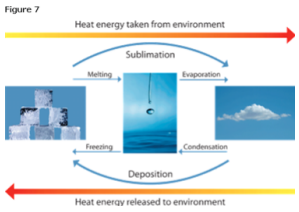
Calorimetry & Phase Changes

Objectives

Apply calorimetry to phase changes.

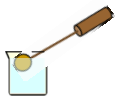
Calculate the amount of heat required for a phase change, including temperature changes.

Interpret a phase change diagram of water.



Calorimetry

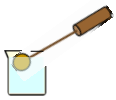
conservation of thermal energy



$Q_{Lost} = Q_{Gain}$

Energy Lost (Q_{Lost})		Energy Gained (Q_{Gain})
Decrease Temp	$m \cdot c \cdot \Delta T$	Increase Temp
Condense	$m \cdot H_v$	Boil
Freeze	$m \cdot H_f$	Melt

Calorimetry

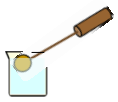


(Brass) $Q_{Lost} = Q_{Gain}$ (Water)

$Q_{600 \to 100} = Q_{20 \to 100} + Q_{Boil}$

m of H_20 Boiled = ?

Calorimetry

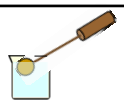


(Brass) $Q_{Lost} = Q_{Gain}$ (Water)

$Q_{600 \to 100} = Q_{20 \to 100} + Q_{Boil}$

$m\ c\ \Delta T = m\ c\ \Delta T + m\ H_v$

Calorimetry



(Brass) $Q_{Lost} = Q_{Gain}$ (Water)

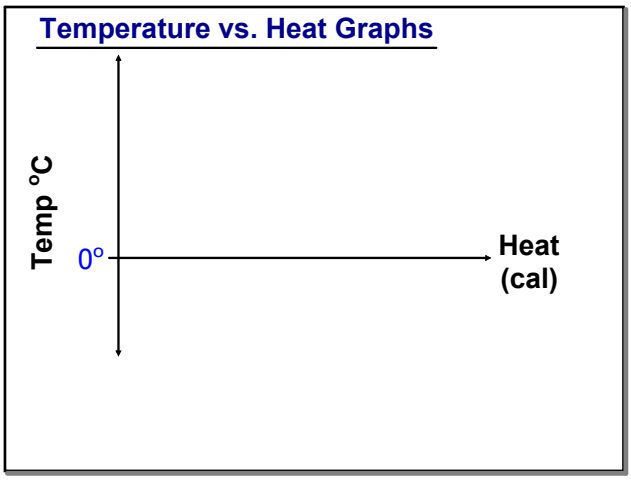
$Q_{600 \to 100} = Q_{20 \to 100} + Q_{Boil}$

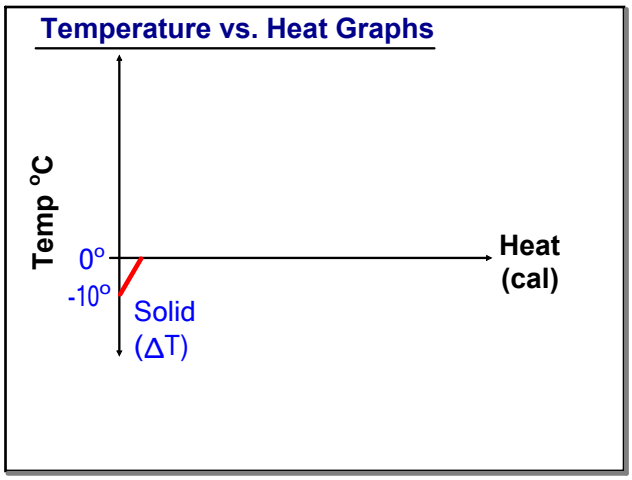
$m\ c\ \Delta T = m\ c\ \Delta T + m\ H_v$

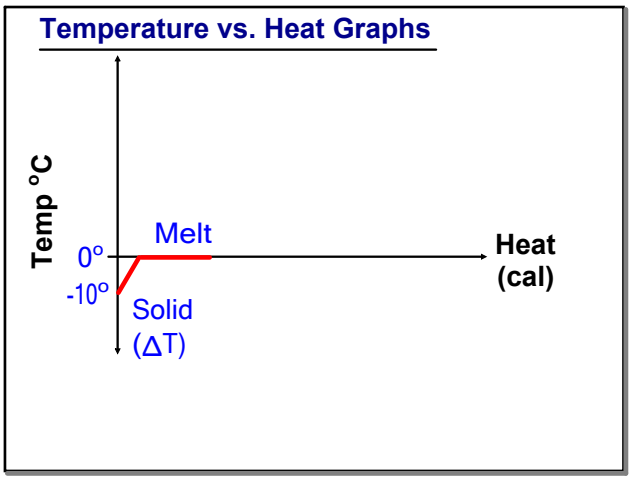
$(50\ g)(.09)(500^oC) = m(1)(80^oC) + m(540\ cal/g)$

