AA PART I.B. ANSWER SHEET

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Q1 - Alternative Assessment –Problem Set Part I Yr.& Section: 9-Magnesium

Total: 10 points

Part I.B Acidic Medium (5pts)

(i) Half-reaction equation	**Oxidation Half-reaction:** $Cl^- \rightarrow Cl_2$	**Reduction Half-reaction:** $Cr_2O_7{}^{2-} \rightarrow Cr^{3+}$
(ii) Balancing of all other elements except H and O *Balancing O* *Balancing H*	$Cl^- \rightarrow Cl_2$ $2Cl^- \rightarrow Cl_2$ $2Cl^- \rightarrow Cl_2 + 2e^-$	$Cr_2O_7{}^{2-} \rightarrow Cr^{3+}$ $Cr_2O_7{}^{2-} \rightarrow Cr^{3+} + 7H_2O$ $Cr_2O_7{}^{2-} + 14H^+ \rightarrow 2Cr^{3+} + 7H_2O$ $6e^- + Cr_2O_7{}^{2-} + 14H^+ \rightarrow 2Cr^{3+} + 7H_2O$
(iii) Balancing each half reaction with respect to charge	$3(2Cl^- \rightarrow Cl_2 + 2e^-)$ $6Cl^- \rightarrow 3Cl_2 + 6e^-)$ **Multiply both sides by 3 so both half reactions have the same electron count**	
(iv) overall balanced equation	$6Cl^- + \cancel{6e^-} + Cr_2O_7{}^{2-} + 14H^+ \rightarrow 3Cl_2 + \cancel{6e^-} + 2Cr^{3+} + 7H_2O$ $\underline{14H^+ + 6Cl^- \rightarrow 3Cl_2 + 2Cr^{3+} + 7H_2O}$	

Part I.B Basic Medium (5pts)

(i) Half-reaction equation	**Oxidation Half-reaction:** $ClO^- \rightarrow Cl^-$	**Reduction Half-reaction:** $Cr(OH)_4{}^- \rightarrow CrO_4{}^{2-}$
(ii) Balancing of all other elements except H and O *Balancing O* *Balancing H*	$ClO^- \rightarrow Cl^- + H_2O$ $H^+ + ClO^- \rightarrow Cl^- + H_2O$ $2H^+ + ClO^- \rightarrow Cl^- + H_2O$ $2OH^- + 2H^+ + ClO^- \rightarrow Cl^- + H_2O + 2OH^-$ $2H_2O + ClO^- \rightarrow Cl^- + H_2O + 2OH^-$ $H_2O + ClO^- + 2e^- \rightarrow Cl^- + 2OH^-$	$Cr(OH)_4{}^- \rightarrow CrO_4{}^{2-} + 4H^+$ $Cr(OH)_4{}^- + 4OH^- \rightarrow CrO_4{}^{2-} + 4H_2O$ $Cr(OH)_4{}^- + 4OH^- \rightarrow CrO_4{}^{2-} + 4H_2O + 3e^-$
(iii) Balancing each half reaction with respect to charge	**Multiply by 3 for equal electrons and to get the LCM (6.)** $3H_2O + 3ClO^- + 6e^- \rightarrow 3Cl^- + 6OH^-$	**Multiply by 2 for equal electrons and to get the LCM (6.)** $2Cr(OH)_4{}^- + 8OH^- \rightarrow 2CrO_4{}^{2-} + 8H_2O + 6e^-$
(iv) overall balanced equation	$3ClO^- + 2Cr(OH)_4{}^- + 2OH^- \rightarrow 3Cl^- + 2CrO_4{}^{2-} + 5H_2O$	