Chemistry 2

(revised 2008) Levels: I - introduced; P - practiced; M - mastered

CONCEPT	SKILLS	LEVEL	Current Text Chapter	Teaching Notes	STATE GOAL
I. States of Matter			12		
	1. Use the kinetic-molecular theory to explain the behavior of gases	I, P, M		2 labs	11.A.4b, 11.B.5b.
	2. Explain how gas pressure is measured & calculate the partial pressure of a gas.	I, P, M			11.B.4b, 12.C.4a 12.C.5b
	3. Describe intramolecular forces.	I, P, M			11.A.5c
	4. Compare & contrast intramolecular forces	I, P, M			13.A.5a,5b, 13.B.5b
	5. Contrast the arrangement of particles in liquids & solids	P, M			
	6. Describe the factors that affect viscosity.	I, P			
	7. Explain how the unit cell and crystal lattice are related.	I, P			
	8. Explain how the addition & removal of energy can cause a phase change	I, P, M			
	9. Interpret a phase diagram	I, P, M			
II. Gases			13		
	1. State the relationships among pressure, temperature & volume of a constant amount of gas.	I, P, M		1-2 labs	11.A.5b, 4b 11.A,5c
	2. Apply the gas laws to problems involving the pressure, temperature & volume of a constant amount of gas.	I, P, M			12.C.5a,5b 13.A.5a,5b, 13.B.5b
	3. Relate the amount of gas present to its pressure, temperature & volume using the ideal gas law.	I, P, M			
	4. Compare the properties of real & ideal gases.	I, P			
	5. Review gas stoichiometry.	P, M			
III. Mixtures & Solutions			14		
	1. Compare the properties of suspensions, colloids & solutions	I, P		3 labs	11.A.5b, 4b
	2. Identify types of colloids & types of solutions	I, P, M			11.A,5c
	3. Describe concentration using different units	I, P, M			12.C.5a,5b
	4. Determine the concentration of solutions	I, P, M			13.A.5a,5b, 13.B.5b
	5. Calculate the molarity of a solution	I, P, M			
	6. Describe how intermolecular forces affect solvation.	I, P			
	7. Understand what factors affect solubility.	I, P, M			
	8. Describe colligative properties.	I, P, M			
	9. Identify 4 colligative properties of solutions.	I, P, M			
	10. Determine the boiling pt. elevation and the freezing pt. depression of a solution.	I, P, M			

IV. Energy & Chemical Change			15	
1.Define energy.	P, M		3 labs	11.A.5b, 4b
2.Distinguish potential & kinetic energy	P, M			11.A,5c
3.Relate chemical potential energy to the heat lost or gained in chemical reactions.	I, P, M			12.C.5a,5b 13.A.5a,5b, 13.B.5b
4.Describe how a calorimeter is used to measure energy that is absorbed or released	I, P			
5 Explain the meaning of enthalpy & enthalpy change in chemical reactions & processes	I, P, M			
6.Write thermochemical equations for chemical reactions & other processes.	I, P, M			
7.Describe how energy is lost or gained during changes of state.	I, P, M			
8.Calculate the heat absorbed or released in a chemical reaction	I, P, M			
9.Apply Hess's law to calculate the enthalpy change for a reaction.	I, P, M			
10.Explain the basis for the table of standard enthalpies of formation.	I,P			
11.Calculate H using thermochemical equations	I, P, M			
12.Determine the enthalpy change for a reaction using standard enthalpies of formation data.	I, P, M			
13.Differentiate between spontaneous & nonspontaneus processes.	I, P, M			
14.Explain how changes in entropy & free energy determine the spontaneity of chemical reactions and other processes.	I, P			
V. Reaction Rates			16	
1. Calculate average rates of chemical reactions from experimental data.	I, P, M		2-3 labs	11.A.5b, 4b 11.A,5c
2. Relate rates of chemical reactions to collisions between reacting particles	I, P, M			12.C.5a,5b 13.A.5a,5b, 13.B.5b
3. Identify factors that affect the rates of chemical reactions	I, P, M			
4. Explain the role of a catalyst.	I, P, M			
5. Express the relationship between reaction rate & concentration.	I, P, M			
6. Determine reaction orders using the method of initial rates	I, P, M			
7. Calculate instantaneous rates of chemical reactions.	I, P			
8. Understand that many chemical reactions occur in steps.	I, P			
9. Relate the instantaneous rate of a complex reaction to its reaction mechanism	I, P			

