**ELECTROCHEMISTRY – GALVANIC CELL**

**A. Objective questions (5 marks)**

1. Which of the following half-cell diagrams is **not** correctly written?

 A. Pb2+(aq) | Pb(s)

 B. Pt(s) | Cu+(aq), Cu2+(aq)

 C. H2(g), H+(aq) | Pt(s)

 D. Pt(s) | [Fe(CN)6]4-(aq), [Fe(CN)6]3-(aq)

2. Pick the correct statement about S.H.E.

1. S.H.E is used as reference electrode to measure standard reduction potential of half-cell.
2. S.H.E consists of a gold plate immersed in a basic solution.
3. Standard reduction potential for S.H.E is 1.00 V.
4. Hydrogen gas at 1 atm and 0°C is pumped through S.H.E.

3. Cr3+ + e- → Cr2+ Eo = -0.41 V

 Mg2+ + 2e- → Mg Eo = -2.38 V

 Pb4+ + 2e- → Pb2+ Eo = +1.80 V

Which of the following is the strongest oxidising agent?

 A. Mg2+ B. Cr3+ C. Cr2+ D. Pb4+

4. Cr3+ + e- → Cr2+ Eo = -0.41 V

 Mg2+ + 2e- → Mg Eo = -2.38 V

 Pb4+ + 2e- → Pb2+ Eo = +1.80 V

Which of the following is the strongest reducing agent?

 A. Cr2+  B. Mg C. Pb4+ D. Pb2+

5. The electrode potentials for standard metals X and Y are given below:

 X2+ (aq) | X(s) Eo = -0.25 V

 Y2+(aq) | Y(s) Eo = +0.80 V

 The cell made up of the above two half-cells is shown as follows:

Y electrode

X electrode

**V**

 salt bridge

1.0 M X2+(aq) 1.0 M Y2+(aq)

 Which description is correct ?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Cathode | Eocell (V) | Direction of e- flow | Electrode at which cations enter the solution |
| A. | X | +0.55 | X to Y | X |
| B. | X | +1.05 | Y to X | Y |
| C. | Y | +1.05 | X to Y | X |
| D. | Y | +0.55 | Y to X | Y |

**B. Subjective Questions**

1. Based on the cell notation below:

 Pt(s) | H2(g, 1 atm) | H+(aq, 1.0M) ║Ag+(aq, 1.0M) | Ag(s)

 (a) Write the half-equation for the oxidation and reduction reactions and a balanced overall chemical equation for the cell. [3 marks]

(b) Determine the Eo cell.

 Given E° Ag+| Ag = +0.80 V [2 marks]

**ANSWERS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. | 2. | 3. | 4. | 5. |
| **C** | **A** | **D** | **B** | **C** |

|  |  |  |
| --- | --- | --- |
| **NO.** | **PART** | **SUGGESTED ANSWER** |
| **1.** | **(a)** | Oxidation: H2(g, 1 atm) → 2H+(aq, 1.0 M) + 2e-Reduction: [Ag+(aq) + e-  → Ag(s) ] × 2  Overall cell equation: **H2(g) + 2Ag+(aq)** →  **2H+(aq) + 2Ag(s)** |
|  | **(b)** | E°cell = E°cathode ­ - E°anode **E°Ag | Ag - E°H  |  H** ++2= = + 0.80 – 0.00 = **+0.80 V** @  E°cell = E°red­ + E°ox **E°Ag | Ag - E° H  |  H** ++2 =  = +0.80 + 0.00 = +0.80 V |
|  |  | **TOTAL = 5**  |