**Gas Laws**
<http://www.unit5.org/chemistry/Stoichiometry.htm>

**Learning Objectives/Targets** Worksheet / Lab

GAS LAWS

11.1 PROPERTIES OF GASES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To list five observed properties of a gas.*

11.2 ATMOSPHERIC PRESSURE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To state standard atmospheric pressure in the following units: atm, mm Hg, torr, cm Hg, in. Hg, psi, and kPa.
 • To convert a given gas pressure into a different unit of measurement.*

11.3 VARIABLES AFFECTING GAS PRESSURE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To identify the three variables that affect the pressure of a gas.
 • To state whether gas pressure increases or decreases for a given change in the volume, the temperature, or the number of moles of gas.*

11.4 BOYLE’S LAW \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To sketch a graph of the pressure-volume relationship for a gas.
 • To calculate the pressure or volume of a gas after a change in conditions.*

11.5 CHARLES’S LAW \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To sketch a graph of the volume-temperature relationship for a gas.
 • To calculate the volume or temperature of a gas after a change in conditions.*

11.6 GAY-LUSSAC’S LAW \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To sketch a graph of the pressure-temperature relationship for a gas.
 • To calculate the pressure or temperature of a gas after a change in conditions.*

 11.7 COMBINED GAS LAW \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To calculate the pressure, volume, or temperature of a gas after a change in conditions.*

11.8 THE VAPOR PRESSURE CONCEPT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To explain the concept of vapor pressure.
 • To state the relationship of vapor pressure and temperature.*

11.9 DALTON’S LAW \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To apply Dalton’s law of partial pressures to a mixture of gases.*

11.10 IDEAL GAS BEHAVIOR \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To list five characteristics of an ideal gas according to the kinetic theory of gases.
 • To determine the value of absolute zero from a graph of volume or pressure versus temperature.*

11.11 IDEAL GAS LAW \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 *• To calculate the pressure, volume, temperature, or moles of gas, from the ideal gas equation.
 • To calculate the molar mass of a gas from the ideal gas equation.*

**Vocabulary**

|  |  |  |  |
| --- | --- | --- | --- |
|  Avogadro’s principle | diffusion | ideal gas law | pressure |
|  barometer | effusion | kinetic molecular theory | standard temperature and pressure (STP) |
|  Boyle’s Law | Graham’s Law | manometer | Dalton’s Law of partial pressure |
|  Charles’s Law | greenhouse effect | mutagen | vapor pressure |
|  chlorofluorocarbons (CFC’s) | diffusion | ozone depletion | volatile |
|  combined gas law | ideal gas | partial pressure |  |

**Labs/Activities**

|  |  |
| --- | --- |
| (1) [Reaction of Magnesium with Hydrochloric Acid](http://www.unit5.org/chemistry/Gas/Word/7mghcllab.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7mghcllab.pdf)  |  (3) [Ammonia Fountain](http://www.unit5.org/chemistry/Ammonia%20Fountain.htm)  |
| (2) [Molar Volume of Magnesium Lab Simulation](http://www.chemfiles.com/flash/hydrogen_lab.html) |  (4) [Gas Demonstrations](http://www.unit5.org/chemistry/Gas/Word/7Gas%20%20Demos.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7Gas%20%20Demos.pdf)  |

