Answer on Question #39473, Chemistry, Other

Question

If a water electrolysis cell operates at a current of 7.7A. how long will it take to generate 25.0L of hydrogen gas at a pressure of 27.0 atm
and a temperature of 25 degrees celcius

Answer

PV=nRT
V = 25.0 l = $25*10^{-3}$ m^3; P = 27.0 atm = $27.0*1.013*10^5$ = $2.74*10^6$ Pa; T = t + 273 = 25 + 273 = 298 K. R = 8.314 J/(K*mol).

$n(H_2)$ = PV/RT = $2.74*10^6$ * $25*10^{-3}$ / (8.314*298) = 27.6 mol
n(electrons) = $2*n(H_2)$ = 55.2 mol
n(electrons) = I*t/F, F = 96500 C/mol
t = F*n(electrons)/I = $96500*55.2/7.7 = 6.9*10^5$ (seconds).

Answer: $6.9*10^5$ s.