CHEMISTRY 104A – ADVANCED INORGANIC CHEMISTRY (3 UNITS)

COURSE OVERVIEW

Summary

Chemistry 104A is the first of two classes in the canonical inorganic chemistry series that is offered at the undergraduate level. Students will build upon concepts mentioned in Chem 4A, although that class is not absolutely necessary (some sort of general chemistry knowledge is fine). Chemistry 104A is focused more towards atomic structure and bonding (without using *any* quantum mechanics), while Chemistry 104B is organometallic chemistry. Chemistry 104B directly builds off of the group theory concepts learned in Chemistry 104A.

Prerequisites

- General Chemistry (Required)

Topics Covered

- Atomic structure
    - Hydrogen atom, electronic transitions, atomic trends
- Covalent bonding
    - Lewis structures, valence bond theory, VSEPR molecular orbital theory
- Group Theory
    - Symmetry operations, point groups, representations, character tables
    - Using group theory to construct molecular orbital diagrams
- Acid-Base chemistry
    - Bronsted acid-base theory
    - Lewis acid-base theory
    - Hard and soft acid-base theory (HSAB Theory)
- Solid state chemistry
    - Crystal lattices (close-packing model)
    - Band theory, defects, semiconductors

WORKLOAD

Course Work

- 8-10 problem sets
- 2 midterms
- Final exam

Time Commitment

3 hours of lecture per week, 5 hours per problem set.

CHOOSING THE COURSE

When to take

The class is predominantly juniors and seniors, with a noticeable chunk of sophomores. This class is not time-intensive, so feel free to take during a harder semester.

What next?

- Chem 104B: Advanced Inorganic Chemistry (Organometallic Chemistry)
- Chem 108: Inorganic Synthesis Lab
- MSE 45: Properties of Materials

ADDITIONAL COMMENTS/TIPS

Quantum mechanics is not a prerequisite. Having previously taken quantum will not give you any sort of advantage here. Bonding concepts in this course are taught from a qualitative symmetry perspective, not a mathematical one.

You will likely have to do some readings to keep up with the course material, but the textbook (Miessler and Tarr) is very good. This class is not time-intensive.

The “topics covered” section above, lists some topics which you may have encountered in general chemistry (i.e. Chem 4A or others) before. However, Chem 104A delves into those topics in greater depth than before.

The last third of the class (solid state chemistry) is a repeat of concepts learned in MSE 45. Everything then will thus be a review for you, if you’ve previously taken MSE 45. But this class (Chem 104A) assumes you haven’t taken MSE 45, and teaches you from the basics.

This class may get dry at some points, but is necessary to learn before Chem 104B. This class is more on theory, whereas Chem 104B, its counterpart, is more on applications in understanding organometallic chemistry from a synthetic chemist’s perspective.

Written by: Alex Oanta

Last edited: Spring 2018