6. Compute the cost at 5.0 ¢ / kWh of operating an electric motor for 8.0 hours, which takes 15.0 amps at 110.0 volts.

$$\frac{15.0\ C}{1\ sec} \times \frac{110.0\ J}{C} = 1650\ \frac{J}{sec} = 1650\ watt \times \frac{1\ kWatt}{1000\ watt} = 1.65\ kWatt \times 8.0\ hr$$

$$= 13.2\ kWhr \times 5.0¢ = \boxed{.66¢}$$

7. How long would it take to deposit 100. grams of $Al_{(s)}$ from an electrolytic cell containing Al_2O_3 in solution at a current of 125 amps?

$$100.\ g\ Al \times \frac{1\ mol\ Al}{26.98\ g} \times \frac{3\ mol\ e^-}{1\ mol\ Al} \times \frac{96500\ C}{1\ mol\ e^-} \times \frac{1\ sec}{125\ C} \times \frac{1\ min}{60\ sec} \approx \boxed{8580\ sec \quad 143\ min}$$

8. Electrolysis of aqueous NaCl leads to the production of gaseous Cl_2. How much energy in kwh must have been used to produce 9.0718×10^{9} kg of Cl_2 when this type of cell operates at 4.6 volts and 3.0×10^5 amps?

$$9.0718 \times 10^9\ kg\ Cl_2 \times \frac{1000\ g}{1\ kg} \times \frac{1\ mol\ Cl_2}{70.90\ g\ Cl_2} \times \frac{2\ mol\ e^-}{1\ mol\ Cl_2} \times \frac{96500\ C}{1\ mol\ e^-} \times \frac{4.6\ J}{1\ C} \times \frac{1\ KWh}{3.6 \times 10^6\ J}$$

$$\boxed{3.2 \times 10^{10}\ KWh}$$

9. A current of 3.0 amps running for 45.0 minutes electrolyzes a solution containing a +2 metal ion. What is the identity of the metal if 2.67 grams of it plate out in this cell?

$$45.0\ min \times \frac{60\ sec}{1\ min} \times \frac{3.0\ C}{1\ sec} \times \frac{1\ mol\ e^-}{96500\ C} \times \frac{1\ mol\ X}{2\ mol\ e^-} = .0420\ mol\ X$$

$$2.67\ g / .0420\ mol = \boxed{63.57\ g/mol = Cu}$$

10. Galvanizing is placing a thin layer of zinc on an iron nail to protect the nail from corrosion. Find the energy in kWh required to electrolyze 12.6 grams of zinc on an iron nail sitting in an electrolytic cell of $Zn^{2+}_{(aq)}$ with a potential of 5.00 volts.

$$12.6\ g\ Zn \times \frac{1\ mol\ Zn}{65.39\ g\ Zn} \times \frac{2\ mol\ e^-}{1\ mol\ Zn} \times \frac{96500\ C}{1\ mol\ e^-} \times \frac{5.00\ J}{1\ C} \times \frac{1\ KWh}{3.6 \times 10^6\ J} = \boxed{0.0517\ KWh}$$