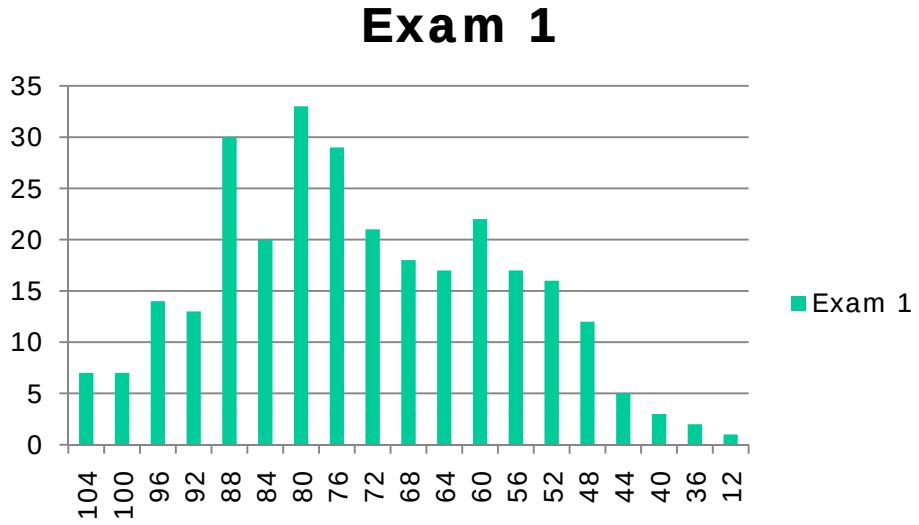
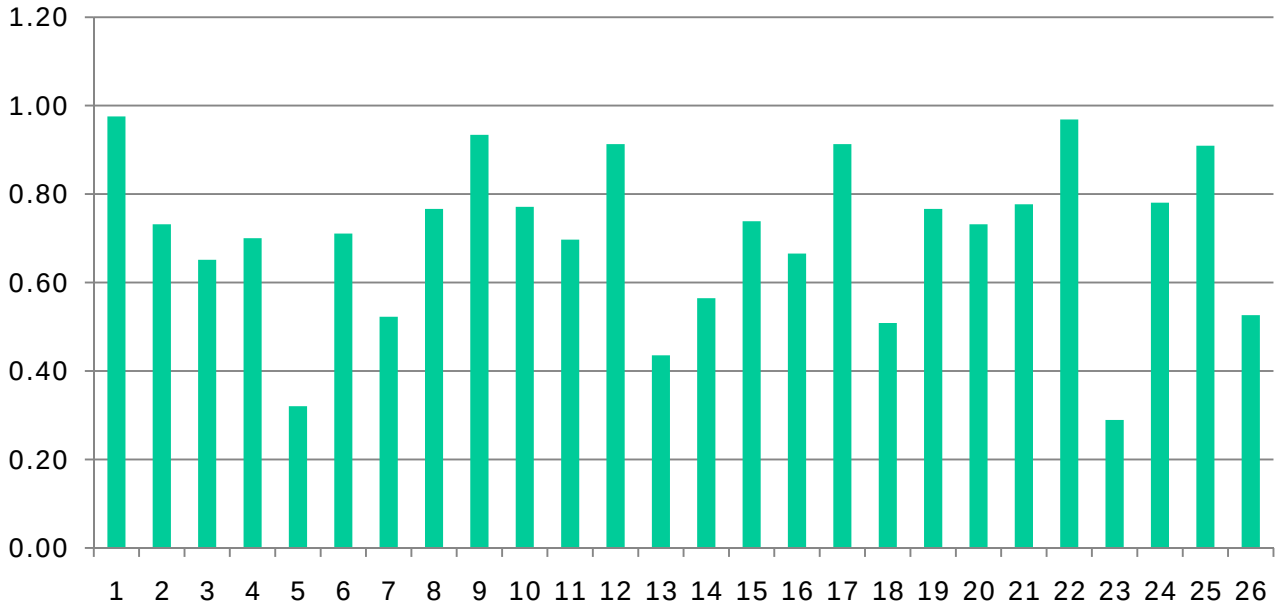
Chem 111

