**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