

Chemistry 411511

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SB1 304: MWF 10:15-11:20

Final Exam: Wednesday, December 5, 10:15-12:05

Text: Huheey, Keiter, and Keiter: **Inorganic Chemistry-Principles of Structure and Reactivity, 4th Ed.**

Office Hours: TBA

By appointment if needed

Course Outline

Chapter 1	Read; also CWG 3-25
Chapter 2	Structure of the Atom
Chapter 4	Ionic Bonding
Chapter 7	Solid State
Chapter 5	Bonding Models: the Covalent Bond
Chapter 6	Structure and Reactivity of Molecules
Chapter 8	Chemical Forces (Graduate students only)
Chapter 11	Coordination Chemistry: Bonding, Spectra, and Magnetism

A complete listing of the reading assignments for each chapter is given on the following pages.

The material presented in chapter 3 will be worked into the course as needed. You should note and use the Appendices in your book from A-1 through A-88

Grading:

Homework	1 point per problem	~50 points
Midterm Exam		150 points
Final Exam		200 points

Grade limits	90-100%	A	65-70%	C+
	85-90%	A-	55-65%	C
	80-85%	B+	50-55%	C-
	75-80%	B	40-50%	D
	70-75%	B-	<40%	F

It is important to attend class and vital that you do ALL the assigned homework. Please don't hesitate to come ask questions during office hours, or at some other mutually arranged time.

Chemical Bonding: tentative schedule
Chemistry 411/511
Fall 2007

Date	Main Topic	Reading Assignment
Sept. 24	Introduction to bonding Schrödinger wave equation Particle in a box	HKK 10
Sept. 26	Schrödinger wave equation Radial and angular wave functions	HKK 10-17 SA 10-17 CWG 39-47 BH 19-33
Sept. 28	Schrödinger wave equation Symmetry of orbitals Energies of orbitals	HKK 17-20 SA 17-20 CWG 48-49
Oct. 1	Polyelectron atoms Pauli Exclusion Principle The aufbau principle Term symbols Hund's Rule	HKK 20-27 SA 17-23 CWG 48-55
Oct. 3	Polyelectron atoms Periodicity Shielding Atomic size Ionization energy Electron affinity (electron attachment enthalpy)	HKK 27-43 SA 23-30 CWG 55-62
Oct. 5	Ionic bonding Ionic substances Crystal structures Lattice energy	HKK 92-104 SA 35-52 CWG 125-129
Oct. 8	Ionic bonding The Born-Haber cycle Lattice energies	HKK 104-112 SA 52-62 CWG 129-131
Oct. 10	Size effects Ionic radii Crystal packing	HKK 112-122 SA 52-62 CWG 131-142
Oct. 12	Size effects Radius ratio Thermochemical calculations	HKK 122-134 SA 49-52 CWG 134-135

Covalent character in ionic bonds

Oct. 15	Solid state structures Imperfections in solids Band theory	HKK 263-272 SA 104-113 CWG 757-781
Oct. 17	Solid state structures Semiconductors	HKK 272-276
Oct. 19	Solid state structures Semiconductors and superconductors	HKK 276-287
Oct. 22	Covalent bonding Lewis Structures Valence bond theory Resonance Formal charge	HKK 138-148 SA 81-84
Oct. 24	Covalent bonding Hybridization Molecular orbital theory	HKK 148-155 SA 79-81
Oct. 26	MIDTERM EXAM (up through solid state structures)	
Oct. 29	Covalent bonding Overlap integral Symmetry and overlap Symmetry of molecular orbitals Homonuclear diatomic molecules	HKK 155-164 SA81-84
Oct. 31	Covalent bonding Homonuclear diatomic molecules Bond lengths and ionization energies Electron density Heteronuclear diatomic molecules	HKK 164-174 SA 84-94
Nov.2	Covalent bonding Triatomic molecules Electronegativity	HKK 175-182 SA 94-104
Nov. 5	Covalent bonding Electronegativity	HKK 182-199 SA 30-32
Nov. 7	Molecular structure VSEPR-Symmetry	HKK 203-218 SA 74-77
Nov. 9	Molecular structure	HKK 218-229

	Molecular orbitals Hybridization Bent's Rules	
Nov. 12	Veteran's Day Holiday	
Nov. 14	Molecular structure Bent bonds Structural methods Fluxional molecules	HKK 229-246
Nov. 16	Coordination chemistry Werner complexes VB theory Backbonding	HKK 387-397 SA 212-226
Nov. 19	Coordination chemistry Crystal field effects CFSE Tetrahedral symmetry Tetragonal symmetry	HKK 397-404 SA 227-230 CWG 503-508; 539-542
Nov. 21	Coordination chemistry The magnitude of Δ Consequences of CFT	HKK 404-413 SA 233 CWG 537-539
Nov. 23	Thanksgiving Holiday	
Nov. 26	Coordination chemistry MO theory: ligand field theory Octahedral complexes Tetrahedral complexes Pi bonding	HKK 413-424 SA 233-240 CWG 509-512
Nov. 28	Coordination chemistry Evidence for pi bonding EPR, IR, PES	HKK 425-433
Nov. 30	Coordination chemistry Electronic absorption spectra Term symbols again Allowed transitions Tanabe Sugano diagrams	HKK 433- SA 437-453 CWG 519-537
Dec. 2	Coordination chemistry Magnetic properties	HKK 459-468 SA 231-233 CWG 512-519
Dec. 2	Organometallic chemistry	

HKK (Huheey Keiter and Keiter)
SA (Shriver and Atkins) on reserve

CWG (Cotton, Wilkinson, and Gaus) on reserve
BH (Butler and Harrod) on reserve