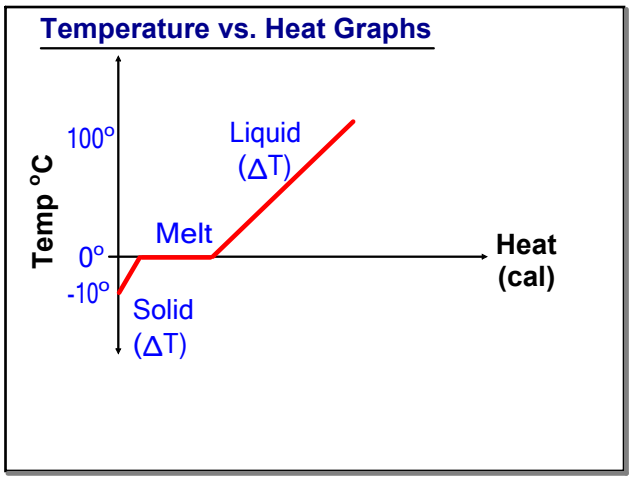
$2250 = m\ 620$

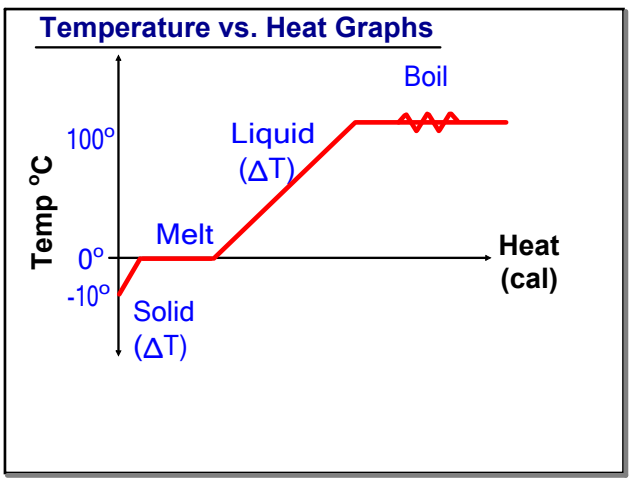
$\boxed{m = 3.6\ g}$

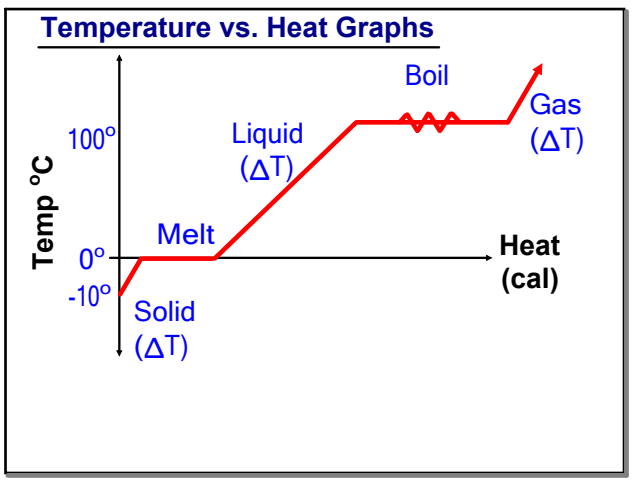

Temperature vs. Heat Graphs
Temp °C
0°
Heat
(cal)


Temperature vs. Heat Graphs
Temp °C
0°
-10°
Solid
(ΔT)
Heat
(cal)


Temperature vs. Heat Graphs
Temp °C
Melt
0°
-10°
Solid
(ΔT)
Heat
(cal)


Temperature vs. Heat Graphs
Temp °C
100°
Liquid
(ΔT)
Melt
0°
-10°
Solid
(ΔT)
Heat
(cal)


Temperature vs. Heat Graphs
Temp °C
Boil
100°
Liquid
(ΔT)
Melt
0°
-10°
Solid
(ΔT)
Heat
(cal)


Temperature vs. Heat Graphs
Temp °C
Boil
Gas
(ΔT)
100°
Liquid
(ΔT)
Melt
0°
-10°
Solid
(ΔT)
Heat
(cal)

Assignments . . .

- Finish Chapter 23 Homework #1 - 4
- Begin Chapter 23 Homework #5 - 10