**Big Idea 1: Chemical Elements and the Arrangement of Atoms**

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[**Mass Percent**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(2 requirements)*

* + Can you identify an element or determine its purity using mass percent calculations? (EK1A1, EK1A2; LO 1.1-1.3)
  + Can you use mole relationships to convert between moles, mass, particles, volume, and pressures? (EK1A3; LO 1.4)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Electronic Structure of Atoms and Periodicity**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you predict and justify periodic trends in data (PES, radii, ionization, electronegativity) using Coulomb’s Law? (EK1B1, EK1B2, EK1C1; LO 1.5-1.11)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Atomic Models**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you use experimental data (mass spectrometry, PES, electromagnetic waves) to justify the replacement of early atomic models with the shell model and eventually the quantum mechanical model? (EK1C1, EK1D1, EK1D2, EK1D3; LO 1.12-1.15)
  + Can you use mass spectrometry to identify elements and determine atomic mass? (EK1D2; LO 1.14)
  + Can you design a lab using a spectrophotometer to determine the concentration of a solution? (EK1D3; LO 1.16)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)

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[**Law of Conservation of Mass**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you balance chemical reactions and use mole ratios to predict amounts needed or produced in a chemical reaction? (EK1E2; LO 1.18-1.20)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)

**Big Idea 2: Molecular Structure and Forces**

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[**Macroscopic Properties**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you identify different properties of solids and liquids based on both differences in structure at both a particulate and macro level? (EK2A1 LO2.1-2.3)
  + Can you relate macroscopic properties of a gas through a mathematical equation? (EK2A2 LO2.4-2.6)
  + Can you identify a homogeneous solutionâ€™s concentration and the interactions between the solute and solvent? (EK2A3 LO2.7-2.10)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Intermolecular Interactions**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you identify London dispersion forces and the main types of molecules that contain these types of intermolecular forces? (EK2B1 LO 2.11)
  + Can you identify dipole forces, including the specific requirements of Hydrogen bonding, based on the types of molecules involved? (EK2B2 LO 2.12-2.14)
  + Can you identify properties of substances, including biological substances, based on the intermolecular forces present? (EK2B3 LO 2.15-2.16)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Chemical Bonds**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(2 requirements)*

* + Can you predict the type of intramolecular bonds present in a substance based on the placement of the elements in the periodic table? (EK2C1-3 LO 2.17-2.20)
  + Can you predict the VSEPR and Lewis structure of a molecule along with the hybridization and polarity? (EK2C4 LO 2.21)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Bonds and Properties of Solids**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(2 requirements)*

* + Can you predict properties of a solid and identify which are ionic compounds? (EK2D1, EK2D2 LO 2.22-2.28)
  + Can you identify a molecular solid and corresponding properties? (EK2D3, EK2D4 LO2.29-2.32)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)

**Big Idea 3: Chemical Reactions**

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[**Stoichiometry**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you represent a chemical reaction as a balanced molecular, ionic, or net ionic equation as well as a particle drawing? (EK3A1 LO 3.1-3.2)
  + Can you calculate a reactionâ€™s percent yield taking into account limiting and excess reactants? (EK3A2 LO 3.3)
  + Can you find a molar mass of a gas in lab and describe laboratory errors? (EK3A2 LO 3.3)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Reactions**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you determine the empirical formula of a substance from lab data? (EK3B1 LO 3.5-3.6)
  + Can you identify Bronsted-Lowry acids, bases, and conjugate acid-base pairs in a chemical reaction? (EK3B2 LO 3.7)
  + Can you use oxidation numbers to identify and balance redox reactions? (EK3B3 LO 3.8-3.9)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Energy**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you classify a reaction as a chemical, physical, or ambiguous change? (EK3C1 LO 3.10)
  + Can you identify endothermic and exothermic reactions based on lab observations as well as symbolic and graphical representations? (EK3C2 LO 3.11)
  + Can you use Faradayâ€™s Laws, identify oxidation and reduction half-reactions, and calculate electrical potential for galvanic and electrolytic cells? (EK3C3 LO 3.12-3.13)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)

**Big Idea 4: Chemical Reactions Rates**

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[**Changes in Reaction Rates**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you identify the factors that influence the rate of a reaction? (EK4A1 LO 4.1)
  + Can you calculate a rate law given reaction concentrations? (EK4A2 LO 4.2)
  + Can you calculate a rate constant and identify factors that affect the rate constant? (EK4A3 LO 4.3)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Collisions in Reactions**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(2 requirements)*

