

Question	Marking Guidance	Mark	Comments
6(a)	Brown <u>ppt/solid</u> Gas evolved/effervescence  $2[\text{Fe}(\text{H}_2\text{O})_6]^{3+} + 3\text{CO}_3^{2-} \rightarrow 2\text{Fe}(\text{H}_2\text{O})_3(\text{OH})_3 + 3\text{CO}_2 + 3\text{H}_2\text{O}$	1 1 2	Must be stated, Allow $\text{CO}_2$ evolved. Do not allow $\text{CO}_2$ alone  Correct iron product (1) allow $\text{Fe}(\text{OH})_3$ and in equation Balanced equation (1)
6(b)	White <u>ppt/solid</u> Colourless <u>Solution</u> $[\text{Al}(\text{H}_2\text{O})_6]^{3+} + 3\text{OH}^- \rightarrow \text{Al}(\text{H}_2\text{O})_3(\text{OH})_3 + 3\text{H}_2\text{O}$ $\text{Al}(\text{H}_2\text{O})_3(\text{OH})_3 + 3\text{OH}^- \rightarrow [\text{Al}(\text{OH})_6]^{3-} + 3\text{H}_2\text{O}$	1 1 1 1	Only award M2 if M1 given or initial ppt mentioned Allow $[\text{Al}(\text{H}_2\text{O})_6]^{3+} + 3\text{OH}^- \rightarrow \text{Al}(\text{OH})_3 + 6\text{H}_2\text{O}$ Allow formation of $[\text{Al}(\text{H}_2\text{O})_{6-x}(\text{OH})_x]^{(x-3)-}$ where $x=4,5,6$ Allow product without water ligands Allow formation of correct product from $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$
6(c)	Blue <u>ppt/solid</u> (Dissolves to give a) deep blue <u>solution</u> $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 2\text{NH}_3 \rightarrow \text{Cu}(\text{H}_2\text{O})_4(\text{OH})_2 + 2\text{NH}_4^+$  $\text{Cu}(\text{H}_2\text{O})_4(\text{OH})_2 + 4\text{NH}_3 \rightarrow [\text{Cu}(\text{H}_2\text{O})_2(\text{NH}_3)_4]^{2+} + 2\text{OH}^- + 2\text{H}_2\text{O}$	1 1 1 1	Only award M2 if M1 given or initial ppt mentioned Allow $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 2\text{NH}_3 \rightarrow \text{Cu}(\text{OH})_2 + 2\text{NH}_4^+ + 4\text{H}_2\text{O}$ Allow two equations: $\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$ then $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 2\text{OH}^- \rightarrow \text{Cu}(\text{OH})_2 + 4\text{H}_2\text{O}$ etc Allow $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 4\text{NH}_3 \rightarrow [\text{Cu}(\text{H}_2\text{O})_2(\text{NH}_3)_4]^{2+} + 4\text{H}_2\text{O}$
6(d)	Green/yellow <u>solution</u> $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 4\text{Cl}^- \rightarrow [\text{CuCl}_4]^{2-} + 6\text{H}_2\text{O}$	1 1	