Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1_Electrode Potentials And Electrochemical Cells

Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Mark Schemes

Q1.

(a) (i) 0.60 V **1**

(ii) $H_2O + H_2SO_3 \rightarrow SO_4^{2-} + 4H^+ + 2e^-$ **1**

(b) (i) $2IO_3^- + 2H^+ 5H_2O_2 \rightarrow 5O_2 + I_2 + 6H_2O$ Species **1**

Balanced **1**

(ii) The concentration of the ions change or are no longer standard or the e.m.f is determined when no current flows **1**

(iii) Unchanged **1**

(iv) Increased **1**

Equilibrium IO_3^-/I_2 displaced to the right **1**

Electrons more readily accepted or more reduction occurs or electrode becomes more positive (Q o L) **1**

(c) VO_2^+ **1**

5 or V **1**

$V^{2+} + 2H_2O \rightarrow VO_2^+ + 4H^+ 3e^-$ **1**

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Q2.

(a) most powerful reducing agent: Zn;

1

(b) (i) reducing species: Fe^{2+}

1

(ii) oxidising species: Cl_2;

1

(c) (i) standard electrode potential 1.25 V;

1

(ii) equation: $Tl^{3+} + 2\ Fe^{2+} \rightarrow 2Fe^{3+} + Tl +$ balanced;

1

correct direction;

1

(d) (i) moles $KMnO_4 = 16.2 \times 0.0200 \times 10^{-3} = 3.24 \times 10^{-4}$;

1

moles H_2O_2 = Moles $KMnO_4 \times 5 / 2 = 8.10 \times {}^{-4}$;

1

8.10×10^{-4} moles H_2O_2 in 25 cm^3
$8.10 \times 10^{-4} \times 1000 / 25$ in 1000 $cm^3 = 0.0324$ mol dm^{-3};

1

hence g dm^{-3} = mol $dm^{-3} \times M_r = 0.0324 \times 34 = 1.10$;
(penalise use of an incorrect H_2O_2 to $KMnO_4$ ratio by two marks)

1

(ii) $PV = nRT$;

1

hence $V = nRT / P$
$= 8.10 \times 10^{-4} \times 8.31 \times 298/98000$;

1

$= 2.05 \times 10^{-5}$;

1

units m^3;
(mark consequentially to answers in (c)(i))
(allow correct answers with other units)
(answers to (c)(i) and (ii) must be to 3 significant figures; penalise once only)

1

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