

Solutions

Original marking guidance: M1 method, A1 accuracy, B1 explanation.

2.1 Platinum and hydrogen/ H^+ contact, 298 K, hydrogen at 100 kPa, H^+ at 1.00 mol dm^{-3} .

2.2 Silver is positive, with Ag^+ reduced; $E^\circ = 0.80 - 0.34 = +0.46 \text{ V}$.

2.3 Platinum provides an inert electron contact because neither couple member is a conducting solid. Bridge ions complete the circuit/maintain charge balance; electrons move in the external wire.

3.1 $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$; $2\text{Ag}^+ + 2\text{e}^- \rightarrow 2\text{Ag}$. Overall $\text{Cu} + 2\text{Ag}^+ \rightarrow \text{Cu}^{2+} + 2\text{Ag}$. Voltage is energy transfer per charge; scaling reaction and charge together leaves it unchanged.

3.2 A high activation barrier can make it too slow. Actual concentrations/temperature may differ from standard conditions, changing potentials.

3.3 $3\text{A}^{2+} \rightarrow 2\text{A}^{3+} + \text{A}$. Reduction is A^{2+} to A , oxidation reverses $\text{A}^{3+}/\text{A}^{2+}$; $E^\circ = 0.60 - 0.20 = +0.40 \text{ V}$. Positive voltage corresponds to $K > 1$ under the stated standard model.