

Westmoreland County Public Schools
Integrated Instructional Pacing Guide
Chemistry 2011 – 2012

Text: *World of Chemistry* by Zumdahl (published by McDougal Littell)

**Week 1 – Safety &
Classification of Matter**

SOL's: 1a,b,c,e,g,i; 5c; 2h

Topics:

- What is chemistry?
- Scientific method
- Laboratory safety
- States of matter
- Physical & Chemical properties
- Physical & Chemical changes
- Classifying matter
- Separating mixtures
- Polyatomic ions

Labs: 011 Equipment & MSDS
012 Bunsen Burner
013o Temperature & Alka-Seltzer

Demos: Carbon Tower p 6
Full or Empty p 23
Genie in bottle p 26
States of matter p 28
Styrofoam molecules p28
Mysterious Mixing p 34
Separating Fe + S mixture p 37
Distillation p 40 & L10

Text Sections: 1.1-1.6, 2.1 – 2.6

Supplementary material on safety from lab manual

Week 2 – Intro to Atoms

SOL's: 2a,b,c,d,g,i

Topics:

- Elements
- Dalton's Theory
- Law of Definite Composition
- Thomson, Millikan & Rutherford
- Atomic structure & subatomic particles
- Atomic mass & number
- Isotopes
- Periodic table, families
- Metal, non-metal, semi-metal
- Classifying elements
- Ions, ionic charge & periodic table

Labs: 021 Physical & Chemical Changes
031 Classifying Elements
L11 Aluminum atoms

Demos: Fe in cereal p 50
Electrolysis L12

Text Sections: 3.1-3.11

Supplement Section 1

**Week 3 – Nomenclature
& Measurement**

SOL's: 3a,c,d; 2g

Topics:

- Naming ionic compounds
- Writing formulas of ionic compounds
- Polyatomic ions & nomenclature
- Ionic/covalent (molecular) compounds – properties, recognition
- Naming covalent compounds
- Scientific notation
- SI units

Labs: 041 Forming & Naming Ionic Compounds
023 Chromatography

Demos: CuCl vs CuCl₂ p 90
Electrolytes p 74 & L14
Length, volume, mass p 119

Text Sections: 4.1-4.4, 4.6, 5.1-5.3

**Westmoreland County Public Schools
Integrated Instructional Pacing Guide
Chemistry 2011 – 2012**

Week 4 – Measurement & Moles

SOL's: 2g; 4

Topics:

- SI units
- Dimensional analysis
- Uncertainty
- Accuracy/precision
- Significant digits
- Temperature scales
- Mathematical problem solving
- Density
- Mole concept

Labs: 051 Density
024 Carbon Dioxide

Demos: Density of oil & water p 142
Rainbow density column p 142
Moles & molecules p 158

Text Sections: 5.1-5.8, 6.1-6.3

Week 5 – Moles

SOL's: 3c, 4

Topics:

- Mole concept
- Mole conversions
- Atomic mass, Molar mass
- Percent composition
- Empirical formulas*
- Molecular formulas*

Labs: 061 Synthesis of MgO
062 Analysis of a Hydrate

Demos: % composition of ores p 173
Properties of ammonia p 178

Variations:

* Calculation of empirical and molecular formulas –
honors topic

Text Sections: 6.4-6.8

Week 6 – Chemical Reactions

SOL's: 3b,c,d

Topics:

- Signs of chemical reaction
- Characteristics of chemical reactions
- Chemical equations
- Balancing chemical equations
- Five reaction patterns
- Oxidation & reduction

Labs: 071 Conservation of Mass
081 Observing & Classifying Reactions

Demos: Elephant's Toothpaste p 194
Handwarming chemistry p 194
Fire on demand p 196
Traffic light chemistry p 200

Text Sections: 7.1-7.3, 8.6-8.7

**Westmoreland County Public Schools
Integrated Instructional Pacing Guide
Chemistry 2011 – 2012**

**Week 7 – Chemical Reactions &
Stoichiometry**

SOL's: 3b, 4e

Topics:

