

Name of the Student: _____

Max. Marks : 19 Marks

Time : 19 Minutes

Mark Schemes

Q1.

- (a) (Standard) hydrogen (electrode) **(1)** 1
- (b) (i) To allow transfer of electrons / provide a reaction surface **(1)**
- (ii) 298 K **(1)**
Both $\text{Fe}^{3+}(\text{aq})$ and $\text{Fe}^{2+}(\text{aq})$ have a concentration of
 1 mol dm^{-3} **(1)** (QoL)
OR $[\text{H}^+] = 1 \text{ mol dm}^{-3}$
NOT zero current or 100 kPa 3
- (c) +1.34 V **(1)**
 $2 \text{MnO}_4^- + 5 \text{H}_2\text{SO}_3 \rightarrow 2 \text{Mn}^{2+} + 5 \text{SO}_4^{2-} + 3 \text{H}_2\text{O} + 4 \text{H}^+$
 Correct species / order **(1)**
 Balanced and cancelled **(1)**
Allow one for $2 \text{MnO}_4^- + 5 \text{H}_2\text{SO}_3 \rightarrow 2 \text{Mn}^{2+} + 5 \text{SO}_4^{2-}$ 3
- (d) (i) $\text{Ce}^{4+}(\text{aq})$ **(1)**
- (ii) $\text{VO}_2^+(\text{aq})$ **(1)**; Cl_2 **(1)**
Penalise additional answers to zero 3
- (e) $\text{Pt} | \text{Fe}^{2+}(\text{aq}), \text{Fe}^{3+}(\text{aq}) || \text{Ce}^{4+}(\text{aq}), \text{Ce}^{3+}(\text{aq}) | \text{Pt}$
 Correct species **(1)**
 Correct order **(1)**
Deduct one mark for each error 2

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Q2.

- (a) Cell e.m.f.: 1.93 (v) CE if negative value given **(1)**

Half equation: $\text{Mg} \rightarrow \text{Mg}^{2+} + 2 \text{e}^-$ **(1)**

or $\rightleftharpoons$

Ignore state symbols

Mark on after an AE

2

- (b) Change in e.m.f.: increases **(1)**

Mark on even if incorrect

Explanation: Equilibrium displaced to Mg^{2+} or to the left **(1)**

cell reaction or overall reaction goes to the right

Electrode is more negative or E decreases

or gives more electron

or forms more Mg^{2+} ions

Mark separately

3

- (c) Cell e.m.f. : -0.84 (V) **(1)**

Explanation: Fe is giving electrons **or** forming Fe^{2+}

or reaction goes in the reverse direction **(1)**

Mark on after AE

N.B. In (a) and (c) mark on if no value given,
but CE in both (a) and (c) if e.m.f. = 0

2

[7]