

Chemistry 111 Dr. Macintosh s'09 Tentative lecture schedule

		Topics	Vocabulary--learn definitions before class. For terms separated by vs, learn the definition of both terms and also explain the difference between them.	Reading (read before class)
1	Jan. 13	Toledo Placement Exam		
2	Jan. 15	Scientific Method; Elements, compounds, mixtures from a macroscopic perspective	hypothesis vs observation; law vs theory; law of conservation of mass; macroscopic; element vs compound vs mixture; substance vs element vs compound; heterogeneous vs homogeneous; physical change vs chemical change; decomposition vs chemical reaction; phase vs state of matter	1-13
3	Jan. 20	Elements, compounds, mixtures, physical and chemical changes: a nanoscale perspective; energy types	atom vs molecule; molecular element, atomic element, conserved; potential energy; kinetic energy; mass vs density; heat vs temperature; thermal energy; intensive property vs extensive property; giga, mega, kilo, centi, milli, micro, nano, pico	83-84, 89, 14-15; 15-21
4	Jan. 22	Dimensional analysis; specifying uncertainty in a measurement and after a calculation	significant figure; accuracy vs precision; uncertainty; exact numbers; ratio	21-31
5	Jan. 23	Problem-solving strategies; practice dimensional analysis; estimating answers		31-35; 45-48
6	Jan. 27	Simple subatomic structure; regions of the periodic table	Electron, proton, neutron, atomic number, atomic mass vs mass number, nucleus, isotope, gold foil experiment, ion, cation, anion, metals, nonmetals, metalloids, main-group elements (also called representative elements), transition metals, group (on periodic table), noble gases, alkali metals, halogens	54-69
7	Jan. 29	Ways to represent molecules; Intro to ionic and covalent compounds; Naming and Formulas	ionic bond vs covalent bond; molecular compound vs ionic compound; formula unit; polyatomic ion; empirical formula, molecular formula, structural formula (=structure), space-filling model	83-100

8	Feb. 3	Counting items with mass: moles of elements, moles of compounds and subscripts as mole ratios in a compound	Mole; Avogadro's number; grams vs moles; formula mass, molar mass	69-74, 101-103, 106 –top of 109
9	Feb. 5	Percent by mass; empirical formulas and molecular formulas; balancing reaction equations	Percent by mass vs molar ratio; Molecular formulas vs empirical formulas; reaction equations; balanced equation; subscript vs coefficient;	103-106, 109-112, 114-116
10	Feb. 6	Representing reactions, intro; Stoichiometry I	g-mol-mol-g, nonlimiting stoichiometry	
11	Feb.10	Catch-up & review		
12	Feb. 12	EXAM 1		
13	Feb. 17	Stoichiometry II	Limiting reactant; percent yield vs theoretical yield; molarity; dilution	137-148
14	Feb. 19	Stoichiometry III; Types of solutes	Solution stoichiometry; electrolytes and nonelectrolytes; weak electrolytes, weak acids, soluble, insoluble	149-155
15	Feb. 20	Types of Reactions I; titrations	Precipitate, precipitation reaction, net ionic equations, acid-base reactions, hydronium ion, polyprotic acid, diprotic acid; titration, equivalence point, endpoint, indicator	155-165
16	Feb. 24	Types of Reactions II	gas-evolution reactions, oxidation-reduction reactions (redox), oxidation vs reduction; combustion; Energy, heat, kinetic energy, thermal energy, potential energy, chemical energy, law of conservation of energy, internal energy, system, surroundings	165-168; 173-174, 237-243
17	Feb. 26	Energy transformations and enthalpy changes from calorimetry	calorie, joule, thermodynamics, first law of thermodynamics, state function, heat, work, heat capacity, specific heat (capacity), molar heat capacity; enthalpy (note: use heat evolved at constant pressure as definition), endothermic, exothermic, Enthalpy of reaction, calorimeter	246-248, 253-259

18	Mar. 3	Hess's Law; Using ΔH_f to get ΔH_{rxn}	Hess's Law; standard enthalpy of formation	259-269
19	Mar. 5	Nature of Light; Bohr model of the atom	Electromagnetic radiation, wavelength, frequency, energy, wave interference, Photon, Bohr model of the atom, emission spectra; Uncertainty principle, trajectories vs probabilities, duality of matter, de Broglie wavelength	281-290, 292-299
20	Mar. 6	Energy and bond formation; lattice energy and formation of ionic compounds	Ionic bonding, covalent bonding, metallic bonding, Lewis symbol, octet rule, lattice energy,	362-374
21	Mar. 10	Catch-up & Review		
22	Mar. 12	EXAM 2		
	Mar. 16-20	Spring Break		
23	Mar. 24	Covalent compounds & Lewis structures	Lone pair, double bond, triple bond, multiple bond, directional bond, electronegativity, polar bond, dipole moment	374- 384
24	Mar. 26	More Lewis structure	Resonance and Formal Charge; Exceptions	384-391
25	Mar. 27	Bond Energy and Bond Lengths; metallic bonding; molecular shapes	Bond energy, metallic bonding; valence shell electron repulsion theory (VSEPR), linear, trigonal planar, tetrahedral, trigonal bipyramidal, octahedral	391-397; 405-410
26	Mar. 31	Lone pairs and VSEPR; polarity	Molecular geometry; polar molecules	410-422
27	Apr. 2	Intermolecular forces	Intermolecular forces, dispersion force, instantaneous dipole, dipole-dipole force, hydrogen-bonding, ion-dipole force	460-474

28	Apr. 7	Effects of Intermolecular forces; vapor pressure	Surface tension, capillary action, viscosity; vapor pressure, vaporization, evaporation, condensation, heat of vaporization (also called enthalpy of vaporization), dynamic equilibrium, boiling, boiling point, normal boiling point, heating curve	474-483
29	Apr. 9	Solution formation and predicting solubility	Solution, solute, solvent, aqueous solutions, solubility, entropy, solvent-solute interactions, solvent-solvent interactions, solute-solvent interactions, miscible	518- 526
30	Apr. 10	More changes of state and phase diagrams	Critical point, sublimation, fusion, deposition, melting point, melting, heat of fusion, heating curve, phase diagram	487-495
31	Apr. 14	Gas Laws	Pressure, mm Hg, barometer, atmosphere, pascal, Boyle's law, Charles's law Avogadro's law, ideal gas law, gas law constant, molar mass of a gas	185-200, 203-204
32	Apr. 16	Partial pressures; Kinetic Molecular Theory	Partial pressure, Dalton's Law of partial pressures, mole fraction, real gases (ignore algebraic equations for real gases)	204-205, 214-223
33	Apr. 21	Gas Stoichiometry	Stoichiometry and gases	206-213
34	Apr. 23	open		
35	Apr. 24	EXAM 3		
36	Apr. 28	Types of solids	Molecular, Ionic, Metallic and Network Covalent solids;	504-507
37	Apr. 30	open		
	May 7, 10:15am	ACS Standardized Final Exam		