M1. (a) (i)

	The addition of $AgNO_3$	followed by concentrated	the addition of $NH_3(aq)$
Observation with NaBr(aq)	Cream or off white precipitate or solid (1)	Precipitate dissolves (1)	
Observation with NaI(aq)	Yellow precipitate or solid (1)	Precipitate insoluble or no change (1)	

(ii) Ag F is soluble;

5

(b) (i) identity: $[Ag(S_2O_3)_2]^{3-}$;

1

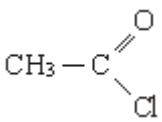
(ii) equation: $AgI + 2S_2O_3^{2-} \rightarrow [Ag(S_2O_3)_2]^{3-} + I^-$

1

(iii) use: in photography or as a fixer;

1

(c) (i) Structure

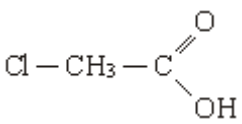


1

Observation: Vigorous or violent or exothermic reaction
or fumes or white precipitate formed immediately

1

(ii) Structure:



1

Observation: No immediate precipiate or reaction

OR

white precipitate formed very slowly;

1

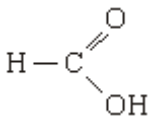
(d) (i) Silver-containing complex: $[Ag(NH_3)_2]^+$;

1

Shape: Linear;

1

(ii) Structure



1

Explanation: Methanoic acid contains an aldehyde group;

1

(iii) H_2CO_3 or CO_2 or $OC(OH)NH_2$ or $(NH_2)_2CO$ or $(NH_4)_2CO_3$

OR

$HCOONH_4$;

1

[17]

M2. D

[1]

M3. (a) Gains electrons (or removes electrons)

1

(b) (i) +4

1

+6

1

(ii) $Br_2 + 2e^- \rightarrow 2Br^-$

1

(iii) $SO_2 + 2H_2O \rightarrow 4H^+ + SO_4^{2-} + 2e^-$

1

(iv) $Br_2 + SO_2 + 2H_2O \rightarrow 2Br^- + 4H^+ + SO_4^{2-}$

1

(c) $Cl_2 + H_2O \rightarrow H^+ + Cl^- + HOCl$

1

Chloride: –1

1

Chlorate(I): +1

1

(d) Chloride ions cannot reduce sulphuric acid

(Or chloride ions are weak reducing agents
Or sulphuric acid is not a strong enough oxidising agent
Or sulphuric acid is a weaker oxidising agent than chlorine)

1

(e) $KCl + H_2SO_4 \rightarrow HCl + KHSO_4$

(Allow $2KCl + H_2SO_4 \rightarrow 2HCl + K_2SO_4$)

1

(f) (i) Bromine

1

(ii) Sulphur dioxide

1

[13]