**Worksheets**

|  |  |
| --- | --- |
|  (5) [Vocabulary - The Gas Laws](http://www.unit5.org/chemistry/Gas/Word/7Vocab%20Gas.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7Vocab%20Gas.pdf) | (14) [Gas Laws with One Term Constant](http://www.unit5.org/chemistry/Gas/Word/7gasoneconst.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7gasoneconst.pdf)  |
|  (6) [Unit Conversions for the Gas Laws](http://www.unit5.org/chemistry/Gas/Word/7gasconv.docx) [pdf](http://www.unit5.org/chemistry/Gas/PDF/7gasconv.pdf) | (15) [Dalton's Law of Partial Pressures](http://www.unit5.org/chemistry/Gas/Word/7daltonslaw.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7daltonslaw.pdf)  |
|  (7) [The Combined Gas Law](http://www.unit5.org/chemistry/Gas/Word/7combined.docx) [pdf](http://www.unit5.org/chemistry/Gas/PDF/7combined.pdf) | (16) [Vapor Pressure and Boiling](http://www.unit5.org/chemistry/Gas/Word/7VaporPressureBoiling.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7VaporPressureBoiling.pdf)  |
|  (8) [Manometers](http://www.unit5.org/chemistry/Gas/Word/Manometers.docx) [pdf](http://www.unit5.org/chemistry/Gas/PDF/Manometers.pdf) | (17) [Behavior of Gases](http://www.unit5.org/chemistry/Gas/Word/7gasbehav.doc.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7gasbehav.doc.pdf) |
|  (9) [Density of Gases](http://www.unit5.org/chemistry/Gas/Word/7gasdenshw.docx) [Table](http://www.unit5.org/chemistry/Gas/Word/7gasdenstab.docx) [pdf](http://www.unit5.org/chemistry/Gas/PDF/7gasdenshw.pdf)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7gasdenstab.pdf) | (18) [Gas Laws Review/Mole](http://www.unit5.org/chemistry/Gas/Word/7Gas%20Laws%20ReviewName.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7Gas%20Laws%20ReviewName.pdf) |
| (10) [Graham's Law](http://www.unit5.org/chemistry/Gas/Word/7grahamshw.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7grahamshw.pdf) | (19) [Review Problems for the Gas Laws](http://www.unit5.org/chemistry/Gas/Word/7revprobs.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7revprobs.pdf) |
| (11) [Ideal Gas Law](http://www.unit5.org/chemistry/Gas/Word/7idealgaslaw.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7idealgaslaw.pdf) | (20) [Textbook Questions](http://www.unit5.org/chemistry/NEW%20Text%20Questions/u9tqs_0910.docx)  [pdf](http://www.unit5.org/chemistry/NEW%20Text%20Questions/u9tqs_0910.pdf) |
| (12) [Practice Problems for the Gas Laws](http://www.unit5.org/chemistry/Gas/Word/7mixprobs.docx)  [pdf](http://www.unit5.org/chemistry/Gas/PDF/7mixprobs.pdf) | (21) [Video - Crisis in the Atmosphere](http://www.unit5.org/chemistry/Gas/Word/Crisis%20in%20the%20Atmosphere.htm)  pdf |
| LECTURE OUTLINE: [Unit 10 Notes - Gas Laws](http://www.unit5.org/chemistry/Outlines/u9ohnotes18f2005.docx)  [pdf](http://www.unit5.org/chemistry/Outlines/u9ohnotes18f2005.pdf)  (25 pages) ([students](http://www.unit5.org/chemistry/Outlines/Student%20Notes/u9lectout.docx))  [pdf](http://www.unit5.org/chemistry/Outlines/Student%20Notes/u9lectout.pdf) |

 **Calendar**

Day 1 – Greenhouse Effect (5)
Day 2 – Ozone
Day 3 – Unit Conversions for the Gas Laws (6) [WEBSITE for Chemistry Textbook](http://wps.prenhall.com/esm_corwin_chemistry_4/16/4164/1066178.cw/index.html)
Day 4 – Introduce Gas Laws (11), (7)
Day 5 – Manometers and Barometers (8)
Day 6 – Combined Gas Law (7), (14)
Day 7 – Ideal Gas Law (11)
Day 8 – Gas Demonstrations
Day 9 – Gas Stoichiometry (12), (19), (1)
Day 10 – QUIZ: Gas Laws
Day 11 – Dalton’s Law of Partial Pressures (15)
Day 12 – Eggsplosion
Day 13 – LAB: Mg + HCl (1), (2)
Day 14 – Graham’s Law of Diffusion (10)
Day 15 – Density of Gases (9)
Day 16 – Bernoulli’s Principle (3), (12)
Day 17 – TEST: Gas Laws
Day 18 – Post Test

UNIT 10 – Gas Laws
Honors Chemistry