CAIE IGCSE Chemistry

8.2 Group I properties

Notes

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Describe the Group I alkali metals, lithium, sodium and potassium, as relatively soft metals with general trends down the group, limited to:

- Elements in group 1 in the periodic table are known as the alkali metals
- Group 1 elements have 1 electron in their outer shell. They tend to lose the 1 electron to form ions with a +1 charge
- Alkali metals, such as lithium, sodium and potassium, are relatively soft metals (can be cut with a knife)

(a) Decreasing melting point

- The melting point of alkali metals decreases down the group, because the strength of the metallic bonds decreases, so less energy is required to break these bonds to turn the solid into a liquid.

(b) Increasing density

- The density of alkali metals increases down the group.
- All Group I elements have low densities and will float on water.

(c) Increasing reactivity

- The reactivity of alkali metals increases down the group
- Group I elements lose an electron when they react. Atomic radius and electron shielding increase down the group so there is weaker attraction between the nucleus and outer shell electron. This means less energy is required to remove this electron from elements further down the group.
- Generally when alkali metals react with water, the reaction is vigorous and produces an alkaline solution and hydrogen (production is visible due to bubbles of hydrogen)

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Predict the properties of other elements in Group I, given information about the elements

- The properties of elements in group 1 can be predicted using their position in the group.
- E.g. Using the trend in melting points, predict the element in group 1 with the highest melting point
    - Lithium has the highest melting point, as the melting point decreases going down the group.
- E.g. Using the trend in density, predict the element in group 1 with the second lowest density
    - Sodium has the second lowest density, as the density increases going down the group and lithium has the lowest density.
- E.g. Using the trend in reactivity, predict the element in group 1 with the highest reactivity
    - Francium is the most reactive element in group 1, since the reactivity increases down the group.

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