Answer on Question #56036 - Chemistry - Physical Chemistry

Solution:
According to Arrhenius equation:
$$k = \mathrm{Ae}^{\frac{-E_a}{RT}}$$
Accept that E_{a1} –energy of activation of uncatalytic reaction with rate constant k_1, E_{a2}= E_{a1}-0.4 (Kcal) –energy of activation of catalytic reaction with rate constant k_2.

Then $$\frac{k_2}{k_1} = \mathrm{A}e^{\frac{-E_{a2}}{RT}} \Big/ \mathrm{A}e^{\frac{-E_{a1}}{RT}} = e^{\frac{E_{a1}-E_{a2}}{RT}}$$

e=1.9872cal·K^{-1}/Mol^{-1}, E_{a1} – E_{a2}= 0.4 Kcal=400 cal
$$\frac{k_2}{k_1} = e^{\frac{400}{400*1.987}} = 1.654$$
Answer: (1) rate increased by 1.65 times