

Reactants fully correct with "2" (1)  
Products fully correct including state symbols (1)

**All formulae correct with other errors – 1 max (2 marks)**

(ii) Molar mass of  $\text{CaCO}_3 = 40 + 12 + 3 \times 16$   
 $= 100$  (1)

Amount =  $\frac{m}{M} = \frac{0.680}{100}$   
 $= 0.0068$  (1) (2 marks)

(iii) Volume of  $\text{CO}_2 = 24 \times 0.0068$  (1)  
 $= 0.16(32) \text{ dm}^3$  (2 marks)

(iv) (Excess) wind/burping/flatulence/chalky taste (1 mark)

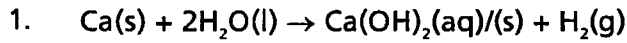
(b) (i) Nichrome/platinum wire/silica rods (1)  
**Concentrated** hydrochloric acid (1)  
Wire dipped in acid, then crushed/powder(ed) tablet/salt or paste,  
then into (roaring) (Bunsen) flame (1)  
(3 marks)

(ii) (brick/orange) red (1 mark)

(iii) Magnesium does not emit light/radiation in the visible  
region  
*ACCEPT*'gives no colour to the flame' (1 mark)

**Total 12 marks**

**Unit Test 1 6251/01**

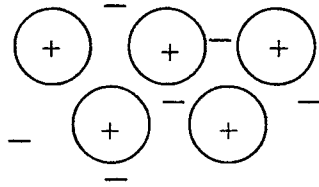


All formulae correct (1)

Balancing and all state symbols (1)

**2 marks**

2. (a)



ALLOW e(-) for electrons.

Cations must not touch.

(Equal number of) regularly arranged positive charges and (randomly) arranged electrons.

**(1 mark)**

(b) *Mark independently from (a)*

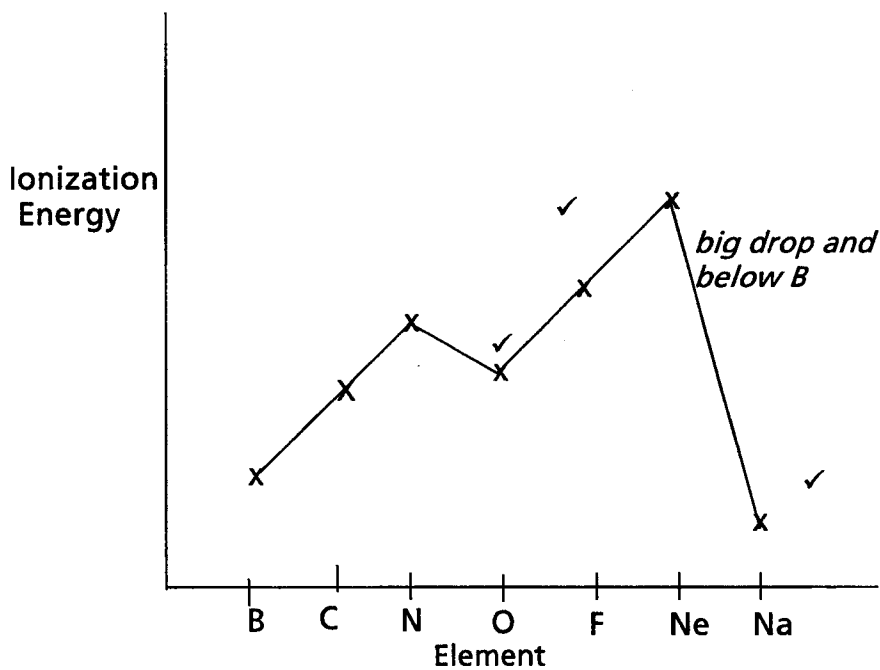
"Electrons/are mobile/ free to move"

**(1 mark)**

3. (a)  $1s^2 2s^2 2p^2$

**(1 mark)**

(b)



1<sup>st</sup> mark for O between C and N

2<sup>nd</sup> mark for F, Ne in straight line with O.