Lecture 14

Exams



7 Perfects
7 100%
Avg – 74
StDev - 16



Exams

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Announcements

- Breanne recitation session → HASA 126, Wed (10/13) from 5 - 6pm

- SI Sessions

- Office Hours

- Boards

- CRC

Homework

- Continue Reading Chapter 5
- OWL online homework

Recap

- Beer’s Law
- Thermodynamics – Kinetics v Potential
- Units
- System V Surroundings
- Temperature
- Thermal Equilibrium
- Endo and Exothermic Process
- Heat Cap city

Let’s Practice

How much heat is needed to warm 250 g of water (about a cup of water) from 22 ^{o}C (about room temperature) to near its boiling point, 98 ^{o}C?

Specific Heat H_2O = 4.18 J/gK

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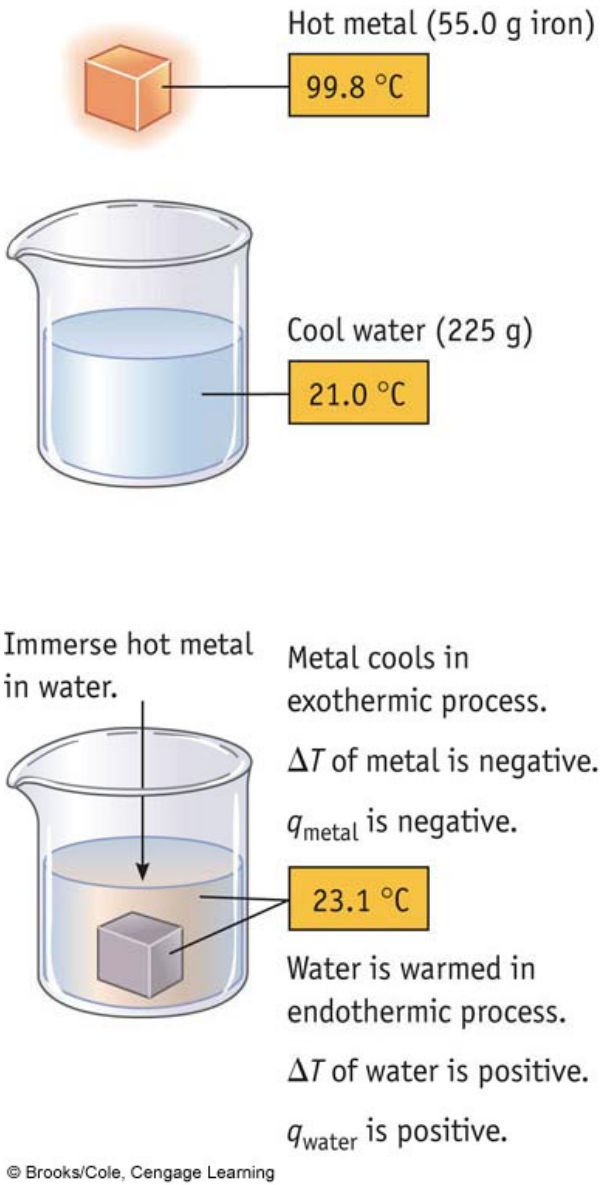
- Assume energy is transferred as only heat
- Energy is only transferred within the system
- q_{water} is positive value
- q_{metal} is negative value
- $q_{water} = -q_{metal}$

