

## Unit 8: Gases

### Summary

This unit will introduce you to calculations involving the simplest state to model, gases.

### Textbook References

- Wilbraham, Staley, Matta, & Waterman. Chemistry. Boston, Massachusetts: Pearson Prentice Hall, 2007.
- Wilbraham, Antony C., Dennis D. Staley, Michael S. Matta. Addison-Wesley Chemistry, 5<sup>th</sup> ed. Menlo Park, CA: Addison-Wesley Publishing Company, 2002. – Chapter 12

### Vocabulary

|                      |                         |                                      |
|----------------------|-------------------------|--------------------------------------|
| pressure             | STP                     | combined gas law                     |
| barometer            | ideal gas law           | molar volume                         |
| atmospheric pressure | temperature (K, °C, °F) | Dalton's law                         |
| atmosphere           | Charles' law            | vapor pressure correction over water |
| mm Hg                | absolute zero           | kinetic molecular theory (KMT)       |
| torr                 | Kelvin scale            | diffusion                            |
| kilopascal           | Boyle's law             |                                      |
| psi                  | Gay-Lussac's law        |                                      |

### Calendar *Note: \*\*Outline is Optional\*\**

0°C = 273K

1L = 1000mL

1atm = 760mmHg = 760 torr = 29.92 inHg = 101.3 kPa = 14.7 psi

-Always make sure the temperature is in KELVIN.

-Did I mention?? Always make sure the temperature is in KELVIN.

-What if it wants the answer in Celcius? Use Kelvin in the equation and then convert back to Celsius.

| M 2/16    | T 2/17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | W 2/18                                                                                      | Th 2/19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | F 2/20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| NO SCHOOL | <p><b>Due Today:</b></p> <p>-Once you finish <a href="#">Online Hwk#41 Upload it Here</a></p> <p><b>Today:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Show Mole Island Updated Handout</a></li> <li>• Quick Temp Ppt (0°C = 273K)</li> <li>• Charles' Law (<math>V_1/T_1 = V_2/T_2</math>)</li> <li>• <a href="#">CSU Online Homework #41</a> OR <a href="#">Jaffe Online #26</a> OR <a href="#">HenryHigh Online Homework #26</a></li> <li>• <b>Notes:</b><br/>**<a href="#">Video Help#1</a><br/>**<a href="#">Video Help#2</a></li> <li>• If time....Charles' Lab Activity (one per group)</li> </ul> <p><i>Demo: (Charles' Law)</i><br/>-Dime on top of 250mL Volumetric Flask<br/>-Birthday candle in petri dish with water....invert test tube over candle (teacher only to save time)</p> <p><b>HW:</b></p> <p>-Finish Online Hwk</p> | <p><b>Today:</b></p> <ul style="list-style-type: none"> <li>• Unit 7 Test Retake</li> </ul> | <p><b>Due Today:</b></p> <p>-Once you finish <a href="#">Online Hwk#40 Upload it Here</a></p> <p><b>Today:</b></p> <ul style="list-style-type: none"> <li>• Middle ear and altitude changes <a href="#">Video</a></li> <li>• Units of Pressure (1 atm = 760 torr)</li> <li>• Boyle's Law (<math>P_1V_1 = P_2V_2</math>)</li> <li>• <a href="#">CSU Online Homework #40</a> OR <a href="#">Jaffe Online #25</a> OR <a href="#">HenryHigh Online Homework #25</a></li> <li>• <b>Notes:</b><br/>**<a href="#">Video Help#1</a><br/>**<a href="#">Video Help#2</a></li> </ul> <p><i>Demo: (Pressure)</i><br/>-Water staying in straw when place finger on top<br/>-Wind up straw and flick it<br/>-Squeeze 500ml water bottle and flick off cap<br/>(Boyle's Law)<br/>-<a href="#">Boyle's Law &amp; Respiration</a><br/>-<a href="#">Boyle's Law &amp; the Lungs</a><br/>-<a href="#">Dog Popper</a> (Boyle's Law)</p> <p><b>HW:</b></p> <p>-Finish Online Hwk</p> | <p><b>Today:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Review of Module One</a> Video</li> <li>• <a href="#">Ice Cream Video</a></li> <li>• TUPE <a href="#">Lesson</a> Module 2<br/>-<a href="#">PG &amp; VG</a> (Typical PG/VG ratio is 50:50, but more VG results in thicker juice and denser cloud Ex 30PG:70VG)<br/>-<a href="#">PG/VG Tied to Lung Damage</a> (<a href="#">Listen</a> from 20:00-25:00min or <a href="#">Wired</a> article)</li> <li>• <a href="#">Nicotine in a Pod</a></li> <li>• <a href="#">Vaping &amp; Your Lungs</a> <ol style="list-style-type: none"> <li>1. <a href="#">Vitamin E &amp; THC Vaping</a><br/>*Show example of Vitamin E capsules</li> <li>2. <a href="#">NBC video</a></li> </ol> </li> <li>• <a href="#">TUPE Post-Survey Link</a></li> </ul> <p>If time remains:</p> <ul style="list-style-type: none"> <li>• Avogadro's Law (<math>V_1/n_1 = V_2/n_2</math>) using <a href="#">Jaffe Online #24</a> OR <a href="#">HenryHigh Online Homework #24</a></li> </ul> |

