

## Chemistry Curriculum Bundle #11



Title	Suggested Dates
Neutralization Reactions and Gases	4/18 – 5/6 (14 days)

Big Idea/Enduring Understanding	Guiding Questions
Temperature and pressure affect the motion of gas particles.	How does Kinetic Molecular Theory explain the behavior of gases?

The resources included here provide teaching examples and/or meaningful learning experiences to address the District Curriculum. In order to address the TEKS to the proper depth and complexity, teachers are encouraged to use resources to the degree that they are congruent with the TEKS and research-based best practices. Teaching using only the suggested resources does not guarantee student mastery of all standards. Teachers must use professional judgment to select among these and/or other resources to teach the district curriculum.

Knowledge & Skills with Student Expectations	District Specificity/Examples	Suggested Resources (See note above)
<p><b>10 Science concepts. The student understands and can apply the factors that influence the behavior of solutions. The student is expected to:</b></p> <p>10H understand and differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions;</p> <p>10G define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions and predict products in acid base reactions that form water;</p>	<p>Describe the properties of acids and bases, and identify the products of a neutralization reaction. CCRS</p> <p><i>d. Describe how a titration is performed and how this process can be used to determine the concentration of an unknown acid or base solution. CCRS</i></p> <p>Understand oxidation-reduction reactions. CCRS</p> <p><i>a. Differentiate between oxidation and reduction, and between oxidizing agent and reducing agent.</i></p> <p><i>b. Understand the consequences of corrosion processes and define and describe the electroplating process.</i></p> <p><i>c. Determine the oxidation number of any atom in an element, ion, or compound. CCRS</i></p> <p><b>Including</b></p> <ul style="list-style-type: none"> <li>• Describe reactants and products of neutralization reactions</li> <li>• Predict the hydrolysis of salts (PAP)</li> <li>• Explain how titration is used in a volumetric analysis of acid or base concentrations (PAP)</li> <li>• Solve titration problems (PAP)</li> <li>• Describe the effects of acids and bases on living systems such as acid rain (PAP)</li> <li>• Describe electrical conductivity with reference to presence of ions (PAP)</li> </ul> <p><b>Pre-AP: Identify precipitates in double-replacement rxns</b></p>	<p><b>Acid Rain Demonstration</b>  <a href="http://www.iied.edu.hk/apfslt/v5_issue1/fongmw/index.htm">http://www.iied.edu.hk/apfslt/v5_issue1/fongmw/index.htm</a></p> <p><b>Matter and Change Lab Manual</b>                      Glencoe                      Lab: Acids, Bases, and Neutralization</p> <p><b>Laying the Foundation: A Resource and Strategies Guide for Chemistry</b>                      Lesson 33: Titrations-Titrations                      Pg. 670</p> <p><b>A Demo a Day Volume 1</b>  <b>A Year of Chemical Demonstrations</b>                      A Neutralization of Stomach Acid                      Pg 178</p> <p><b>Orange Juice to Strawberry Float Demo</b>                      Flinn Scientific, Inc.                      See chemistry resource folder</p> <p><b>Titration Virtual Lab</b>  <a href="http://lrs.ed.uiuc.edu/students/mihyewon/chemlab_experiment.html">http://lrs.ed.uiuc.edu/students/mihyewon/chemlab_experiment.html</a></p> <p><b>A Demo a Day Volume 1</b>  <b>A Year of Chemical Demonstrations</b>                      Acid Strength versus Concentration</p>

