19.1 Electrochemical Cells

Question Paper

Course	DP IB Chemistry
Section	19. Redox Processes (HL only)
Topic	19.1 Electrochemical Cells
Difficulty	Medium

Time allowed: 10

Score: /5

Percentage: /100

Question 1

Use the following electrode potentials to answer the question.

$$Sn^{2+}(aq) + 2e^- \rightleftharpoons Sn(s) \quad E^\theta = -0.14\,V$$

$$Fe^{3+}(aq) + e^- \rightleftharpoons Fe^{2+}(aq) \quad E^\theta = +0.77\,V$$

What will be the EMF, in V, when the following voltaic cell is connected?

$$Sn(s) + 2Fe^{3+}(aq) \rightarrow 2Fe^{2+}(aq) + Sn^{2+}(aq)$$

A. -0.91

B. +0.63

C. +1.68

D. +0.91

[1 mark]

Question 2

Which of the following reactions could take place at the positive electrode (cathode) in a voltaic cell?

I. $Cu^{2+}(aq)$ to $Cu(s)$
II. $Br_2(g)$ to $Br^-(aq)$
III. $Co^{3+}(aq)$ to $Co^{2+}(aq)$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 3

What is true when aqueous copper(II) sulfate is electrolysed using platinum electrodes?

A. H_2 and O_2 are produced in a 2:1 mole ratio

B. Cu and O_2 are produced in a 2:1 mole ratio

C. H_2 and O_2 are produced in a 1:1 mole ratio

D. Cu and O_2 are produced in a 1:1 mole ratio

[1 mark]

Question 4

Use the following electrode potentials to answer the question.

$$Zn^{2+}(aq) + 2e^- \rightleftharpoons Zn(s) \quad E^\theta = -0.76\,V$$

$$Cl_2(aq) + 2e^- \rightleftharpoons 2Cl^-(aq) \quad E^\theta = +1.36\,V$$

$$Mg^{2+}(aq) + 2e^- \rightleftharpoons Mg(s) \quad E^\theta = -2.37\,V$$

Predict what happens when some powdered zinc is added to aqueous magnesium chloride?

A. There is no reaction observed

B. Bubbles of chlorine gas will be seen

C. Magnesium metal will be produced

D. Zinc chloride will be produced

[1 mark]

Question 5

Which of the following electrolytic cells would give the greatest mass of metal at the cathode?

	Current	Time	Solution
A.	1.5	250	1.0 mol dm^{-3} $AgNO_3$ (aq)
B.	1.0	750	1.0 mol dm^{-3} $CuSO_4$ (aq)
C.	2.0	250	1.0 mol dm^{-3} $AgNO_3$ (aq)
D.	1.0	500	1.0 mol dm^{-3} $CuSO_4$ (aq)

[1 mark]