

EASTERN LEBANON COUNTY SCHOOL DISTRICT
STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **Matter & Measurement (U1)**

Days: **13**
Grade Level: **10-12th**

Key Learning Chemistry is a branch of science that studies the matter that makes up the world around us by using specialized measuring techniques, mathematical concepts and basic understanding of atomic interactions based on the modern atomic theory.



Unit Essential Question How are the physical and chemical processes around us understood through specialized chemistry techniques and atomic interaction theories and calculations?

Concept Nature of Science	Concept Matter	Concept Measurement
Standards: CHEM.A.1.1.2; 3.2.10.A; 3.2.10.B	Standards: CHEM.A.1.1.1; CHEM.A.1.1.4; CHEM.A.1.2.2; CHEM.A.2.1.1; CHEM.A.2.1.2; CHEM.A.2.2.1; CHEM.A.2.2.2; CHEM.A.2.2.3; CHEM.A.2.3.1; CHEM.A.2.3.2; CHEM.A.2.2.4; 3.4.10.A; 3.1.10.C; 3.2.12.A2	Standards: CHEM.A.1.1.3; 3.1.10.D; 3.7.10.B; 3.7.10.D; 3.2.10.D
↓	↓	↓
LEQ How do scientists study the world around us?	LEQ What is matter & how is it classified?	LEQ How are measurement techniques utilized to study matter?
↓	↓	↓
Vocabulary Hypothesis, Theory, Law, Experiment, Control, Independent Variable, Dependent Variable, Quantitative, Qualitative	Vocabulary Matter, Mass, Element, Compound, Atom, Particle, Mixture, Pure Substance, Heterogeneous, Homogeneous, Separation, Filtration, Distillation, Electron, Quantum Numbers, Spectroscopy, Nucleus, Isotope, Atomic Mass, Periodic Table, Trends	Vocabulary Accuracy, Precision, Mass, Volume, Unit, Significant Figure, Dimensional Analysis, Regression Line, Extrapolation,

EASTERN LEBANON COUNTY SCHOOL DISTRICT STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **Bonding & Reactions (U2)**

Days: **10**
Grade Level: **10-12th**

Key Learning Atomic interactions are governed by various fundamental laws in chemistry. Atoms share or transfer electrons in whole number ratios and form in various 3-dimensional shapes in order to minimize potential energy. These atoms often rearrange and take on new properties, but matter is never created or destroyed.



Unit Essential Question How do atoms interact with each other in predictable ways that allow us to take advantage of physical properties and product amounts of specific reaction products?

<p>Concept Chemical Bonding and Hybridization</p> <p>Standards: CHEM.B.1.3.1; CHEM.B.1.3.2; CHEM.B.1.3.3; CHEM.B.1.4.1; CHEM.B.1.4.2; 3.2.C.A1; 3.2.10.A2;</p>	<p>Concept Ionic & Molecular Formulas</p> <p>Standards: CHEM.A.1.1.5; CHEM.B.1.2.1; CHEM.B.1.2.2; CHEM.B.1.2.3; 3.2.10.A2; 3.2.C.A2</p>	<p>Concept Chemical Reactions & Net Ionic Equations</p> <p>Standards: CHEM.B.2.1.3; CHEM.B.2.1.4; CHEM.B.2.1.5; 3.2.10.A4; 3.2.C.4</p>
↓	↓	↓
<p>LEQ How do molecules utilize hybridization to orient in 3-dimensions?</p>	<p>LEQ What methods do scientists use to describe and represent chemical substances?</p>	<p>LEQ Why are reaction products able to be predicted based upon reactants?</p>
↓	↓	↓
<p>Vocabulary Lewis Dot Structure, Polarity, Ionic, Polar Covalent, sp³, Dipole, Intermolecular Force</p>	<p>Vocabulary Chemical Formula, Cation, Anion, Molecular & Empirical Formula</p>	<p>Vocabulary Displacement Reactions, Combustion, Synthesis, Decomposition, Spectator Ions</p>

<p>Concept Stoichiometry</p>
<p>Standards: CHEM.B.1.1.1; CHEM.B.2.1.1; CHEM.B.2.1.2; 3.2.C.4</p>
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<p>LEQ How can we estimate the amount of product produced from a chemical reaction?</p>
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<p>Vocabulary Percent Yield, Theoretical Yield, Molar Ratio</p>

EASTERN LEBANON COUNTY SCHOOL DISTRICT
STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **States of Matter (U3)**

Days: **10**
Grade Level: **10-12th**

Key Learning Variables such as pressure and temperature are taken into consideration by the Kinetic Molecular Theory to describe the movement, interaction, and state of matter for the particles of a substance.



Unit Essential Question Why do outside conditions allow for changing particle interaction and therefore various physical states in the matter that makes up the world around us?

Concept Kinetic Molecular Theory	Concept Phase Changes & Energy Diagrams	Concept Distillation
Standards: CHEM.B.2.2.1; CHEM.B.2.2.2; 3.2.10.A3; 3.2.C.A3	Standards: 3.2.C.A3	Standards: CHEM.A.1.1.1; CHEM.A.1.2.2
↓	↓	↓
LEQ How do we explain the movement of particles in various states of matter?	LEQ Why do changes in state produce periods of no temperature change?	LEQ How can the properties of two mixed liquids be used to separate those liquids?
↓	↓	↓
Vocabulary Surface Tension, Diffusion, Combined Gas Law, pressure, temperature	Vocabulary Phase change, Phase Diagram, Evaporation, Boiling, Freezing, Absolute 0, Kelvin	Vocabulary Distillation, boiling chip, side arm flask, water condenser

Concept Heat Transfer
Standards: N/A
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LEQ How can heat be transferred within a substance?
↓
Vocabulary Convection, Conduction

EASTERN LEBANON COUNTY SCHOOL DISTRICT
STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **Solution Chemistry (U4)**

Days: **11**
Grade Level: **10-12th**

Key Learning Solutions contain particles that are dissolved in a solvent. The nature and abundance of these particles affect the properties of the solution, such as concentration, conductivity, rate of reactivity, solubility, and various colligative properties.