VI. Chemical Equilibrium			17	
1. List the characteristics of chemical equilibrium	I, P, M		3 labs	11.A.5b, 4b
2. Describe aqueous solutions.	I, P, M		9	11.A,5c
3. Write complete ionic & net ionic equations for chemical reactions in aqueous solutions.	I, P, M		9	12.C.5a,5b 13.A.5a,5b, 13.B.5b
4. Predict whether reactions in aqueous solutions will produce a precipitate, gas or water.	I, P, M		9	
2. Write equilibrium expressions for systems that are at eq.	I, P, M		17	
3. Calculate eq. constants from concentration data	I, P, M		17	
4. Describe how various factors affect chemical equilibrium	I, P, M		17	
5. Explain how LeChatelier's principle applies to eq. Systems	I, P, M		17	
6. Determine eq. concentrations of reactants & products.	I, P, M		17	
7. Calculate the solubility of a compound from its solubility product constant.	I, P, M		17	
8. Explain the common ion effect.	I, P		17	
VII. Acids & Bases			18	
1. Identify the chemical & physical properties of acids & bases.	I, P, M		3 labs	11.A.5b, 4b
2. Classify solutions as acidic, basic or neutral.	I, P, M			11.A,5c
3. Compare the Arrhenius & Bronsted-Lowry models of acids & bases.	I, P, M			12.C.5a,5b 13.A.5a,5b, 13.B.5b
4. Relate the strength of an acid or bases to its degree of ionization.	I, P, M			
5. Compare the strength of a weak acid with the strength of its conjugate base.	I, P			
6. Explain the relationship between the strengths of acids & bases and the values of their ionization constants.	I, P, M			
7. Explain pH and pOH.	I, P, M			
8. Relate pH and pOH to the ion product constant for water.	I, P, M			
9. Calculate the pH and the pOH pf aqueous solutions.	I, P, M			
10. Write chemical equations for neutralization reactions.	I, P, M			
11. Explain how neutralization reactions are used in acid-base titrations.	I, P, M		titration lab	
12. Compare the properties of buffered & unbuffered solutions.	I, P			
VIII. Redox Reactions			19	
1. Describe the processes of oxidation & reduction.	I, P, M		2-3 labs	11.A.5b, 4b
2. Identify oxidizing & reducing agents	I, P, M			11.A,5c
3. Determine the oxidation number of an element in a cpd.	I, P, M			12.C.5a,5b

	4. Interpret redox reactions in terms of change in oxidation state.	I, P, M		13.A.5a,5b, 13.B.5b
	5. Relate the changes in oxidation number to the transfer of e-.	I, P, M		
	6. Use the changes in oxidation numbers to balance equations.	I, P, M		
	7. Balance net ionic redox equations using the half reaction method.	I, P, M		
IX. Electrochemistry			20	
	1. Describe a way to obtain electrical energy from a redox rxn.	I, P, M	2 labs	11.A.5b, 4b
	2. Identify the parts of a voltaic cell & explain how each part operates.	I, P, M		11.A,5c 12.C.5a,5b
	3. Calculate cell potentials & determine spontaneity of redox reactions	I, P, M		13.A.5a,5b, 13.B.5b
	4. Describe the structure, composition & operation of the typical carbon-zinc dry-cell battery.	I, P, M		
	5. Distinguish between primary & secondary batteries & give 2 examples of each.	I, P, M		
	6. Explain the structure & operation of the hydrogen-oxygen fuel cell.	I, P, M		
	7. Describe the process of corrosion of iron & methods to prevent corrosion.	I, P, M		
	8. Describe how it is possible to reverse a spontaneous redox reaction in an electrochemical cell.	I, P, M		
	9. Compare the reactions involved in the electrolysis of molten NaCl with those in the electrolysis of brine.	I, P, M		
	10. Discuss the importance of electrolysis in the smelting & purification of metals.	I, P, M		
X. Hydrocarbons	This is done as time permits.		21	
	1. Explain the terms organic compound & organic chemistry.	I, P, M	1 lab	11.A.5b, 4b
	2. Identify hydrocarbons & the methods used to represent them	I, P, M		11.A,5c
	3. Distinguish between saturated & unsaturated hydrocarbons	I, P, M		12.C.5a,5b
	4. Describe where hydrocarbons are obtained & how they are separated.	I, P, M		13.A.5a,5b, 13.B.5b
	5. Name alkanes by examining their structures.	I, P, M		
	6. Draw the structure of an alkane given its name.	I, P, M		
	7. Describe the properties of alkanes.	I, P, M		

Current Text:
Chemistry, Matter and Change
Glencoe Science
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