- Factors that cause reactions[†]
- Identifying precipitates[†]
- Molecular, ionic, net ionic equations[†]
- Strong acid-base reaction[†]
- Metal-nonmetal reactions[†]
- Electron transfer as driving force[†]
- Stoichiometry
- Limiting reactants*
- Percent yield

Labs: 082o Activity Series
091 Stoichiometry

Demos: Precipitate p 214
Lights out p 215
Colorful precipitates p 224
Growing crystals p 230
Making salt p 233
Nuts & bolts p 254
Baking soda & acid p 265

Text Sections: 8.1-8.5, 9.1-9.8

Variations:

* Limiting reactants – honors topic
[†] Detailed study of the forces driving various reaction types to be undertaken as time allows. These are non-SOL topics.

Week 8 – Energy

Topics:

- Energy, Temperature & heat
- Heat flow; exothermic & endothermic
- Calorimetry & specific heat
- Enthalpy
- Entropy
- Energy as driving force
- Energy-reaction graphs
- Collision model
- Activation Energy, Catalysts
- Rates of Reaction
- Energy resources

SOL's: 5d,e; 3f

Labs: 101 Energy in a Peanut
103f/171 Iodine clock

Demos: Chemiluminescence p 289
Energy of textbook p 289
Endothermic reaction p 292
Spontaneous combustion p 294
Heat up or chill out? P 296
Fireproof balloon p 300
Probability of flipping coins p 315
Surface area and reaction rate p 542
Dust explosion p 542

Text Sections: 10.1-10.6, 10.8-10.10

Week 9 – Modern Atomic Theory

Topics:

- Rutherford's model
- Electromagnetic radiation
- Photon/quantum
- Atomic emissions of EMR
- Emission spectra
- Bohr model
- Wave mechanical model
- BENCHMARK 1

SOL's: 2i

Labs: 102 Heat of Fusion
111 Flame Test

Demos: Burning rainbows p 326
Atomic spectra p 328

Variations:

Text Sections: 11.1 – 11.6

Westmoreland County Public Schools
Integrated Instructional Pacing Guide
Chemistry 2011 – 2012

**Week 10 – Modern Atomic Theory &
Periodic Table**

SOL's: 2d,e,f,g,h,i

Topics:

- Atomic orbitals
- Orbital filling
- Electron configuration
- Valence electrons
- Trends in properties vs. Per. Table
- Electronegativity, ionization
- Bond polarity, molecule polarity
- Electron configurations and ions

Labs: 112 Wobovian Periodic Chart
113 The Periodic Law

Demos: Cow magnet electrons p 337
Na in water (p 343 but use better procedure)
Roman candle p 347

Text Sections: 11.7 – 11.11

Week 11 – Bonding

SOL's: 2d,e,f,g; 3a,c,d

Topics:

- Ionic vs. Covalent Compounds
- Electron configurations and ions
- Formulas of ionic compounds
- Ionic structures
- Lewis structures of covalent compounds
- Structural formulas
- Molecular geometry
- Names/formulas of common substances

Labs: 121 Lewis Structures & Geometry
122o Measuring the Size of a Molecule

Demos: Geometric balloons p 385

Text Sections: 12.1 – 12.10

Week 12 – Gases

Topics:

- Pressure
- Boyle's Law
- Charles's Law
- Kelvin, absolute zero
- Avogadro's Law
- Ideal Gas Law
- Dalton's Law
- STP
- Real and Ideal Gases
- Gas Stoichiometry[†]

Demos: Collapsing can p 400
Water barometer p 401
Boyle's law syringe p 403
Cartesian diver p 404
Helium hot air p 408
Avogadro's law & balloon p 412
Candle & tumbler p 413
Marshmallow man p 416
Egg/balloon in a bottle p 422/426
Bouncing beaker p 427
KMT beads p 428
Molar volume of a gas p 430
Density of gases p 432

Text Sections: 13.1 – 13.11

SOL's: 4a,c,d; 5a

Labs: 131 Alka-Seltzer & Balloon
132 Gas Stoichiometry
132a Gas Stoichiometry & rate of reaction

