Question #45771, Chemistry, Inorganic Chemistry

How much energy (in kilojoules) is needed to heat 5.40g of ice from -10.5∘C to 35.0∘C? The heat of fusion of water is 6.01kJ/mol, and the molar heat capacity is 36.6 J/(K·mol) for ice and 75.3 J/(K·mol) for liquid water.

Answer:

First, find out the number of moles of ice:

n= m/M = 5.4/18=0.3 mol

$M(H_2O)$=18 g/mol

Then we can find the amount of heat that you need to pass the ice that he had started to float

$n*C_1*dT_1=H_1$

H_1= 0.3*36.6*10.5=115.29 (J)

Now we find the energy that must be expended on the transition from the solid to the liquid substance:

$H_2=n*H_{phase\ tran}$ = 0.3*6.01= 1.80 (kJ)

Further calculate how much energy you need to pass water for that would heat it from 0 degrees to 35.5:

$H_3=n*C_2*dT_2$=0.3*75.3*35=790.65 (J)

Than sum all H:

$H=H_1+H_2+H_3$=115.29+1800+790.65= **2705.94 (J)**