**AP Chemistry Syllabus**

**Unit 3: Chapters 7 to 10**

**PLEASE NOTE:** Each individual assignment in the problem set should be done on its own piece of paper to get full credit. Don’t merge them together.

The days are approximate and are subject to change.

DAY TOPIC

1 Chapter 7: Atomic Structure and Periodicity

Introduction to the Chapter

Read Sections Chapter 7: Get to at least section 5

2 Chapter 7: Atomic Structure and Periodicity

7.1: Electromagnetic Radiation

Description of EM Radiation

Types of EM Radiation

Parts of a Wave

Speed of Light c = λ ν (nu)

7.2: The Nature of Matter

Planck’s Work

E = h v

The Photoelectric Effect

Einstein & E = mc2

de Broglie equation: λ = h / m v

finds the wavelength of a particle

3 Chapter 7: Atomic Structure and Periodicity

7.3 The Atomic Spectrum of Hydrogen

Continuous Spectra v. Line Spectrum

Quantum nature of Energy

7.4 The Bohr Model

How/Why it is still useful

Energy in an Energy Level

Rydberg Equation

4 Chapter 7: Atomic Structure and Periodicity

7.4 Continue with the Bohr Model and problems

7.5 The Quantum Mechanical Model of the Atom

The hard core mathematical look of the location of the electrons in an atom

For us, the most important aspect to take from this section is:

An orbital is defined as the location where an electron will be found 90 % of the time.

The atomic radii is a the ‘average’ distance of an electron.

All of this leads us to quantum numbers

The Heisenberg Uncertainty Principle

5 Chapter 7: Atomic Structure and Periodicity

7.6 Quantum Numbers

Quantum Number Basics

Name, Definition, Symbol, Value

7.7 Orbital Shapes and Energies

Descriptions and images of different types of

Orbitals. Only resp. for s and p

7.8 Electron Spin and the Pauli Principle

7.9 Polyelectronic Atoms

6 Chapter 7: Atomic Structure and Periodicity

7.10 The History of the Periodic Table

Dobreiner, Newland, Meyer

Dmitri Ivanovich Mendeleev

He accurately predicted properties

7.11 The Aufbau Principle and the Periodic Table

Aufbau Process

Hund’s Rule

Briefly go over exceptions

Organization of the Periodic Table

7 Chapter 7: Atomic Structure and Periodicity

7.12 Periodic Trends in Atomic Properties

How the chart is organized to help determine trends in properties

Ionization Energy & Successive IE

with calculations

Electron Affinity, Atomic Radii, Ionic Radii, Electronegativity, Formula Weight

7.13 The Properties of a Group: The Alkali Metals

8 Chapter 8: Bonding: General Concepts

8.1 Types of Chemical Bonds

Ionic – Polar Covalent Bond – Covalent Bond

Sharing vs. Transfer

Bond Energy and Bond Length

Coulomb’s Law: Energy between ions

Figure 8:1 and how bond length >> low energy

How to write partial charges

8.2 Electronegativity (En)

Definition and general facts

8.3 Bond Polarity and Dipole Moments

How to use E­n to find polarity

How Symmetric Polar bonds results in

Non-polarity

8.4 Ions: Electron Configurations and Sizes

How size changes vs. charge

Size of isoelectronic ions

8.5 Energy Effects in Binary Ionic Compounds

Lattice Energy Diagrams

9 Chapter 8: Bonding: General Concepts

8.6 Partial Ionic Character of Covalent Bonds

Reflection of Electronegativity Differences

8.7 The Covalent Chemical Bond: A Model

The idea of sharing an electron

What is a ‘MODEL’

8.8 Covalent Bond Energies and Chemical Reactions

Bond Energy Calculations

10 Chapter 8: Bonding: General Concepts

8.9 The Localized Electron Bonding Model

Introduction to VSEPR, Lewis structures

8.10 Lewis Structures

How to draw a proper Lewis Diagram

Octet Rule

8.11 Exceptions to the Octet Rule

Electron Deficient and Expanded Octets

11 Chapter 8: Bonding: General Concepts

8.12 Resonance

When does it apply

Formal Charge

8.13 Molecular Structure: The VSEPR Model

Introduce VSEPR and its concepts

12 Chapter 8: Bonding: General Concepts

8.13 Molecular Structure: The VSEPR Model

Go over each shape.

