

Electrolysis Problems Set II

Note: show all your work to answer these questions.

1. The half-reactions at an electrode is $\text{Mg}^{2+} (\text{molten}) + 2\text{e}^- \rightarrow \text{Mg}_{(\text{s})}$
Calculate the number of grams of Mg that could be produced by passing 1.00 F through the electrode. (ans. 12.15g)

2. Consider the electrolysis of molten lithium chloride.

(a) Write the electrode reactions.

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(b) How many grams of lithium metal can be produced by passing 0.50 A for 30 minutes? (ans. 0.064 g)

3. Explain why different products are obtained in the electrolysis of molten ZnCl_2 and in the electrolysis of an aqueous solution of ZnCl_2 .

4. How many Faradays of electricity are required to produce:

(a) 0.84 L of O_2 at exactly at 1.0atm and 25°C from aqueous H_2SO_4 solution; (ans. 0.14 *f*)

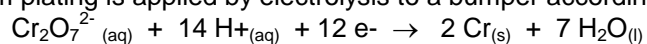
(b) 6.0g of Sn from molten SnCl_2 ?

(ans. 0.10 *f*)

5. Calculate the amounts (in grams) of Cu and Br₂ produced at inert electrodes by passing a current of 4.50 A through a solution of CuBr₂ for 1.0 hour. (ans. 5.33g; 13.42g)

6. The passage of a current of 0.750 A for 25.0 min deposited 0.369 g of Cu from a CuSO₄ solution. From this information, calculate the molar mass of copper. (ans. 63.29g/mol)

7. Chromium plating is applied by electrolysis to a bumper according to the following half-reaction:



Assume that the electrolytic cell is operating at 25.3 A, how long (in hours) will it take to plate out 18 g of Cr onto an automobile bumper? (ans. 2.2 hours)