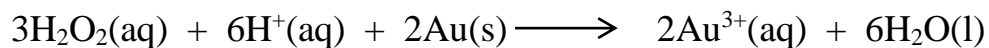


B. Subjective Questions

1. Refer to the reaction below



- (i) Identify the reducing agent and oxidizing agent for the reaction.
- (ii) Determine the pH of the half-cell if emf of the cell is + 0.2711 V
[Au³⁺] = 0.25 M, and [H₂O₂] = 1.50 M
- (iii) If the the concentration of [Au³⁺] is increased, what would happen to the emf of the cell ? Explain

[Given $E^\circ_{\text{Au}^{3+}|\text{Au}} = +1.50 \text{ V}$; $E^\circ_{\text{H}_2\text{O}_2|\text{H}_2\text{O}} = +1.77 \text{ V}$]

[10 marks]

ANSWERS

1.	2.	3.	4.	5.
C	B	A	A	C

NO.	PART	SUGGESTED ANSWER
1.	(i)	<p>Reducing agent : Au 1 mark</p> <p>Oxidising agent : H₂O₂ 1 mark</p>
	(ii)	$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$ $= E^\circ_{\text{H}_2\text{O}_2/\text{H}_2\text{O}} - E^\circ_{\text{Au}^{3+}/\text{Au}}$ $= +1.77 \text{ V} - 1.50 \text{ V}$ $= +\mathbf{0.27 \text{ V}}$ 1 mark
	(iii)	$E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0.0592}{n} \log Q$ $E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0.0592}{n} \log \frac{[\text{Au}^{3+}]^2}{[\text{H}_2\text{O}_2]^3 [\text{H}^+]^6}$ 1 mark $0.2711 \text{ V} = 0.27 \text{ V} - \frac{0.0592}{6} \log \frac{(0.25)^2}{(1.50)^3 [\text{H}^+]^6}$ <p style="text-align: right;">n = 6 1 mark</p> $\log \frac{(0.25)^2}{(1.50)^3 [\text{H}^+]^6} = -0.1115$ $\frac{(0.25)^2}{(1.50)^3 [\text{H}^+]^6} = 10^{-0.1115}$ <p>[H⁺] = 0.5368 M 1 mark</p> <p>pH = -log [H⁺]</p> $= -\log 0.5368$ $= \mathbf{0.27}$ 1 mark
	(iv)	<p>If the concentration of Au³⁺ is increased, Q increases, log Q increases. 1 mark</p> <p>Therefore, emf or E_{cell} decreases. 1 mark</p>
		TOTAL = 10