

9/23/05

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CHM 123 - Lecture (Friday 10:30am)

- Quiz next week: covers Thermochemistry
- No lecture on Monday unless otherwise stated on webct.

Calorimetry.

$$C_{\text{soln}} \times m_{\text{soln}} \times \Delta T_{\text{soln}} = - C_{\text{metal}} \times m_{\text{metal}} \times \Delta T_{\text{metal}}$$

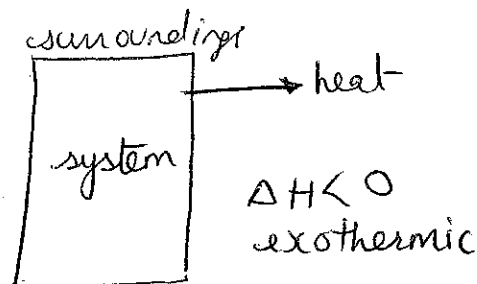
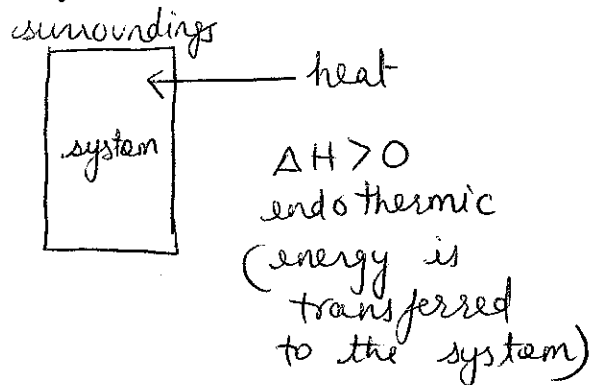
Bomb Calorimetry

- Constant volume
- often used for combustion reactions
- Heat released by reaction is absorbed by calorimeter contents.
- Need heat capacity of calorimeter
- $q_{\text{cal}} = -q_{\text{rxn}} = q_{\text{bomb}} + q_{\text{water}}$

Energy and enthalpy

Most physical and chemical changes take place at constant pressure.

- Heat transferred at constant pressure, P :- enthalpy (H)
- Can only measure ΔH
- $\Delta H = H_{\text{final}} - H_{\text{initial}} = q_P$
- sign of ΔH indicates direction of heat transfer.



- During phase changes, temperature does not change.

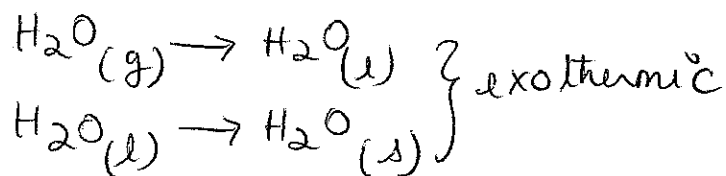
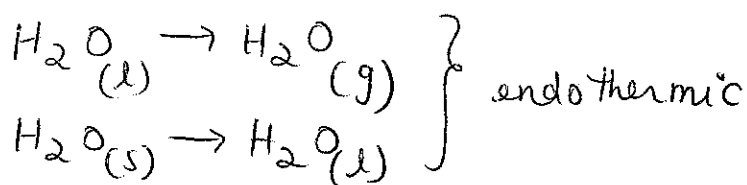
Enthalpy and phase changes

- Melting and freezing:

- Quantity of thermal energy to be transferred to a solid to cause melting - heat of fusion (q_{fusion}).
- Qty of energy to be transferred to cause liquid to freeze - heat of freezing (q_{freezing})

$$q_{\text{fusion}} = -q_{\text{freezing}}$$

- Similarly, $q_{\text{vaporization}} = -q_{\text{condensation}}$.



State functions

- Value of a state function is independent of path taken to get to state - depends only on present state of system.
- Internal energy is state function.
- q and w are NOT state functions.
- H (enthalpy) - state function

(Q) How do internal energy and enthalpy differ?

$$\Delta E = q + w$$

$$\Delta H = q_p$$

Answer: work.