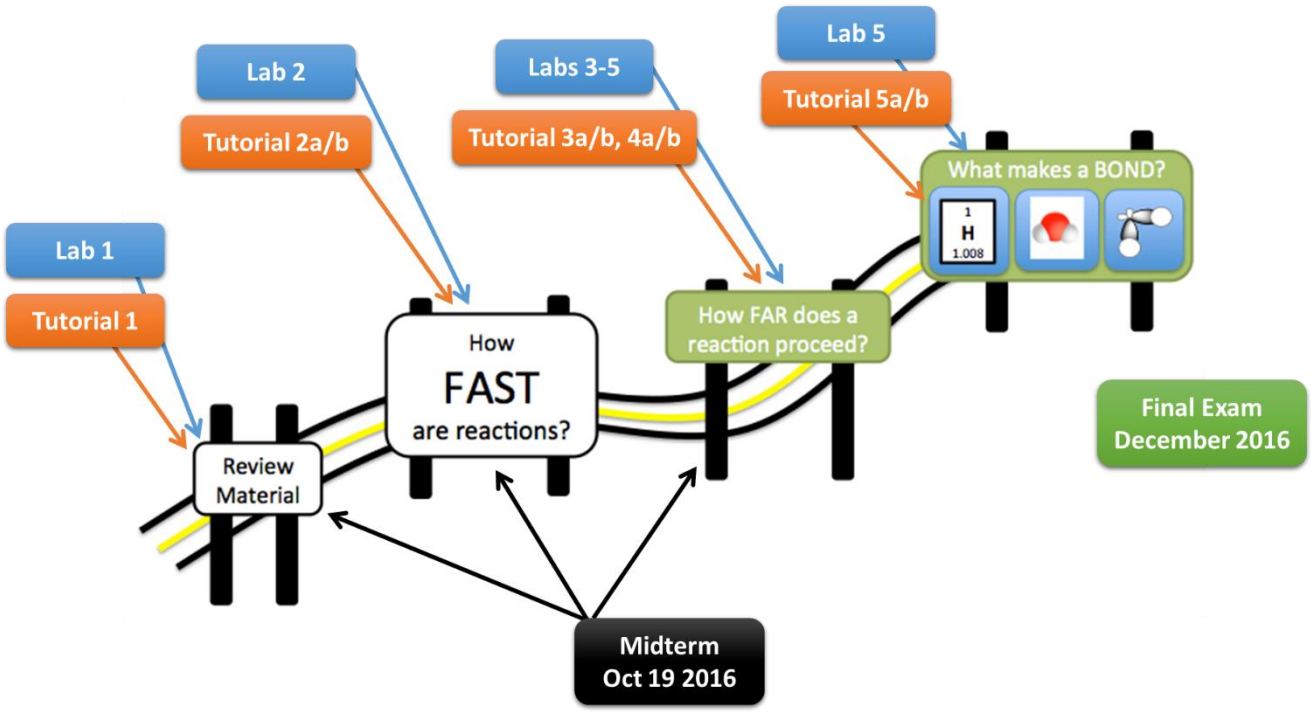
CHEM 209 – Fall 2016



Midterm Date: Wednesday Oct. 19, 2016, 7-9 PM.
Please plan to arrive 10 min early. You will not be allowed to begin the exam after 7:30 PM.

Location:

If you are in lecture:	You will write in room:
L01	**ST 140**
L02	**ST 148**

Bring with you:

- Pencils and eraser for filling in *Optical Scoring Sheet* and for your rough work on multiple
- Pens with non-erasable ink (exams in erasable media will not be considered for regrading)
- Schulich-approved, non-programmable calculator
- Ruler
- Your Student ID card
- Water bottle and a watch (if desired)

Do not bring:

- Valuables – all coats, backpacks, bags, purses, etc will be left at the front of the room. Small items may be sealed in "Integrity bags" and kept under your seat.
- Based on academic honesty policies at the UofC, **your cell phone cannot be on your person while you write the midterm.**
- Notes, textbooks, etc (you can leave these in your bag at the front of the room)

Exam Length: 2 hours
Grade Value: 20% of your final grade
Question types:

- Multiple choice: *approximately* 50% of the score (2 points each)
- Written answer: *approximately* 50% of the score (various points)

Topics & chapters tested:

High School Review: Including chapters 1-3, 4.1-4.4, & 16.1-16.2. See the *CHEM 209 Preparation* document on D2L for more details. See the Course Syllabus for suggested review problems. [Tutorial 1]			
BIG IDEA: HOW FAST ARE REACTIONS? [TUTORIAL 2A, 2B]			
KEY CONCEPTS	ESSENTIAL SKILLS	READINGS:	QUESTIONS:
Chemical reactions occur at certain speeds.	✓ Qualitatively *describe* what the speed of a reaction depends upon.	14.1	Chapter 14: 3, 5
The speed of a reaction is measured by looking at concentration changes over time.	✓ *Determine* the instantaneous and average rate of reaction from experimental data.	14.2	12, 14, 18
	✓ *Generate* plots of concentration versus time for the chemical species of a reaction.	14.2	10
	✓ *Relate* reactant concentration to instantaneous reaction rates using rate laws.	14.3	32 Sample 14.2
	✓ Given experimental data, quantitatively *determine* the components of a rate law (*k* and order), using the method of initial rates.	14.3	34 Sample 14.4
	✓ *Use* integrated rate laws to *determine* the amount of product produced (or reactant remaining) at any given point within a reaction and *determine* the half-life of a reaction.	14.4	43, 45, 125
The speed of a reaction depends on a reactions mechanism.	✓ *Determine* the rate law given the mechanism of a reaction, and vice versa - for reactions with a slow first step only.	14.5, 14.6	83
	✓ *Draw* and *interpret* a reaction energy diagram for a given reaction.	14.5, 14.6	64 Sample 14.9
The speed of a reaction can be altered by changing temperature.	✓ Use the Arrhenius Equation to *determine* the effect of changing temperature on rate and activation energy.	14.5	59 Sample 14.8
The speed of a reaction can be altered by the use of a catalyst.	✓ Explain how reaction speed can be modified using a catalyst	14.7	77, 78
BIG IDEA: HOW FAR DOES A REACTION GO? [REVIEW TUTORIAL]			
Chemical reactions are dynamic equilibria.	✓ Qualitatively *describe* chemical equilibrium.	15.1	Chapter 15: 1
The equilibrium, or extent of a reaction, is described by an equilibrium constant, K.	✓ *Generate* and *manipulate* expressions for K and Q for reactions using concentrations or partial pressures, based on a given reaction or set of related reactions.	15.2 15.3	14, 16, 18, 20, 27, 29, 81,
	✓ *Distinguish* between K and Q, and use these values to determine the direction in which a reaction will proceed.	15.4	35 Sample 15.6
	✓ *Apply* equilibrium principles to determine equilibrium concentrations given initial reaction conditions and K, and vice versa.	15.5	41, 45, 51, 84, 87
Equilibria can be disturbed.	✓ *Describe* (qualitatively and quantitatively) the effect of changes in concentration, partial pressures, and volume on equilibrium.	15.6	63, 76, 84, 87
Equilibria can be altered.	✓ Use the van't Hoff equation to *describe* (qualitatively and quantitatively) the effect of changes in temperature on equilibrium.	15.6	59, 105, 109
Acid and base solutions are equilibrium systems.	✓ Use K_a, pH, and pOH to *identify* and *describe* solutions of acids and bases. **(review material) – part of Prelim. Quiz 2**	16.1	Chapter 16: 17, 23, 35, 37, 44, 49, 55