Question. A 1.5V cell supplies 0.20A to a lamp for seven hours before the lamp goes out. What is a sensible estimate for the initial chemical energy content of the cell?

Solution. Let us neglect all heat losses and assume that the cell voltage will not change during the discharge. According to the law of conservation of energy, the initial chemical energy content of the cell is the same, as the electrical energy transferred to the lamp. Last energy we can find from equation $E = Pt$, where P is the power of the lamp and t is the discharge time. Power of the lamp is $P = IU$, so finally we obtain:

$$E = IUt$$

$$E = 0.2 * 1.5 * 7 * 3600 = 7560 \text{ J}$$

Answer: $E = 7560$ J.