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	<p>using solubility table or solubility rules</p>	
	<p>Including</p> <ul style="list-style-type: none"> <li>• Describe electrical conductivity with reference to presence of ions (PAP)</li> </ul>	<p><b>A Demo a Day Volume 1</b>  <b>A Year of Chemical Demonstrations</b>          Acid Strength versus Concentration          Pg 172</p> <p><b>Base Strength animation</b>          McGraw Hill  <a href="http://www.mhhe.com/physsci/chemistry/chang7/esp/folder_structure/ac/m2/s2/index.htm">http://www.mhhe.com/physsci/chemistry/chang7/esp/folder_structure/ac/m2/s2/index.htm</a></p> <p><b>Acid Strength animation</b>          McGraw Hill  <a href="http://www.mhhe.com/physsci/chemistry/chang7/esp/folder_structure/ac/m2/s1/index.htm">http://www.mhhe.com/physsci/chemistry/chang7/esp/folder_structure/ac/m2/s1/index.htm</a></p> <p><b>Conductivity Animation</b>  <a href="http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/electroChem/conductivity.html">http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/electroChem/conductivity.html</a></p>
<p><b>9 Science concepts. The student understands the principles of ideal gas behavior, kinetic molecular theory, and the conditions that influence the behavior of gases. The student is expected to:</b></p> <p>9A describe and calculate the relations between volume, pressure, number of moles, and temperature for an ideal gas as described by Boyle's law, Charles' law, Avogadro's law, Dalton's law of partial pressure, and the ideal gas law;</p> <p>9B perform stoichiometric calculations, including determination of mass and volume relationships between reactants and products for reactions involving gases; and</p> <p>9C describe the postulates of kinetic molecular theory.</p>	<p>Understand principles of ideal gas behavior and kinetic molecular theory. CCRS</p> <p><i>a. Use kinetic molecular theory to explain how gas pressure is affected by volume, temperature, and the addition of gas.</i></p> <p><i>b. Distinguish between real and ideal gas behavior, and identify the criteria in the kinetic molecular theory that conflict with the properties of real gases. CCRS</i></p> <p>Apply the concept of partial pressures in a mixture of gases. CCRS</p> <p><i>a. Use Dalton's Law to determine the partial pressure of a gas in a mixture of gases. CCRS</i></p> <p>Understand the effect of vapor pressure on changes in state; explain heating curves and phase diagrams. CCRS</p> <p><i>a. Define boiling, freezing, sublimation, etc.</i></p> <p><i>b. Explain heating curves and phase diagrams. CCRS</i></p> <p>Understand chemical kinetics. CCRS</p>	<p><b>KMT on gases animation</b>  <a href="http://www.absorblearning.com/media/item.action?quick=17e">http://www.absorblearning.com/media/item.action?quick=17e</a></p> <p><b>Lab: Gas Stations</b>          See chemistry resource folder</p> <p><b>Gas Law Jeopardy</b>          See chemistry resource folder</p> <p><b>Laying the Foundation: A Resource and Strategies Guide for Chemistry</b>          Lesson 19: Charles' Law          Pg. 472</p> <p><b>Laying the Foundation: A Resource and Strategies Guide for Chemistry</b>          Lesson 20: Airbags          Pg. 482</p>

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a. Describe collision theory and use this theory to explain effects of concentration, temperature, and nature of reactants on reaction rate.

b. Define catalyst and describe how a catalyst affects a reaction rate. CCRS

### Including

- Temperature (Celsius vs Kelvin)
- Particle number (Avogadro's number)
- Pressure (Pressure unit conversions)
- Volume
- Gas law constant
- Discuss the Kinetic Molecular Theory of Gases with regard to the nature of gases and varying conditions
- Explain the importance of and use STP when applying the gas laws
- Graph relationships expressed by the gas laws
- Explain important gas laws and use them in calculations:
  - Charles's law
  - Gay-Lussac's Law
  - Boyle's law
  - The combined gas law
  - Dalton's law of partial pressures,
  - Avogadro's Law
  - Graham's Law of Diffusion (PAP)
- Describe what is meant by an "ideal" gas
- Use and manipulate the ideal gas equation,  $PV=nRT$
- Describe conditions a real gas approaches ideal gas behavior.
- Perform stoichiometric calculations involving gases.
- Calculate the molar mass of a substance using DRT/P and identify the substance (PAP)
- Calculate the molar mass of a gas using Graham's law of diffusion (PAP)

### Gas Law Demonstrations with Graphs

<http://www.grc.nasa.gov/WWW/K-12/airplane/aboyle.html>

<http://www.grc.nasa.gov/WWW/K-12/airplane/aglussac.html>

### Lab: Popcorn Pressure

See chemistry resource folder

### Ideal Gas Law Animation

<http://intro.chem.okstate.edu/1314F00/Laboratory/GLP.htm>

### Ideal Gas Law Virtual Lab

<http://jersey.uoregon.edu/vlab/Piston/index.html>