Unit Essential Question How can the properties of a solution be varied in response to the concentration and nature of both the solute and solvent?

Concept Solubility and factors	Concept Concentration	Concept Colligative Properties
Standards: CHEM.A.1.2.1; CHEM.A.1.2.3; CHEM.A.1.2.5	Standards: CHEM.A.1.2.4	Standards: CHEM.A.1.2.1; 3.2.12.A1
↓	↓	↓
LEQ What factors affect a substance's ability to dissolve?	LEQ How do we measure the number of particles per unit of volume?	LEQ Why does concentration affect certain properties of substances?
↓	↓	↓
Vocabulary Solubility, surface area, electrolytes, supersaturated, solute, solvent	Vocabulary Molality, molarity, parts per million	Vocabulary freezing point, boiling point, depression, elevation

Concept Reaction Kinetics
Standards: CHEM.A.1.2.1; 3.2.10.A4
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LEQ How does concentration affect the kinetics of a chemical reaction?
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Vocabulary Collision Theory, rate law, reaction rate, activation energy

EASTERN LEBANON COUNTY SCHOOL DISTRICT
STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **Equilibrium & Acid/Base (U5)**

Days: **14**
Grade Level: **10-12th**

Key Learning Many chemical reactions and solutions exist in a dynamic state of equilibrium rather than a static state of fixed concentration. Acid and base chemistry relies on the dynamic shifting of $[H^+]$ and the properties of a solution depending on $[H^+]$.



Unit Essential Question How does the dynamic nature of equilibrium affect properties associated with acid/base chemistry?

Concept Equilibrium & ICE Tables	Concept Acids & Bases	Concept pH & Titration
Standards: 3.2.12.A5	Standards: 3.2.12.A4	Standards: 3.2.12.A4
↓	↓	↓
LEQ How does equilibrium affect concentration of particles?	LEQ What is the importance of measuring the concentration of hydrogen ions?	LEQ How do we represent and measure the concentration of hydrogen ions?
↓	↓	↓
Vocabulary Equilibrium constant,	Vocabulary Acid, Base, Arrhenius, Lewis, Bronsted-Lowrey	Vocabulary acidic, basic, pH,

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STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **Organic Chemistry (U6)**

Days: **16**
Grade Level: **10-12th**

Key Learning Carbon-based chemistry, organic chemistry, has its own system of nomenclature and molecule representation. The orientation of functional groups and nature of the electron affect properties and reactions of organic molecules.



Unit Essential Question How are specialized systems of nomenclature, representation, and reaction mechanics used to express and communicate about organic chemistry?

Concept Nomenclature and Skeletal Structures	Concept Functional Groups	Concept Resonance
Standards: N/A	Standards: N/A	Standards: N/A
↓	↓	↓
LEQ How are organic compounds named and drawn?	LEQ How do certain additions to organic molecules change their properties?	LEQ How can we represent the dynamic shifting of electrons in certain molecules?
↓	↓	↓
Vocabulary methane, ethane, propane, butane, pentane, hexane, heptane, octane, nonane, decane, alkane, alkene, alkyne	Vocabulary ketones, carboxylic acid, alcohols, esters, ethers, aldehydes	Vocabulary Resonance structure

EASTERN LEBANON COUNTY SCHOOL DISTRICT STUDENT LEARNING MAP

Course/Subject: **Chemistry II**
Topic: **Biochemistry (U7)**

Days: **13**
Grade Level: **10-12th**

Key Learning The function of biological macromolecules is heavily dependent on the structure of the specific biological macromolecule. The structure nature of the organic molecules that comprise the macromolecule.



Unit Essential Question What affect does organic chemistry have on the structure, and therefore function, of the biological macromolecules found in living systems?

Concept Carbohydrates	Concept Lipids & Proteins	Concept Nucleic Acids
Standards: BIO.A.2.2.1; BIO.A.2.2.2; BIO.A.2.2.3; 3.1.10.A7; 3.1.B.A7; 3.1.C.A7	Standards: BIO.A.2.2.1; BIO.A.2.2.2; BIO.A.2.2.3; 3.1.10.A7; 3.1.B.A7; 3.1.C.A7	Standards: BIO.A.2.2.1; BIO.A.2.2.2; BIO.A.2.2.3; 3.1.10.A7; 3.1.B.A7; 3.1.C.A7
↓	↓	↓
LEQ How does the chemical structure of carbohydrates explain the function of carbohydrates?	LEQ How do the chemical structures of lipids & proteins explain the function of carbohydrates?	LEQ How does the chemical structure of nucleic acids explain the function of nucleic acids?
↓	↓	↓
Vocabulary Monosaccharide, disaccharide, polysaccharide, starch, cellulose, Haworth projection, Fischer projection	Vocabulary saturated, unsaturated, triglyceride, phospholipid, amino acids	Vocabulary phosphate group, deoxyribose, nitrogenous base, acid/base pairing