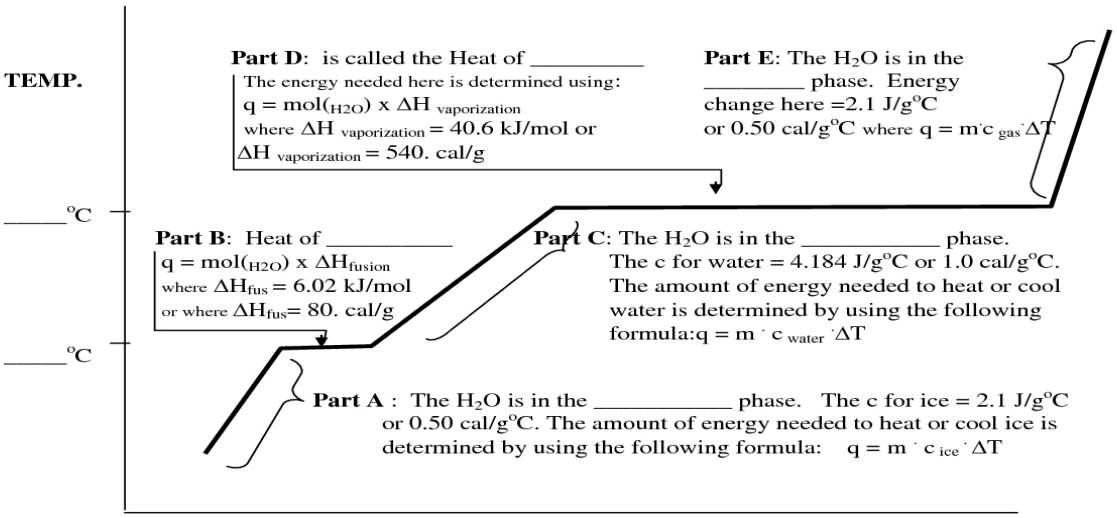
Calculating Energy Changes for the Heating Curve of Water

Below is the heating curve for water. Fill in all the blanks. Answer all the questions that apply to the chart.



HEAT ABSORBED AT A CONSTANT RATE

In calculating the total energy required to heat a chunk of ice from a temperature in the area of Part A all the way to a temperature in the area of Part E requires five different steps. The energy from each step (given in kJ) is then added up to give the total energy involved in this (**Physical** or **Chemical** circle one) change.

For example: Say you were asked to determine the total amount of energy that was required to have a 25.0 g sample of ice at –20.0°C be heated to a temperature of 120.0°C. This is what you would have to do:

Part A: : $q = m \cdot c_{ice} \cdot \Delta T$

$q = (0.0^{\circ}C - (-20.0^{\circ}C)) \times 25.0\ g\ H_2O \times \frac{2.1\ J}{g\ ^{\circ}C} \times \frac{1\ kJ}{1000\ J}$

$q = 1.1\ kJ$

Part B: $q = mol_{(H2O)} \times \Delta H_{fusion}$

$q = 25.0\ g\ H_2O \times \frac{1\ mol\ H_2O}{18.02\ g\ H_2O} \times \frac{6.02\ kJ}{1\ mol\ H_2O}$

$q = 8.35\ kJ$

Part C: : $q = \Delta T \cdot m \cdot c_{water}$

$q = (100.0^{\circ}C - 0.0^{\circ}C) \times 25.0\ g\ H_2O \times \frac{4.184\ J}{g\ ^{\circ}C} \times \frac{1\ kJ}{1000\ J}$

$q = 10.5\ kJ$