3<sup>rd</sup> mark for Na below B

**(3 marks)**

4. (a) An acid which is partly ionized/dissociated.  
*ACCEPT* "Not fully dissociated/ionised". (1 mark)
- (b) (i) Conductivity/pH meter (1 mark)
- (ii) Low conductivity  
*ALLOW* pH in range 3-6 / yellow/orange  
Result must relate to test in (i). (1 mark)

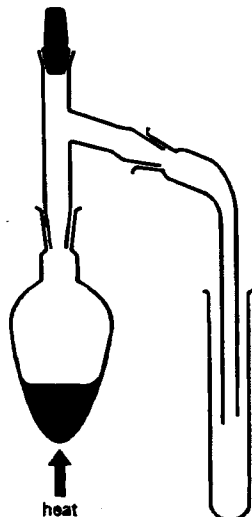
**TOTAL FOR SECTION A: 11 MARKS**

5. (a) (i) molar mass =  $(0.973 \times 115) + (0.0269 \times 113)$   
 $= 114.9 \text{ g mol}^{-1}$   
Method (1)  
Answer with units and Sig. Figs. (1) (2 marks)
- (ii) **Mass** spectrometer (1 mark)
- (b) (i)  $2\text{In}(s) + 3\text{H}_2\text{SO}_4(aq) \rightarrow \text{In}_2(\text{SO}_4)_3(aq) + 3\text{H}_2(g)$   
Formulae (1)  
Balancing and all state symbols (1) (2 marks)
- (ii) Boil/heat to remove excess water/reduce the volume/concentrate the solution (1)  
Cool/leave/allow water to evaporate/to crystallise. (1)  
Filter/decant/pick out crystals (1)  
Dry between (filter) papers/in a desiccator. (1)  
(4 marks)
- (c) 49 protons (1)  
66 neutrons (1)  
46 electrons (1)  
(3 marks)

**Total 12 marks**

6. (a) (i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$  (1 mark)
- (ii) Potassium/sodium dichromate (1)  
*ACCEPT* correct formulae (1)  
 (dilute) sulphuric acid (2 marks)

(iii)



*Delivery tube must at least enter the tube UNLESS a condenser is used.*

- Heat and round bottomed/pear shaped flask (1)  
 Air/water condenser and still head (1)  
 Product collection – delivery tube/condenser and collection vessel (1)

Poor drawing

Sealed/unsealed apparatus

} -1

(3 marks)

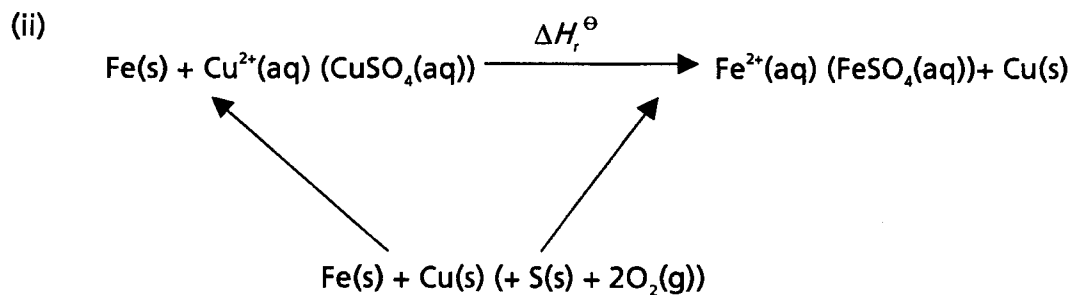
(iv) From orange (1) to green(blue) (1) (2 marks)

(b) (i) Remains blue (1)  
 Forms a red/brown/orange (precipitate) (1)  
 (2 marks)

(ii) Butanal is readily oxidized /reacts with oxygen/air (1)  
 to butanoic/carboxylic acid (1)  
 (2 marks)

**Total 12 marks**

8. (a) (i)  $\text{Fe(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Fe}^{2+}(\text{aq}) + \text{Cu(s)}$   
 Formulae (1)  
 State symbols (1) (2 marks)



Entities (1)

Arrows (1)

