Mark schemes

Q1.

(a) ions can move through the molten substance to the electrodes

1

(b)

Molten compound	Product at negative electrode	Product at positive electrode
Lead chloride	**Lead**	Chlorine
Potassium iodide	Potassium	**Iodine**
Zinc bromide	Zinc	Bromine

1
1
1

(c) $2\ Al_2O_3 \rightarrow 4\ Al + 3\ O_2$

*allow **1** mark for 4 Al*

*allow **1** mark for 3 O_2*

2

(d) (M_r =)
$(27 \times 2) + (16 \times 3)$

1

= 102

1

(e) (by electrolysis) any **one** from:
- potassium / K
- lithium / Li

allow aluminium / Al

allow sodium / Na

allow calcium / Ca

allow magnesium / Mg

1

(by carbon reduction) any **one** from:
- zinc / Zn
- tin / Sn

allow iron / Fe

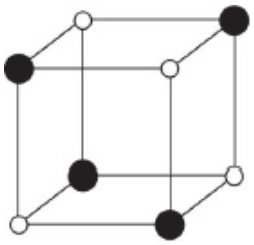
allow copper / Cu

1

[10]

Q2.

(a)



*allow **1** mark for 2 Na^+ and 2 Cl^-*

2

(b) the ions can move (in the liquid)

*do **not** accept reference to moving / delocalised electrons*

1

(c)

Molten compound	**Product at the negative electrode**	**Product at the positive electrode**
Magnesium bromide	Magnesium	**Bromine**
Potassium chloride	**Potassium**	Chlorine

2

(d) the mixture has a lower melting point than pure aluminium oxide

1

(e) water

1

(f) hydrogen is less reactive than sodium

1

(g) the volume of hydrogen is twice the volume of oxygen

allow the volume of hydrogen is greater than the volume of oxygen

allow the volume of hydrogen is (directly) proportional to the volume of oxygen

1

[9]

Q3.

(a) hydroxide ions

1

(b) 27 (cm^3)

1

(c) ions cannot move (freely in a solid)

allow ions are fixed in place (in a solid)

1

(d)

Molten compound	**Product at negative electrode**	**Product at positive electrode**
Potassium iodide	Potassium	**Iodine**
Zinc bromide	**Zinc**	Bromine

2

(e) carbon is less reactive than sodium

1

(f) (I)

1

(g) (percentage atom economy =) $\frac{48}{80} \times 100$

1

= 60 (%)

1

[9]