| M 2/23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | T 2/24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | W 2/25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Th 2/26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | F 2/27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <b>Today:</b> <ul style="list-style-type: none"> <li>Gay Lussac's Law (<math>P_1/T_1 = P_2/T_2</math>)</li> <li>Can Crush ActivInspire Activity OR <a href="#">Can Crush Demo Video</a></li> <li>Can Crush Video (from several years ago)</li> <li><a href="#">Rail tanker safety</a></li> <li><a href="#">Train tanker video online</a></li> <li>MythBusters Train Tanker Implosion <a href="#">Intro</a> Only 0-55sec, <a href="#">Part I</a> (all), and <a href="#">Part II</a> (1:40-3:20sec)</li> <li>Notes: <b>**Video Help#1</b></li> </ul> <b>HW:</b><br>-Finish Online Hwk | <b>Due Today:</b><br>-Once you finish <a href="#">Online Hwk#43 Upload it Here</a><br><b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">The Deep Sea &amp; Article</a></li> <li>Combined Gas Law<br/> <math display="block">\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}</math> </li> <li><a href="#">Gas Law Review Practice Problems Part I</a> OR <a href="#">CSU Online Homework #43</a> OR <a href="#">Jaffe Online #27</a> OR <a href="#">HenryHigh Online Homework #27</a></li> <li>Notes: <b>**Video Help#1</b><br/><b>**Video Help#2</b></li> <li>If necessary: Combined Gas Law Ppt (Prob#1-3)</li> </ul> <i>Demo: (GLs Law)</i><br>-Egg in Bottle<br>-Blow up Balloon in bottle<br><b>HW:</b><br>-Finish Online Hwk<br>-Watch Video <a href="#">10.2 (Pressure)</a><br>-Watch Video <a href="#">10.5a</a> , <a href="#">10.5b</a> , <a href="#">10.5c</a> , <a href="#">10.5d</a> , <a href="#">10.5e</a> (Ideal Gas Law) | <b>Due Today:</b><br>-Once you finish <a href="#">Online Hwk#44 Upload it Here</a><br><b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">STP Video</a></li> <li><a href="#">Real Gases Video</a></li> <li><a href="#">Ideal Gas Law CSU Online Hwk#44</a> OR <a href="#">Jaffe Online #28</a> OR Ideal Gas Law Ppt (**Use either their "R" value OR 0.08206 Latm/molK)<br/>               *If the Online Hwk link isn't working, use this <a href="#">backup video link for Online Hwk#44</a></li> </ul> <i>Demo:</i><br>-Empty 2L bottle (or 500mL water bottle) w/o vortex, w/ vortex, & w/ hole punched in bottom<br><b>HW:</b><br>-Finish Online Hwk | <b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">Gas Law Review Practice Problems Part II</a></li> <li>Knuckle Cracking <a href="#">Video</a></li> <li>Scuba diving &amp; Gas Law <a href="#">Video</a><br/>               -145m assisted dive <a href="#">video</a><br/>               -136m free dive <a href="#">video</a> (2 months later same diver <a href="#">blackouts</a> on ascent)</li> <li><a href="#">Lawn Chair Larry</a></li> <li>If time: <a href="#">Annenberg Chemistry Video - "Behavior of Atoms" (~30min)</a></li> </ul> <i>Demo:</i><br>- <a href="#">Marshmallows &amp; Boyle's Law</a><br>- <a href="#">Bike Pump with Syringe</a><br><b>HW:</b><br>- <a href="#">Self-test</a> | <b>Due Today:</b><br>-Once you finish <a href="#">Gas Stoich Mini-WS Upload it Here</a><br><b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">Gas Stoichiometry Mini-WS (KEY)</a><br/>               -These are very good problems because they relate PV=nRT (the ideal gas law) back to stoichiometry. (Make sure to first balance the equations before solving the problem.)</li> <li>KMT - How do gas molecules behave?</li> </ul> <i>Demo: (to explain KMT)</i><br>-Handboilers w/ & w/o ice<br>-Canning Jar & Surface Tension<br><b>HW:</b><br>- <a href="#">Self-test</a> |
| M 3/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | T 3/3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | W 3/4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Th 3/5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | F 3/6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Due Today:</b><br>-Once you finish <a href="#">PV=nRT Mini-Lab Upload it Here</a><br><b>Today:</b> <ul style="list-style-type: none"> <li>PV=nRT mini-Lab ActivInspire</li> </ul> <b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul>                                                                                                                                                                                                                                                                                                         | <b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">Partial Pressure &amp; Gas Collection over Water Video</a><br/>               **Reference p227 in Tro Chem Book</li> <li>Optional: <a href="#">Gas Law Review Practice Problems Part III</a><br/>               (uses prob#2 from Gas Stoich Mini-WS in simpler form)</li> </ul> <i>Demo:</i><br>-Cup/Card Demo<br><b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">AP Prob – 1971 Gas Collection over Water</a> (Here is the <a href="#">KEY</a>)</li> <li>Overview Lab: Percent NaHCO<sub>3</sub> in Alka Seltzer</li> </ul> <i>Demo:</i><br>-Blow Dryer & Balloon w/ Penny (Bernoulli Principle)<br><b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul>                                                                                                                                                                                                                                                                             | <b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">CA Healthy Kids Survey</a></li> </ul> OR <ul style="list-style-type: none"> <li><del><a href="#">Beer-Lambert Law PhET</a></del></li> <li>Work on <a href="#">Beer's Law Tutorial WS</a> (Activity 1-3)</li> </ul> <b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul>                                                                                                                                                                                                                                                                                                                                              | <b>Due Today:</b><br>-Once you finish <a href="#">Alka Seltzer Lab Upload it Here</a><br><b>Today:</b> <ul style="list-style-type: none"> <li>Perform Alka Seltzer Lab</li> </ul> <i>Demo:</i><br>-2L bottle w/ 3 holes<br><b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul>                                                                                                                                                                                                                                                                              |

