Review guide for test II chemistry with Clark. Test date: Thurs/Fri October 27/28.

Article: In Hot Water. when did the ocean heat wave described in this article take place? By how much had the cod fishery declined? What was the economic value of this fishery loss? What other 'symptoms' of the heat wave began to emerge? What triggered the formation of 'the blob'? What other factors came into play to further increase the size of the marine heat wave? How did the 'food chain' in the ocean fall apart? What was the percent loss of 'forage fish' in the oceans in 2015? How did the energy content of the fish that remained compare to the energy content of fish from previous years? Why was there such a significant difference? How did the increasing temperature of the water add additional stress to the fish that remained? What other environmental losses (beyond fish losses) began to appear around the Pacific ocean that were clearly related to the marine heat wave? What are the forecasts for future marine heat waves?

Reading: Geology and Climate. What is the carbon cycle described in the reading? How long does the 'full cycle' usually take? What kind of rocks make up 90% of Earth's crust? How does exposure to CO2 in earth's humid atmosphere affect these rocks and how does this process change the ocean chemistry? What are 'carbonate rocks'? roughly what percentage of the world's Carbon is captured in rocks? What percentage of earth's carbon is in the 'biosphere'? (i.e., living things).

Hot bolt into cold water lab: What is the concept of specific heat capacity? Know how to use the Specific Heat Equation. Given a sample of data from the lab, be able to determine; the heat gained by water, the specific heat capacity of a metal sample, and the total distribution of heat within a two-substance system at thermal equilibrium.

Lab: Heat of fusion of ice: How does heat of fusion compare to specific heat capacity? How are they similar? How are they different?

Lab: Calcium Carbonate. Know the three equations described in the lab, including 'states of matter' for each reactant and product. Ocean chemistry: Know how, and under what conditions, these same reactions happen in the ocean. Know where the materials (products and reactants) come from and go to under 'normal' conditions as well as under 'global warming' conditions.

Lecture: Storms as a way to dissipate heat. What is causing the oceans to warm up? What fraction of the Earth's excess heat is being absorbed by the oceans. What role do storms play in changing ocean temperatures? Why do Hurricanes and Tornadoes have similar shapes?

Tipping point. The ocean becoming a 'source' of CO2 instead of a 'sink' for CO2. What conditions might cause this to happen?

Thermal conductivity vs specific heat capacity.. What's the difference? How does an object with low Thermal Conductivity compare to an object with High Thermal Conductivity? Can you recognize examples of each? Can you describe how examples of each might cool down or heat up when in contact with another substance at a high or low temperature?

Radiative heat transfer. How does it work?

Heat transfer by conduction.. How does it work?

Heat Transfer by convection.

Practice problems. (solutions posted on line soon).

1. The specific heat of ethanol is 2.46 J/g-C. Find the heat required to raise the temperature of 193 g of ethanol from 19oC to 35oC.

2. When a 120 g sample of aluminum (Al) absorbs 9612 J of energy, its temperature increases from 25oC to 115oC. Find the specific heat of aluminum. Be sure to include the correct unit for specific heat.

3. The specific heat of lead (Pb) is 0.129 J/g-oC. Find the amount of heat released when 2.4 grams of lead is cooled from 37.2oC to 22.5oC.

4. A ceramic coffee cup (mass = 350 grams, Cp = 1.34 j/gC) is heated from 5 ° C to 35 °C. By the addition of 250 mL of hot water. How hot it was the water before it was added?

5. A student drops 55 grams of ice into 300 grams of water, initially at 50°C. What is the final temperature of the mixture?

6. Candle wax melts at roughly 50°C. If the heat of fusion of wax is roughly 200 joules per gram, how much energy would be required to melt a chunk which weighs 100 grams? If the melting took place in a put of hot water (500 mL at 100 C), by how much would the water cool, just melting the wax?

7. How many grams of ice should a student drop into 400 grams of hot water (initially at 60°C) in order to cool it down to 40°C ?