1. CT – 1mk
D.P – 1 mk
Accuracy (1 mk)

(a) Average volume of solution X = 25.0cm^3 (1 mk)
(b) Moles of solution X required
$\qquad$ NaOH(aq) + HCl(aq) $\longrightarrow$ NaCl(aq) + H2O(l)
$\qquad$ 1:1 (1/2 mk)
Moles of NaOH $= \frac{0.2 \times 25}{1000} = 0.005\ moles$ (1/2 mk)
Moles of solution X $= \frac{0.005 \times 1}{1} = 0.005$ moles (1 mk)
(c) Molarity of solution X
No. of moles = 0.005 moles
0.005 moles $\qquad$ 25cm^3
? $\qquad$ 1000 cm^3
$= \frac{0.005 \times 1000}{25}$ (1 mk) = 0.2m (1 mk)
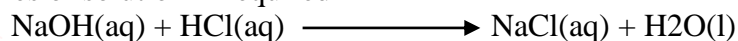
Procedure II
CT – 1 mk
D.P – 1 mk
Accuracy – 1 mk
(d) Average volume of solution X
$\qquad$ = 25.0 cm^3 (1 mk)
(e) Number of moles of Na_2CO_3 in 25cm^3
Na2CO$_{3(aq)}$ + 2HCl$_{(aq)}$ $\longrightarrow$ 2NaCl$_{(aq)}$ + CO$_{2(g)}$ + H$_2$O$_{(l)}$
$\qquad$ 1:2
Moles of HCl reacting $= \frac{0.2 \times 25}{1000}$
$\qquad\qquad\qquad$ = 0.005 moles (1/2 mk)
Mole ratio – Na$_2$CO$_3$:HCl
$\qquad\qquad$ 1:2 (1/2 mk)
Moles of Na$_2$CO$_3$ = ½ x 0.005(1/2 mk) = 0.0025 moles (1/2 mk)
(f) Concentration of sodium carbonate in moles per litre.
0.0025 moles $\longrightarrow$ 25cm^3
$\qquad$? $\longrightarrow$ 1000cm^3
$\frac{0.0025 \times 1000}{25}$ (1 mk) = 0.1 M (1 mk)
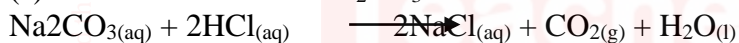
2. (a)

Observations	Inferences
- Solid turns to yellow and then to white on cooling. (1 mk) - A gas that turns moist blue litmus paper to red.	Zn^{2+} present (1 mk) The gas is acidic

(b) (i)

Observations	Inferences
A white precipitate soluble in excess. (1 mk)	Zn^{2+} present (1 mk)

(ii)

Observations	Inferences
A white ppt present (1 mk)	SO_4^{2-}, Cl^-, CO_3^{2-} present (1 mk for any two)

(c)

Observations	Inferences
Effervescence present (1 mk)	CO_3^{2-} present (1 mk)

(i)

Observations	Inferences
A white ppt which dissolves in excess (1 mk)	Zn^{2+} present (1 mk)

(ii)

Observations	Inferences
No white ppt (1 mk)	SO_4^{2-}, CL^-, SO_3^{2-} absent (1 mk for any two)

3. (a) (i)

Observations	Inferences
Solid burns with a sooty flame (1 mk)	$C=C$ or $-C=C-$ present (1/2 mk for each)

(b) (i)

Observations	Inferences
Solid dissolves forming a colourless solution. (1/2 mk)	The solid is polar (1/2 mk)

(ii)

Observations	Inferences
Purple acidified potassium manganate (vii) is decolourised (1 mk)	$C=C$ or $-C=C-$ present (1/2 mk for each)

(iii)

Observations	Inferences
Orange acidified Potassium dichromate (vi) turns to green. (1 mk)	$C=C$ or $-C=C-$ present (1/2 mk for each)

(iv)

Observations	Inferences
Effervescence present (1 mk)	H^+ present (1 mk)

(v)

Observations	Inferences
PH is 5 (1 mk)	Solution is weakly acidic. (1 mk)