Answer on Question#38678, Physics, Molecular Physics

1. Heat, obtained from heater in time t is $Q=P\cdot t$ by definition of power. From the other side, amount of heat needed to rise temperature of water from 20 to 100 degrees is
$Q=cm\Delta T=c\rho_w V\Delta T$, where c is heat capacity, ρ_w is the density of the water, V is volume of water and $\Delta T=T_1-T_2$ is the difference between initial and final temperatures. Using last two equations, obtain:

$$Pt=c\rho_w V\Delta T \Rightarrow t=\frac{c\rho_w V\Delta T}{P}=\frac{4200\frac{J}{kg\cdot K}\cdot 1000\frac{kg}{m^3}\cdot 0.6\cdot 10^{-3}m^3\cdot 80\,K}{2500\,W}=81\ s.$$

2. Since in last 20 seconds water is not at 100 degrees, none of it will boil in last 20 seconds.