Hess applied  $\Delta H_r^\ominus = \Delta H_f^\ominus [\text{Fe}^{2+}(\text{aq})] - \Delta H_f^\ominus [\text{Cu}^{2+}(\text{aq})]$  (1)

(3 marks)

(b) (i) Polystyrene/plastic cup (1 mark)

(ii)  $(0.01 \times 56 =) 0.56 \text{ (g)}$  (1 mark)

(iii)  $\left[ \frac{25 \times 0.2}{1000} \right] 5 \times 10^{-3}$  (1 mark)

(iv)  $153.9 \times 1000 \times 5 \times 10^{-3} = 769.5/770 \text{ J} / 0.7695/0.77 \text{ kJ}$  (1 mark)

(v) As enthalpy change is negative, heat is given out. (1 mark)

(vi) Temperature change =  $\frac{769.5}{4.18 \times 25} = (+)7.4/7.36 \text{ }^\circ\text{C/K}$

Value (1)

Sign and unit  $^\circ\text{C}$  or  $\text{K}$  and "+"

*IF* -7.4  $^\circ\text{C/K}$  1 max

(2 marks)

(vii) Heat losses to the surroundings/Mass of chemicals/heat capacity of solution not allowed for.

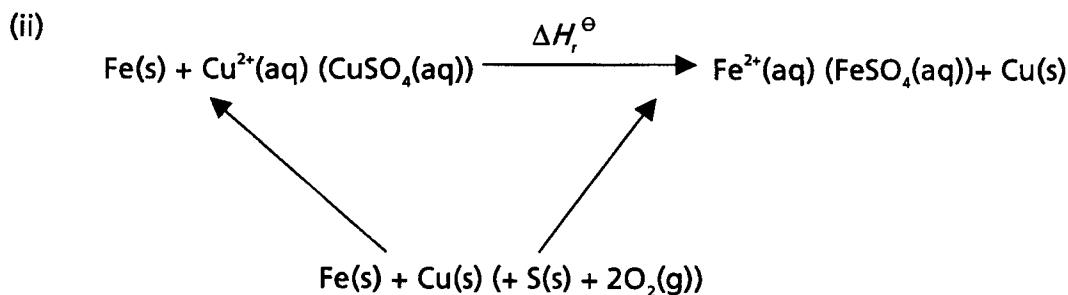
*Any reasonable point*

*NOT* heat loss to calorimeter

(1 mark)

**TOTAL FOR SECTION B: 49 MARKS**

8. (a) (i)  $\text{Fe(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Fe}^{2+}(\text{aq}) + \text{Cu(s)}$   
 Formulae **(1)**  
 State symbols **(1)** **(2 marks)**



Entities **(1)**

Arrows **(1)**

Hess applied  $\Delta H_f^\ominus = \Delta H_f^\ominus [\text{Fe}^{2+}(\text{aq})] - \Delta H_f^\ominus [\text{Cu}^{2+}(\text{aq})]$  **(1)**

**(3 marks)**

(b) (i) Polystyrene/plastic cup **(1 mark)**

(ii)  $(0.01 \times 56 \Rightarrow) 0.56 \text{ (g)}$  **(1 mark)**

(iii)  $\left( \frac{25 \times 0.2}{1000} \right) \approx 5 \times 10^{-3}$  **(1 mark)**

(iv)  $153.9 \times 1000 \times 5 \times 10^{-3} = 769.5/770 \text{ J} / 0.7695/0.77 \text{ kJ}$  **(1 mark)**

(v) As enthalpy change is negative, heat is given out. **(1 mark)**

(vi) Temperature change =  $\frac{769.5}{4.18 \times 25} = (+)7.4/7.36 \text{ }^\circ\text{C/K}$

Value **(1)**

Sign and unit  $^\circ\text{C}$  or  $\text{K}$  and "+"

*IF -7.4  $^\circ\text{C/K}$  1 max*

**(2 marks)**

(vii) Heat losses to the surroundings/Mass of chemicals/heat capacity of solution not allowed for.

*Any reasonable point*

*NOT* heat loss to calorimeter

**(1 mark)**

**TOTAL FOR SECTION B: 49 MARKS**