* + Can you identify an elementary reaction and connect it to the frequency and success of collisions? (EK4B1 LO 4.4)
  + Can you identify successful collisions in a reaction based on energy,orientation, and reaction pathway? (EK4B2, EK4B3 LO 4.5-4.6)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Elementary Reactions**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you identify the overall reaction based on elementary steps of a multistep mechanism? (EK4C LO 4.7)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Catalysts**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you identify the effects of different types of a catalyst on a reaction? (EK4D1, EK4D2 LO 4.8-4.9)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)

**Big Idea 5: Energy**

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[**Heat Energy**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you identify the heat transferred between objects both graphically and by calculation in terms of kinetic energy and temperature? (EK5A1 LO 5.1-5.3)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
* **

[**Energy Conservation**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(2 requirements)*

* + Can you differentiate between work and heat energy between systems in thermal contact? (EK5B1, EK5B2 LO 5.4-5.5)
  + Can you relate heat transfer to changes of state including heat calculations? (EK5B3, EK5B4 LO 5.6-5.7)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
* **

[**Bond Energy**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you calculate the potential energy and net energy change of a substance to the geometric arrangement of the atoms/ions? (EK5C1, EK5C2 LO5.8)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
* **

[**IMF Energy**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you identify the interaction of molecules based on attractive forces? (EK5D1 LO 5.9)
  + Can you identify the difference between a chemical and physical change based on inter and intra molecular forces? (EK5D2 LO 5.10)
  + Can you identify non-covalent bond types in large biological molecules? (EK5D3 LO 5.11)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)
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[**Enthalpy and Entropy**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(4 requirements)*

* + Can you predict the relative magnitude and sign of an enthalpy change for a reaction? (EK5E1 LO 5.12)
  + Can you determine if a reaction is thermodynamically favored based on Gibbs Energy calculations? (EK5E2, EK5E3 LO 5.13-5.14)
  + Can you identify external forces that drive a nonspontaneous reaction? (EK5E4 LO 5.15-5.17)
  + Can you identify which reactions will not occur based on kinetic constraints? (EK5E5 LO 5.18)
  + [Collapse](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21)

**Big Idea 6: Equilibrium**

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[**Reversible Reactions**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(3 requirements)*

* + Can you determine Q or K from a series of reactions? (EK6A2 LO 6.2)
  + Can you calculate K or equilibrium concentrations and pressures for a reversible reaction? (EK6A3 LO 6.5-6.6)
  + Can you use the size of K to determine the amounts of substances at equilibrium? (EK6A4 LO 6.7)
* **

[**Le Chatelier**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you use Le Chatelierâ€™s Principle and Q to describe the direction and relative forward and reverse rates of a reaction? (EK6A1, EK6A3, EK6B1, EK6B2 LO 6.1, 6.3. 6.4, 6.8-6.10)
* **

[**Acid-Base and Solubility Equilibria**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(6 requirements)*

* + Can you describe the similarities and differences between a strong and weak acid in terms of formula, concentrations, pH, ionization, particle diagrams, titration graphs, and amount of base needed to reach the equivalence point? (EK6C1 LO 6.11-6.12)
  + Can you determine the pH, concentrations of substances, and pKa or pKb at any point in a titration? (EK6C1 LO 6.13, 6.15-6.17)
  + Can you convert between hydronium and hydroxide concentrations, pH, pOH, Ka, Kb, Kw, pKa, and pKb? (EK6C1 LO 6.13-6.14)
  + Can you design a buffer solution with a specific pH and buffer capacity and predict how the buffer will react with the addition of an acid or a base? (EK6C2 LO 6.18, 6.20)
  + Can you select and determine the color change of an indicator for a titration using pH and the indicators pKa? (EK6C2 LO 6.19)
  + Can you use Ksp and Le Chatelierâ€™s principle to predict and calculate the solubility of a salt? (EK6C3 LO 6.21-6.23)
* **

[**Gibbs Free Energy and Equilibrium**](https://www.learnerator.com/ap-chemistry/checklist?utm_source=sendy&utm_campaign=ap-teacher-april-21) *(1 requirements)*

* + Can you predict K based on enthalpy, entropy, and spontaneity data? (EK6C3, EK6D1 LO 6.24-6.25)