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CHEMISTRY II

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EXERCISES OF ELECTROCHEMISTRY II

Exercise 1. Predict the products resulting from the electrolysis of 1 M NaBr (aq).

Data: E^0 (Na^+/Na) = $-$ 2.71 V; E^0 (Br_2/Br^-) = + 1.07 V; E^0 (O_2/H_2O, H^+) = + 1.23 V; E^0 (H_2O/H_2, OH^-) = $-$ 0.83 V.

Exercise 2. An aqueous LiCl solution is electrolyzed and the products formed at the anode and cathode are chlorine gas and hydrogen gas, respectively. Describe the electrolysis in terms of the reactions at the electrodes.

Data: E^0 (Li^+/Li) = $-$ 3.05 V; E^0 (Cl_2/Cl^-) = + 1.36 V; E^0 (O_2/H_2O, H^+) = + 1.23 V; E^0 (H_2O/H_2, OH^-) = $-$ 0.83 V.

Exercise 3. A current of 1.62 A is passed through a Cu^{2+} solution for 1.00 h. What is the mass of metallic Cu that will be deposited on the cathode?

Data: M(Cu)=63.5 g/mol.

Exercise 4. Determine the time, in hours, required to electroplate 7.00 g of magnesium metal from molten magnesium chloride using a current of 7.30 A. What volume of chlorine gas at 25 °C and 1 atm will be produced at the anode?

Data: Atomic mass: Mg = 24.3; F = 96500 C/mol e^-.

Exercise 5. One of the half-reactions for the electrolysis of water is: $2H^+$ (aq) +2e^- → H_2 (g). If 0.8445 L of H_2 is collected at 25 °C and 782 mmHg, how many coulombs had to pass through the solution? How many moles of electrons will be involved in this process?

Data: F = 96500 C mol^{-1}, R = 0.082 atm L mol^{-1} K^{-1} = 8.314 J K^{-1} mol^{-1}.