| M 3/9                                                                                                                                                                                                                                                                            | T 3/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | W 3/11                                                                                                                                                                                                                     | Th 3/12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | F 3/13                                                                      |
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| NO SCHOOL                                                                                                                                                                                                                                                                        | <b>Today:</b> <ul style="list-style-type: none"> <li><a href="#">Ideal Gas Law Video &amp; Variations of PV=nRT</a> <ul style="list-style-type: none"> <li>-Molar Mass (<math>PV=nRT/MM</math>)</li> <li>-Density (<math>MM=dRT/P</math>)</li> </ul> </li> <li>Overview Lab: Percent <math>CaCO_3</math> in Tums (Informal Lab)</li> </ul> <i>Demo:</i> <ul style="list-style-type: none"> <li>-Handboilers showing distillation process (Relate to SmartWater &amp; how 1st ingredient states "Vapor Distilled Water")</li> </ul> <b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul> | <b>Today:</b> <ul style="list-style-type: none"> <li>Lab: Percent <math>CaCO_3</math> in Tums</li> <li>Work on Self-Test</li> </ul> <b>HW:</b> <ul style="list-style-type: none"> <li><a href="#">Self-test</a></li> </ul> | <b>Due Today:</b> <ul style="list-style-type: none"> <li>Once you finish <a href="#">Self-test Upload it Here</a> (<a href="#">KEY</a>)</li> </ul> <b>Today:</b> <ul style="list-style-type: none"> <li>Work on Self-Test</li> <li><a href="#">Self-test Version 2</a> (Here is the <a href="#">KEY</a>)</li> </ul> <i>Demo:</i> <ul style="list-style-type: none"> <li>-Bike Pump and bottle w/ small amt of rubbing alcohol (makes a cloud – only do ~10 pumps &amp; hold down stopper)</li> </ul> <b>HW:</b> <ul style="list-style-type: none"> <li>Study for unit test</li> </ul> | <b>Today:</b> <ul style="list-style-type: none"> <li>Unit 8 Test</li> </ul> |
| M 3/16                                                                                                                                                                                                                                                                           | T 3/17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                             |
| <b>Today:</b> <ul style="list-style-type: none"> <li>Go over Tests</li> <li>Pipette Diver Activity (ActivInspire)</li> </ul> <i>-Fizz Keeper Expt #13 ("World's Simplest Cartesian Diver")</i><br><b>HW:</b> <ul style="list-style-type: none"> <li>-Study for retake</li> </ul> | <b>Today:</b> <ul style="list-style-type: none"> <li>Built in Buffer Day in case of fire drill, assembly, etc.</li> <li>Possibly start Unit 9</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                             |