Mark schemes

Q1.

(a) copper sulfate

allow $CuSO_4$

1

water

allow H_2O

1

(b) solid remains (in the mixture)

or

no more effervescence / bubbles / fizzing

ignore references to colours

allow copper carbonate remains (in the mixture)

1

(c) to remove copper carbonate

allow to remove excess (copper carbonate)

1

(d) electric heater

or

water bath

ignore Bunsen burner

1

(e)

$$92.8 = \frac{\text{mass produced}}{12.5} \times 100$$

allow mass produced =

$$\%\ \text{yield} \times \frac{\text{max theoretical mass}}{100}$$

1

$$\text{(mass produced)} = \frac{92.8}{100} \times 12.5$$

1

= 11.6 (g)

1

(f) (copper)
does not react with (sulfuric)
acid

allow is unreactive
allow will not displace hydrogen
allow is below hydrogen in the reactivity series
ignore is not reactive enough

1

(sodium)
could explode
or
could get too hot

allow (the reaction is) dangerous

1

[10]

Q2.

(a) $Fe_2O_3 + 3\ C \rightarrow$ **2** Fe + **3** CO

allow multiples

*allow **1** mark for 2 Fe*

or

*allow **1** mark for 3 CO*

2

(b) (iron oxide) loses oxygen

ignore references to gain of electrons

1

(c) (M_r =)

(2 × 56) + (3 × 16)

allow 112 + 48

1

= 160

1

(d) (percentage atom economy =)

$$\frac{63.5}{2 + 79.5} \times 100$$

1

= 77.9 (%)

allow 77.914110 (%) correctly rounded to at least 2 significant figures

1

(e) any **one** from:

- colour change (in solution)
- colour change (in metal)
- change of temperature

allow bubbles

1

(f) (most reactive) **D**

B

A

(least reactive) **C**

1

(reason) more reactive (metals) displace less reactive (metals)

*allow **D** has most (displacement) reactions*

***and C** does not react*

allow the more reactive metals have more (displacement) reactions

1

[10]

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) (l)

1

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

1

= 60 (%)

1

[9]