she

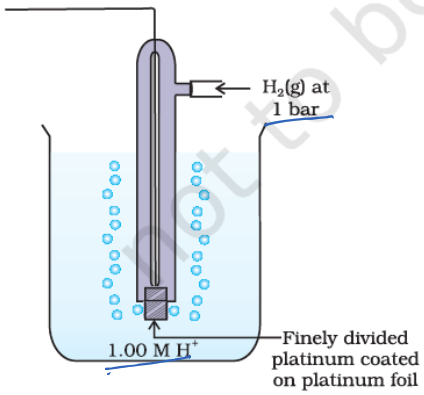


Fig. 3.3: Standard Hydrogen Electrode (SHE).

Electrode potential of Standard Hydrogen electrode is taken as zero at all temperatures.

Standard hydrogen electrode is

$$H^+(aq) \mid H_2(g) \mid Pt(s)$$
$$(1M) \quad (1bar)$$

$$E^\circ_{H^+/H_2} = 0, \quad E^\circ_{H_2/H^+} = 0$$

measured experimentally

$$E_{cell} = E^\circ_{cathode} - E^\circ_{anode}$$

E°_{anode} taken as zero for SHE as per IUPAC convention

Question

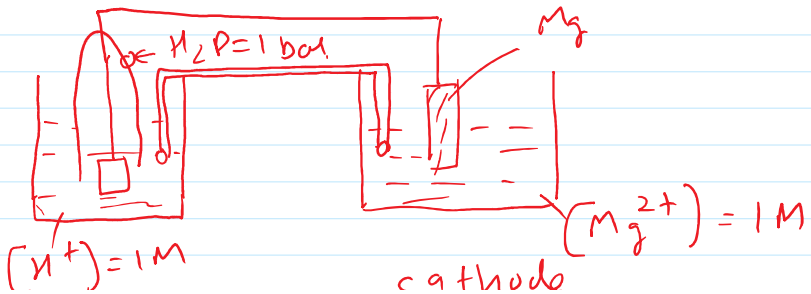
How would you determine the standard potential of the system $Mg^{2+} \mid Mg$?

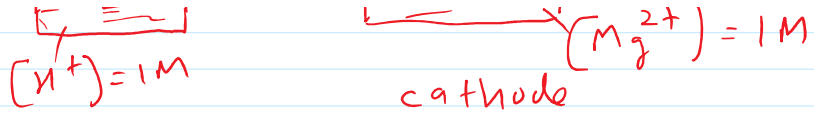
Answer:

i) Take $Mg^{2+} \mid Mg$ electrode with $[Mg^{2+}] = 1M$ as cathode

ii) Take $Pt(s) \mid H_2(g) \mid H^+(aq)$ electrode with $P_{H_2} = 1bar$, $[H^+] = 1M$ as anode.

iii) Construct a galvanic cell and measure cell potential E°_{cell} experimentally.





$$E^\circ_{cell} = E^\circ_{Mg^{2+}/Mg} - E^\circ_{H^+/H_2}$$

By convention $E^\circ_{H^+/H_2} = 0$

$$E^\circ_{Mg^{2+}/Mg} = E^\circ_{cell}$$