

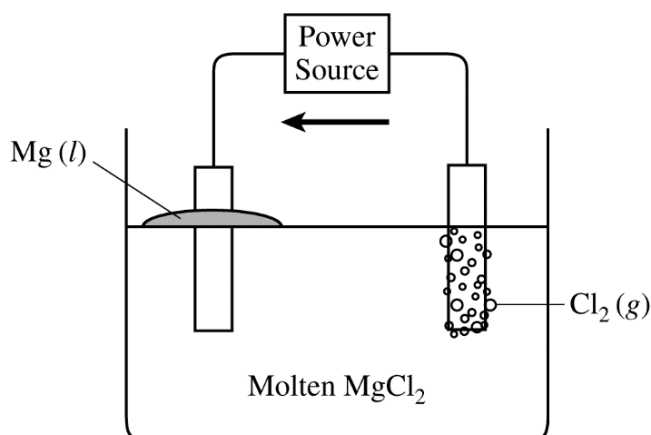
Question 5: Short Answer

4 points

(a) For the correct answer:

1 point

Electron flow should be indicated only in a counter-clockwise direction in the external circuit, from the Cl_2 anode to the Mg cathode.



(b) For the correct answer and calculated value:

1 point

No, because 2.0 V is less than 3.73 V, which is the minimum voltage needed for electrolysis to occur.

$$E_{\text{cell}}^{\circ} = -2.37 \text{ V} + (-1.36 \text{ V}) = -3.73 \text{ V}$$

(c) For the correct calculated value of moles of electrons (may be implicit):

1 point

$$2.00 \text{ g Mg} \times \frac{1 \text{ mol Mg}}{24.30 \text{ g Mg}} \times \frac{2 \text{ mol } e^{-}}{1 \text{ mol Mg}} = 0.165 \text{ mol } e^{-}$$

For the correct calculated number of seconds:

1 point

$$0.165 \text{ mol } e^{-} \times \frac{96,485 \text{ C}}{1 \text{ mol } e^{-}} \times \frac{1 \text{ s}}{5.00 \text{ C}} = 3180 \text{ s}$$

Total for part (c) 2 points

Total for question 5 4 points