## Solutions

**2.1** potassium > zinc > copper > gold.

**2.2** Oxygen and water; any barrier: paint, oil/grease, plastic coating, galvanising.

**2.3** $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$; $Cu^{2+}$ is reduced – it gains two electrons.

**2.4** (C) Zinc is more reactive than iron, so it corrodes preferentially, protecting the steel even where the coat is scratched.

**2.5** (C) It contains chromium which forms an oxide layer resisting corrosion; cutlery/surgical instruments/sinks.

**3.1** Magnesium lies above hydrogen in the series, so it displaces hydrogen from the acid; copper lies below hydrogen and cannot. The gas formed is hydrogen.

**3.2** (C) Carbon cannot reduce aluminium's oxide because aluminium is more reactive than carbon; so the oxide must be split by electrolysis ; molten aluminium oxide/alumina (often in molten cryolite) is electrolysed.

**3.3** (C) In a pure metal the identical ions sit in regular layers that slide over each other when a force is applied – soft and malleable; in an alloy the different-sized atoms distort the layers, so they cannot slide – harder.