$q_{water} + q_{metal} = 0$

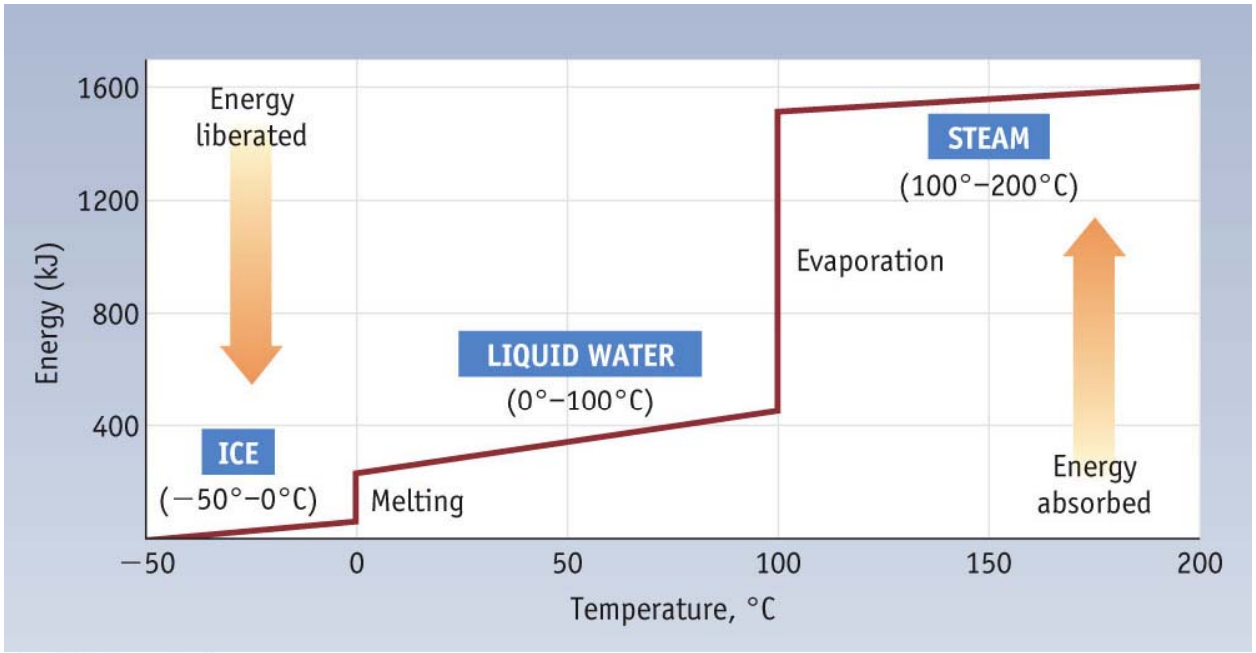
- Water and metal end up at the same temperature



Phase Change

Heat of Fusion: Heat required to convert a pure substance from a solid to a liquid.

Heat of Vaporization: Heat required to convert pure substance from a liquid to a gas.

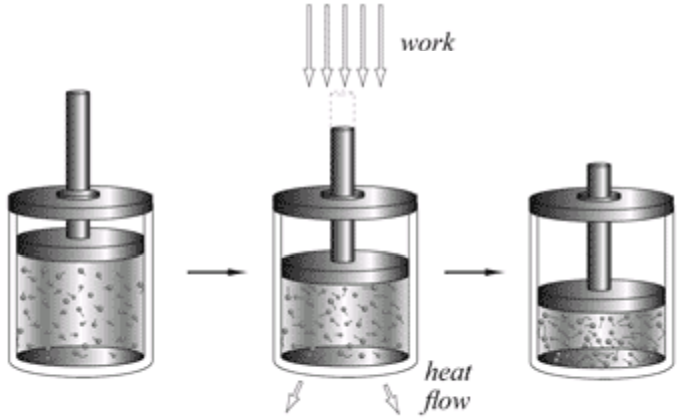


Temperature is constant throughout a change of state

Internal energy

Internal energy (U): is the total energy of the system.
First Law of Thermodynamics:

$$\Delta U = q + w$$



Change	Sign Convention	Effect on U_{system}
Heat: System ← Surrounding	q>0 (+)	U increases
Heat: System → Surrounding	q<0 (-)	U decreases
Work: System ← Surrounding	w>0 (+)	U increases
Work: System → Surrounding	w<0 (-)	U decreases

State Function

The value of a state function does not depend on the particular history of the sample, only its present condition.

The internal energy of a system is a state function.

Enthalpy

Many changes occur under constant pressure.

So most energy transfers that take place are in the form of heat.

Enthalpy is the heat absorbed or released under constant pressure.

It is a state function.

The change in enthalpy, ΔH, equals the heat, q_p, gained or lost by the system when the process occurs under constant pressure.

$$\Delta H = H_{final} - H_{intitial} = q_p$$