Refer to worksheet as this is done

Bond angles in the various VSEPR shapes

13 Chapter 9: Covalent Bonding: Orbitals

9.1 Hybridization and the Localized Electron Model

Different hybrid orbitals

Characteristics of each hybrid orbital

How and why hybridization happens

9.2 The Molecular Orbital Model

How MO differ from AO

Sigma and Pi Bonds

Bonding and Anti-Bonding Orbitals

Molecular Bonding Diagrams

9.3 Bonding in Homonuclear Diatomic Molecules

Using standard MO models

Paramagnetism v. Diamagnetism

14 Chapter 9: Covalent Bonding: Orbitals

9.4 Bonding in Heteronuclear Diatomic Molecules

How the MO diagram doesn’t change

9.5 Combining the Localized Electron and Molecular Orbital Models

A look at the Benzene Molecule

9.6 Photoelectron Spectroscopy

How to read a diagram.

15 Chapter 10: Liquids and Solids

10.1 Intermolecular Forces

Dipole – Dipole Forces

Hydrogen Bonding

How Hydrogen Bonding affects Physical Prop.

London Dispersion Forces

Characteristics of each type

10.2 The Liquid State

Surface Tension and Capillary Action

Viscosity

10.3 An Intro. To Structures and Types of Solids

Crystalline vs. Amorphous Solids

Main Types of Crystal Shapes

Bragg Equation and Diagram

16 Chapter 10: Liquids and Solids

10.4 Structure and Bonding in Metals

Different Types of Packing in Unit Cells

How to ‘Count’ Atoms in a Crystal

How to Determine Density

General Bonding in Metals: Sea of Electrons

Alloys

10.5 Carbon and Silicon: Network Atomic Solids

Graphite vs. Diamond

Silicates and Different Types of Glass

Ceramics

Semiconductors: p & n type

17 Chapter 10: Liquids and Solids

10.6 Molecular Solids

Strong Covalent Bonds Affect Their Properties

10.7 Ionic Solids

Number of Ions in a Unit Cell

10.8 Vapor Pressure and Changes of State

Define Equilibrium Vapor Pressure

How to Calculate Vapor Pressure

Define BP as VP at Equilibrium

18 Chapter 10: Liquids and Solids

10.8 Vapor Pressure and Changes of State

Continue with Problem Solving

Heat of Fusion

Heating Curve

How to solve Heating Curve Problems

10.9 Phase Diagrams

How to read a Phase Diagram.

19 Problem Set Work

Problem Set: Black Book

Set Assignment

1 Ch. 7 p. 330 / 37– 40, 43 – 46

2 Ch. 7 p. 331 / 53 – 70 odd

3 Ch. 7 p. 332 / 75 – 79, 86 – 88

4 Ch. 7 p. 333 / 99 – 109 odd p. 335 / 135 – 168 any 5

5 Ch. 8 p. 393 / 27 – 36 p. 394 / 39 – 46 odd

6 Ch. 8 p. 395 / 58 – 69 odd

7 Ch. 8 p. 396 / 79 – 83 p. 397 / 95 – 102 odd

8 Ch. 8 p. 399 / 129 – 157 any 6

9. Ch. 9 p. 431 / 17 – 29 all

10. Ch. 9 p. 433 / 43 – 48 odd

11 Ch. 10 p. 488 / 33 – 42 odd p. 488 / 45 – 60

12 Ch. 10 p. 489 / 67 – 69, 83, 85, 86

13 Ch. 10 p. 491 / 87 – 106

14 Ch. 10 p. 494 / 115 – 143 any 6

Problem Set: White Book

Set Assignment

1 Ch. 7 p. 342 / 39 – 42, 47 - 50

2 Ch. 7 p. 343 / 57 – 74 odd

3 Ch. 7 p. 345 / 81 – 85, 92 – 94

4 Ch. 7 p. 346 / 105 – 116 odd, p. 347 / 135 – 180 any 5

5 Ch. 8 p. 405 / 27 – 36 p. 406 / 41 – 48 odd

6 Ch. 8 p. 407 / 60 – 72 odd

7 Ch. 8 p. 408 / 81 – 85 p. 409 / 99 – 106 odd

8 Ch. 8 p. 411 / 127 – 164 any 6

9 Ch. 9 p. 445 / 17 – 29 all

10 Ch. 9 p. 447 / 45 – 52 odd

11 Ch. 10 p. 500 / 35 – 42 odd p. 501 / 47 – 62 odd

12 Ch. 10 p. 502 / 69 – 71, 85, 87, 88

13 Ch. 10 p. 504 / 89 – 108 odd

14 Ch. 10 p. 506 / 109 – 149 any 6