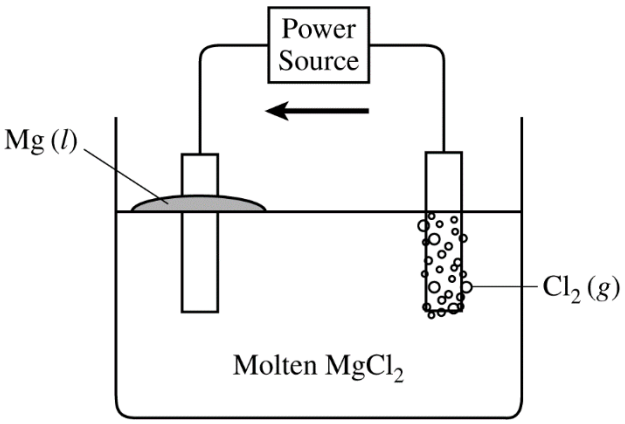
Question 5: Short Answer — 4 points

(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.

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

(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**