Inorganic Review Topics
Last Update July 2, 2012

The CHEM 129/130/131 outcome statements represent the minimal level of knowledge needed for this course in these areas. The ACS has prepared a broad outline of the material to be covered in various chemistry courses. This information, along with the outcome statements for CHEM 129/130/131 may be found on the Chemistry Department's Assessment Page (http://chemlab.truman.edu/Assessment/Assessment.asp). Please refer to your physical chemistry, organic and quantitative analysis notes and texts for more information.

•Nuclear Properties
>Isotopes
>Subatomic particles
>Atomic weight and how to calculate it
>Nuclear magnetic moment

•Periodic Table
>Nomenclature
>Groupings of elements
>Metals vs. non-metals
>Allotropes
>Basic descriptive chemistry of the elements (standard states, stoichiometry of compounds, etc.)

•Nomenclature
>Naming of simple ionic and molecular compounds and coordination compounds

•Periodic Trends
>Electronegativity
>Electron affinity and ionization energies
>Reasons for these trends

•Thermodynamics
>ΔH, ΔS, ΔG what they are, their chemical meaning and how they are connected under different conditions

•Equilibrium
>Proper thermodynamic form of K and the approximations needed to get to a useful form
>Relationship of ΔG to K
>Manipulations of equilibrium expressions
>Calculations to determine K or amount/concentration of a reactant/product present at equilibrium

•Acid-Base Chemistry
>Arrhenius, Bronsted-Lowry, Lewis models
>Application of equilibrium to describe acid-base chemistry

•Electrochemistry

>Galvanic cells and definitions associated with galvanic cells (anode, cathode, salt bridge, etc.)

>Standard reduction potentials and their meaning

>Determination of a cell potential from two standard reduction potentials, determination of a standard reduction potential from two, or more, other standard reduction potentials

>Nernst equation

>Relationship of ΔG to E^0

>Voltammetry

•Kinetics and Mechanism

>Rate laws and how to determine them using integrated rate laws and other methods

>Integrated rate laws (derivation and use)

>How to write mechanisms (both stoichiometric and intimate)

>Arrhenius equation, meaning of an activation energy and determination of a reaction's activation energy

•Quantum Mechanics

>Wavefunctions and operators

>Schrödinger equation and its solutions for hydrogen

>Angular momentum quantization

>Basic idea of interaction of light with matter (see spectroscopy)

•Bonding

>Electronegativity: definition and relationship to an element's ionization energy and electron affinity

>Lewis dot structures and VSEPR (using to predict molecular properties)

>Valence Bond Theory

>Molecular Orbital Theory

>Ionic bonding and solid state structure

>Intermolecular interactions and their effects

•Group Theory

>Operations

>Elements

>Character tables

•Spectroscopy

>Bohr frequency condition ($\Delta E = h\ \nu$), $\lambda\ \nu = c$

>Basics (equations and selection rules) of vibrational and rotational spectroscopy

>Predict NMR peak splittings, calculate coupling constants and assign ^{1}H, ^{13}C NMR spectra using standard 1-D and 2-D (e. g., DEPT) methods