

Solutions

2.1 Any two: transition metals have higher melting points; higher densities; harder; stronger.

2.2 Fe^{2+} – pale green compounds; Fe^{3+} – yellow/brown compounds.

2.3 Iron.

3.1 Potassium reacts vigorously with cold water – fizzing, melting into a ball, producing hydrogen and potassium hydroxide; copper has no reaction with water. Potassium reacts explosively/fast with dilute acid; copper does not react with dilute hydrochloric acid – it is below hydrogen in the reactivity series. Transition metals are much less reactive than Group 1 metals.

3.2 The iron is present as different ions – Fe^{2+} in iron(II) sulfate and Fe^{3+} in iron(III) sulfate; transition elements form ions with different charges; so the two compounds have different formulae (FeSO_4 , $\text{Fe}_2(\text{SO}_4)_3$) and different colours/properties despite containing the same elements.

3.3 Predictions: high melting point; high density/hard/strong; a coloured compound; low reactivity – no reaction with cold water. Use of a transition-metal compound: e.g. iron(III) oxide as a catalyst; any correct use.