Honour Chemistry (*Distant Learning*) Unit 3 Outline: Quantum Theory, Periodicity and Chemical Bonding

****Only do Even-Numbered HW Questions** ***Green Fonts - *Asynchronous*** ***Blue Fonts - **Optional Video Lessons***

Chapter 7: The Electronic Structure of Atoms

Wk/Class	Topics	Suggested Reading	✓	Assignments	✓
Jan 4 / Day 1	Electromagnetic Radiation, Wavelength, Frequency, $c = \lambda\nu$ Plank's Quantum Theory and Planck's Constant, $\Delta E = h\nu$, Photoelectric Effect, Photons, $E = mc^2$, Duality of Light, Quantized Energy	7.1 Classical Physics to Quantum Theory (pg. 207–210) 7.2 The Photoelectric Effect (pg. 211–212) ***[7-1 & 7-2 Video Lesson – 54:44]***			
Jan 4 / Day 2	Diffraction, Emission and Absorption Spectrums, $E_n = \frac{-2.178\times10^{-18}\,J}{n^2}$, Duality of Matter ($p = m\upsilon$), de Broglie's Wavelength $\left(\lambda = \frac{h}{m\upsilon}\right)$	7.3 The Atomic Spectrum of Hydrogen (pg. 212–217) 7.4 The Dual Nature of the Electron (pg. 217–219) ***[7-3 & 7-4 Video Lesson – 25:51]***			
Jan 11 / Day 1	Heisenberg Uncertainty Principle, Standing Waves, Schrödinger's Wave Function $\left(\hat{H}\psi = E\psi\right)$, Probability Distribution, Atomic Orbital, Radial Probability Distributions, Quantum Mechanical Model	7.5 Quantum Mechanics (pg. 219–220) ***[7-5 Video Lesson – 30:14]***		**Video & Worksheet**: *Atom – The Clash of Titans (BBC)* **Video**: *The Uncertainty Principle (BBC)*	
Jan 11 / Day 2	Quantum Numbers, Principal Quantum Number (n), Angular Momentum Quantum Number (l), Magnetic Quantum Number (m_l), Electron Spin, Electron Spin Quantum Number (m_s), Orbital Shapes, Nodal Surfaces or Nodes, Subshells (s, p, d, f, and g orbitals), Orbital Energies of a Hydrogen Atom, Polyelectronic Atom, Electrons Correction Problem (Degeneration)	7.6 & 7.7 Quantum Numbers & Atomic Orbitals (pg. 221–222) ***[7-6 & 7-7 Video Lesson – 29:42]***		pg. 240–241 #48, 57, 58, 61 to 64, 66 to 68, 70	
Jan 18 / Day 1	Pauli Exclusion Principle, Penetration (Tunneling) Effect, Aufbau (Building-Up) Principle, Orbital Diagrams, Hund's Rule, Electron Configurations and Exceptions, Valence Electrons versus Shielding (Core) Electrons	7.8 & 7.9 Electron Configuration & The Building-Up Principle (pg. 226–228, 230–236) ***[7-8 & 7-9 Video Lesson – 55:14]***		***Ch 7 Worksheet – Electrons in Atoms*** pg. 241 #71, 72, 76, 77, 80, 82 to 84, 86 to 89, 91, 92 (even)	
Jan 18 / Day 2	**Activity 3: Flame Tests and Emission Spectroscopy** **(B & D Blocks: January 21, Thursday)**	Activity 3 Handout ***[Activity 3 Video – 28:29]***		**Activity 3 Due:** **(B & D Blocks: Feb 1, Monday)**	

Chapter 8: Periodic Table

Wk/Class	Topics	Suggested Reading	✓	Assignments	✓
Jan 25 / Day 1	Dmitri Mendeleev, Main Group or Representative Elements (*s* and *p* orbitals), Transition Metals (*d* orbitals), Lanthanide and Actinide Series (*f* orbitals), Ground and Excited States, Electron Configurations, Electron Configurations of Ions (Representative Elements and Transition Metals)	8.1 Development of the Periodic Table (pg. 316) 8.2 Periodic Classification of the Elements (pg. 318 – 322) ***[8-1 & 8-2 Video Lesson – 30:50]***		pg. 272 #1, 3, 4 pg. 272–273 #7, 11, 13, 15, 16, 18 to 20, 22 to 26, 28, 30, 32	
Jan 25 / Day 2	Shielding Effect, Effective Nuclear Charge (Z_{eff}), Periodic Trends of Atomic and Ionic Radii, Isoelectronic Ions, Ionization Energy, First and Second Ionization Energies (I_1 and I_2), Periodic Trend in Ionization Energies, Electron Affinity, Periodic Trend of Electron Affinities	8.3 Periodic Variations in Physical Properties (pg. 322 – 329) 8.4 & 8.5 Ionization Energy & Electron Affinity (pg. 329 – 335) ***[8-3 to 8-5 Video Lesson – 52:14]***		pg. 273–274 #34, 36, 38, 40, 42 to 48 pg. 274 #49 to 52, 54 pg. 274 #57 to 62	
Feb 1 / Day 1	**Activity 4: Periodic Trends and Properties of Elements (B & D Blocks: February 1, Monday)**	Activity 4 Handout ***[Activity 4 Video – 20:48]***		**Activity 4 Due: (B & D Blocks: Feb 10, Wed)**	
	Chapter 7 & 8 Take-Home Quiz (B & D Blocks: February 4, Thursday)	***Chapter 7 & 8 HW Due (B & D Blocks: February 4, Thursday)***		**Ch 7 & 8 Take-Home Quiz Due: (B & D Blocks: Feb 8, Monday)**	

