Alloy	Composition	Use	Useful property
bronze	copper: 95% .....: 5%	statues, church bells	hard, does not .....
aerospace aluminium	aluminium: 90.25% zinc: 6% magnesium: 2.5% copper: 1.25%	aircraft construction	 .....
solder	tin: 60% lead: 40%	.....	low melting point
tungsten steel	iron: 95% tungsten: 5%	cutting edges of drill bits	 .....

Exercise 9.2 Extracting aluminium by electrolysis

This exercise should help you recall and understand the details of the method for extracting aluminium.

Because of its strong reactivity, aluminium must be extracted by electrolysis. The electrolyte is aluminium oxide dissolved in molten cryolite. Hydrated aluminium oxide is heated to produce the pure aluminium oxide used.

$$\underset{\text{hydrated aluminium oxide}}{Al_2O_3.3H_2O} \rightarrow Al_2O_3 + 3H_2O$$

a What type of reaction is this? Put a ring around the correct answer.

decomposition **neutralisation** **oxidation** **reduction**

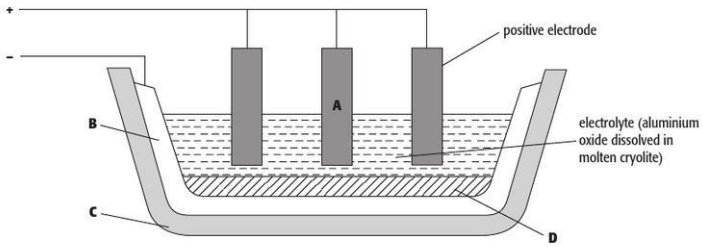
b Why must the electrolyte be molten for electrolysis to occur?

.....

c What is the purpose of the cryolite?

.....

d In the diagram of the electrolysis cell, which letter (**A**, **B**, **C** or **D**) represents the cathode? .....



e State the name of the products formed at the anode and cathode during this electrolysis.

At anode: ..... At cathode: .....

f Why do the anodes have to be renewed periodically?

.....

g Complete the equation for the formation of aluminium from aluminium ions.

Al^{3+} + ... $e^- \rightarrow Al$

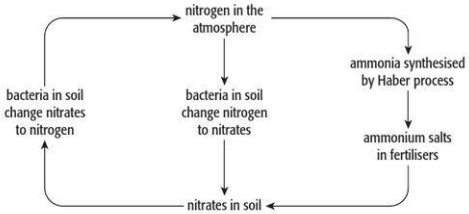
h State one use of aluminium.

.....

Exercise 9.3 The importance of nitrogen

The following exercise connects the ideas surrounding the importance of nitrogen to agriculture and develops your understanding of chemical equilibria. It also develops your skills in processing and interpreting experimental results.

A simplified diagram of the nitrogen cycle is shown. Although certain bacteria in the soil convert nitrogen gas into nitrates, other bacteria convert nitrogen into ammonium salts. The ionic equation for this second reaction is



$$N_2 + 8H^+ + 6e^- \rightarrow 2NH_4^+$$

a Explain why this is a reduction reaction.

.....