**Acids and Bases**   
<http://www.unit5.org/chemistry/Acids.htm>

**Learning Objectives/Targets** Worksheet / Lab

ACIDS AND BASES

15.1 PROPERTIES OF ACIDS AND BASES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To list the general properties of acids and bases.  
 • To classify a solution of given pH as strongly acidic, weakly acidic, neutral, weakly basic, or strongly basic.*

15.2 ARRHENIUE ACIDS AND BASES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To identify strong and weak Arrhenius acids and bases, given the degree of ionization in aqueous solution.  
 • To identify the Arrhenius acid and base that react to produce a given salt.*

15.3 BRONSTED-LOWRY ACIDS AND BASES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To identify the Brønsted-Lowry acid and base in a given neutralization reaction.*

15.4 ACID-BASE INDICATORS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To state the color of the following indicators in a solution of a given pH: phenolphthalein, methyl red, and bromthymol blue.*

15.5 ACID-BASE TITRATIONS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To perform stoichiometry calculations that involve acid-base titrations.  
 • To convert the molarity of an acid or base to mass percent concentration.*

15.6 ACID-BASE STANDARDIZATION \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To perform stoichiometry calculations that involve a standard acid or base solution.*

15.7 IONIZATION OF WATER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To relate the ionization constant of water to [H+] and [OH-].  
 • To calculate the molar hydroxide ion concentration, given the [H+].*

15.8 THE pH CONCEPT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To explain the concept of pH.  
 • To relate integer pH values and the [H+] of a solution.*

15.9 ADVANCED pH CALCULATIONS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   
 *• To relate fractional pH values and the [H+] of a solution.*

15.10 STRONG AND WEAK ELECTROLYTES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To illustrate a strong and weak electrolyte in aqueous solution.*

15.11 NET IONIC EQUATIONS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write a total ionic and net ionic equation for a given chemical reaction.*

**Vocabulary**

|  |  |  |  |
| --- | --- | --- | --- |
| acid | base | hydronium ion | neutralization reaction |
| acid dissociation constant, Ka | buffer | hydroxide ion | pH |
| equilibrium constant, Keq | diprotic acid | indicator | polyprotic acid |
| water dissociation constant, Kw | equilibrium | Le Chatelier’s principle | reversible reaction |
| amphiprotic | hydrogen ion | monoprotic acid | titration |

**Labs/Activities**

|  |  |
| --- | --- |
| (1) [Synthesis of Aspirin Lab](http://wwwchem.csustan.edu/chem1002/aspirin.htm)  (external link) | (4) [Acid Rain Experiment](http://www.unit5.org/chemistry/Acids/Word/1Acid%20Rain.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1Acid%20Rain.pdf) |
| (2) [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) | (5) Dilution 10x activity  [Part 2](http://www.unit5.org/chemistry/christjs/Acid-Base%20Lab--Part%202.doc) |
| (3) [The Neutralizing Ability of an Antacid Tablet Lab](http://wwwchem.csustan.edu/chem1002/antacid.htm)  (ext.) |  |

**Worksheets**

|  |  |
| --- | --- |
| (6) [Vocabulary - Acids and Bases](http://www.unit5.org/chemistry/Acids/Word/1vocabacidbase.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1vocabacidbase.pdf) | (11) [Aspirin Article questions](http://www.unit5.org/chemistry/Acids/Word/1aspirinart.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1aspirinart.pdf) |
| (7) [pH and pOH Calculations](http://www.unit5.org/chemistry/Acids/Word/1phpohws.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1phpohws.pdf) | (12) [Textbook Ch 12 Chemical Equilibrium](http://www.unit5.org/chemistry/Acids/Word/1eqtextqs.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1eqtextqs.pdf) |
| (8) [Practice Problems - Answer Key](http://www.unit5.org/chemistry/Acids/Word/1Practice%20Problems.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1Practice%20Problems.pdf) | (13) [Video:  The Future of the Past](http://www.unit5.org/chemistry/Acids/Word/1futurepast.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1futurepast.pdf) |
| (9) [Aqueous Acids and Bases Titration](http://www.unit5.org/chemistry/Acids/Word/1titration.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1titration.pdf) | (14) [Ch 15 Modern Chemistry textbook questions](http://www.unit5.org/chemistry/Acids/Word/abtextqs%5b1%5d.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/abtextqs%5b1%5d.pdf) |
| (10) [Weak Acid, pKa](http://www.unit5.org/chemistry/Acids/Word/1Lesson%20Weak%20Acid.docx)  [pdf](http://www.unit5.org/chemistry/Acids/PDF/1Lesson%20Weak%20Acid.pdf) | (15) [Textbook Questions](http://www.unit5.org/chemistry/NEW%20Text%20Questions/u11tqs_0910.docx)  [pdf](http://www.unit5.org/chemistry/NEW%20Text%20Questions/u11tqs_0910.pdf) |
| LECTURE OUTLINE: [Unit 12 Notes - Acids and Bases](http://www.unit5.org/chemistry/Outlines/u11ohnotes18f2005.docx)  [pdf](http://www.unit5.org/chemistry/Outlines/u11ohnotes18f2005.pdf)  (27 pages) ([students](http://www.unit5.org/chemistry/Outlines/Student%20Notes/u11lectout.docx))  [pdf](http://www.unit5.org/chemistry/Outlines/Student%20Notes/u11lectout.pdf) | |

**Calendar**  
  
Day 1 – pH Calculations (7)  
Day 2 – pH PowerPoint (6)  
Day 3 – pH PowerPoint [WEBSITE for Chemistry Textbook](http://wps.prenhall.com/esm_corwin_chemistry_4/16/4165/1066418.cw/index.html)  
Day 4 – Acid Dissociation (7)  
Day 5 – Weak Acids (10)  
Day 6 – Conjugate Acid-Base Pairs (8)  
Day 7 – Video: The Proton in Chemistry (11)  
Day 8 – Titration  
Day 9 – LAB: Titration (9)  
Day 10 – LAB: Aspirin Synthesis (1)  
Day 11 – Titration Calculations (9)  
Day 12 – LAB: Titration  
Day 13 – Review Day  
Day 14 – TEST: Acids and Bases   
Day 15 – Video: The Future of the Past (13)

UNIT 12 – Acids and Bases  
Honors Chemistry