Variations:

[†] Gas stoichiometry at non-ideal conditions – honors topic

Westmoreland County Public Schools
Integrated Instructional Pacing Guide
Chemistry 2011 – 2012

**Week 13 – Phases, KMT
& Intermolecular Forces**

SOL's: 4d; 5a,b,c,d

Topics:

- Laws and theories
- Kinetic Molecular Theory
- Intermolecular forces
- Bond polarity, molecule polarity
- Properties of water
- Energy and phase changes
- Molar heat of fusion/vaporization
- Phase Change graphs
- Vapor pressure
- Phase diagrams
- Crystalline & metallic solids*

Labs: 141 Melting curve of Paradichlorobenzene
142 Kinetic Molecular Theory
143f Percentage of Water in Popcorn
L55 Magic sand

Demos: Freezing point L56
Cooling by evaporation p 450
Boiling water at low pressure p 452

Text Sections: 13.8-13.9, 14.1-14.7

Week 14 – Solutions

Topics:

- Solution terms
- Rate of dissolution
- Dissolving process, hydration
- Mass percent
- Molarity
- Dilution
- Colligative Properties

Labs: 151 Solubility vs. Temperature
152 Making Ice Cream
153o Colligative Property

Demos: Like dissolves like
Volume of solutions p 468
Supersaturation p 470
Dissolving peanuts p 471
Saturating a solution p 472
Concentrating on concentration p 472
Dissolving sugar p 473
Rainbow in a straw p 475
Can we add concentrations? p 476
Using a volumetric flask p 480
Successive dilutions p 481
Surface area and reaction rate p 542

Text Sections: 15.1-15.6, 15.10

SOL's: 3d; 4e,g

Week 15 – Acids & Bases

SOL's: 4f,g

Topics:

- Arrhenius acids & bases
- Lowry-Bronsted acids & bases
- Acid nomenclature
- Acid strength
- pH
- Ionization of water, pH & pOH*
- Neutralization reactions
- Acid-base titrations
- Buffered solutions*

Labs: 161 Titration of Vinegar

Demos: Indicators
Goldenrod/bloody paper
Strong/Weak acids p 506
Nonconductivity of water p 510
Measuring pH p 515
Colorful indicators p 520
Cabbage juice indicator p 522
Acetate buffer p 528
Temperature and reaction rate p 538

Text Sections: 16.1-16.8

Variations:

* Mathematical basis of pH, pOH, buffered solutions –
honors topics

Westmoreland County Public Schools
Integrated Instructional Pacing Guide
Chemistry 2011 – 2012

Week 16 – Equilibrium & Nuclear

Topics:

- Equilibrium
- Equilibrium constant*
- LeChatelier's Principle
- Radioactive decay
- Balancing nuclear equations[†]
- Alpha, beta, gamma radiation
- Half life

Text Sections: 17.1-17.8

SOL's: 2b; 3b; 4f

Labs: 172 Le Chatelier's Principle (or as demo)
103f /171 Iodine clock

Demos: Visualizing a reaction p 541
Surface area and reaction rate p 542
Dust explosion p 542
LeChatelier's principle p 554

Variations:

*Equilibrium constant – Honors topic

[†]Optional, but recommended topic

Week 17 – Review

Topics:

- Oxidation & reduction
- Oxidation states[†]
- Redox reactions[†]
- Electrochemical cells[†]
- Corrosion[†]

Text Sections: 18.1-18.4, 18.7

SOL's: 3e

Labs: 181 Percent Cu in a Penny
183o Calcium in Milk

Demos: Silver Mirror p 590
Making Galvanic cell p 592
Lemon power p 599

Variations:

[†]Optional topic – Do if time allows

Week 18 – SOL Testing

Topics:

- Balancing half reactions[†]
- Electrolysis[†]
- Electroplating[†]

Text Sections: 18.1-18.8

SOL's: 3b,e

Labs: 182 Vitamin C Analysis
184o Redox & Corrosion

Demos:

Variations:

[†]Optional topic – Do if time allows