Chapter 9: Chemical Bonding I: The Covalent Bond

Wk/Class	Topics	Suggested Reading	✓	Assignments	✓
Feb 1 / Day 2	Lewis Structures, Ionic Bonding and Predicting Ionic Compounds, Properties of Ionic Compounds, Covalent Bonds and Covalent Compounds, Chemical Bonding Model, Single Bonds, Lone Pairs, Bonding Pairs, Structural Formula, Double and Triple Bonds (Coordinate Covalent Bonds – Multiple Bonds), Bond Lengths, Polar Covalent Bond, Electronegativity, Periodic Trends of Electronegativity, Relative Bond Polarity	9.1: Lewis Dot Symbols (pg. 280) 9.2: The Ionic Bond (pg. 281 – 282) ***[9-1 & 9-2 Video Lesson – 29:23]*** 9.4: The Covalent Bond (pg. 285 – 286) 9.5: Electronegativity (pg. 287 – 290) ***[9-4 & 9-5 Video Lesson – 38:28]***		pg. 306 #1 and 5 pg. 306–307 #7, 9, 10, 13, 16, 18, 20 pg. 307 #29 and 30 pg. 307 #32, 34, 35, 37, 38	
Feb 8 / Day 1	Writing Lewis Dot Diagrams, Duet Rule, Octet Rule, Exceptions to the Octet Rule (Incomplete Octet and Expanded Octet), Odd-Electron Molecules	9.6: Writing Lewis Structures (pg. 291 – 293) ***[9-6 Video Lesson – 36:23]*** 9.9: Exceptions to the Octet Rule (pg. 298 – 301) ***[9-9 Video Lesson – 55:51]***		pg. 307 #41 pg. 308 #55, 57, 61 to 64	
Feb 8 / Day 2	Resonance, Resonance Structures, Formal Charge	9.7 & 9.8: Formal Charges & the Concept of Resonance (pg. 293 – 298) ***[9-7 & 9-8 Video Lesson – 52:42]***		pg. 307–308 #40, 42, 43, 44, 49 to 54	

Chapter 10: Chemical Bonding II: Molecular Geometry

Wk/Class	Topics	Suggested Reading	✓	Assignments	✓
Feb 22 / Day 1	Molecular Geometry, Valence Shell Electron Pair Repulsion (VSEPR) Model, Linear, Trigonal Planar, Tetrahedral, V-Shaped, Trigonal Pyramid, Trigonal Bipyramid, Octahedral and Square Planar Structures, Dipole Moments, Polar and Nonpolar Molecules	10.1: Molecular Geometry (pg. 313 – 332) ***[10-1 Video Lesson – 45:36]*** 10.2: Dipole Moments (pg. 332 − 324) ***[10-2 Video Lesson – 31:51]***		pg. 349−350 #2 to 5, 7 to 12 pg. 350 #14, 15. 20 to 22	
	Chapters 9 and 10 Take-Home Quiz (B & D Blocks: March 1, Monday)			**Ch 9 & 10 Take-Home Quiz Due: (B & D Blocks: March 4, Thursday)**	

Chapter 12: Intermolecular Forces

Wk/ Class	Topics	Suggested Reading	✓	Assignments	✓
Feb 22 / Day 2	Intermolecular Forces, van der Waals Forces (Dipole-Dipole Forces, London Dispersion Forces), Ion-Dipole Forces, Hydrogen Bonding, Properties of Covalent Crystalline Solids and Molecular Crystalline Solids	12.2: Intermolecular Forces (pg. 392 to 397) ***[12-2 Video Lesson – 41:25]***		pg. 418−422 #2, 3, 6 to 10, 12 to 19, 31, 32, 63, 64, 101; pg. 448 #9	
March 1 / Day 1	**Lab #6: Molecular Models (B & D Blocks: March 1, Monday)**	Lab #6 Handout ***[Lab #6 Video – 24:02]***		**Lab #6 Report Due (B & D Blocks: March 11, Thursday)**	
	Unit 3 Test (B & G Blocks: Mar 11, Thursday)	*Ch 8 Periodic Trends MC* Unit 3 Practice Test		***Chapter 9 & 10 & 12.2 HW Due (B & D Blocks: March 9, Tuesday)***	