8. Compare the atomic structure of lithium and potassium. Use your comparison to suggest why reactivity increases down the group.

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