**Nomenclature** & Bonding  
<http://www.unit5.org/chemistry/Nomenclature.htm>

**Learning Objectives/Targets** Worksheet / Lab

NOMENCLATURE and BONDING

7.1 CLASSIFICATION OF COMPOUNDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To classify a compound as a binary ionic, a ternary ionic, or a binary molecular compound.  
 • To classify an acid as a binary acid or a ternary oxyacid.  
 • To classify an ion as a monoatomic cation, a monoatomic anion, a polyatomic cation, or a polyatomic anion.*  
  
7.2 MONOATOMIC IONS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write systematic names and formulas for common monoatomic ions.  
 • To predict the ionic charge for ions of representative elements.*   
  
7.3 POLYATOMIC IONS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write systematic names and formulas for common polyatomic ions.*  
  
7.4 WRITING CHEMICAL FORMULAS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write formula units for compounds composed of monoatomic and polyatomic ions.*  
  
7.5 BINARY IONIC COMPOUNDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To determine the ionic charge on a cation in a binary ionic compound.  
 • To write systematic names and formulas for binary ionic compounds.*  
  
7.6 TERNARY IONIC COMPOUNDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To determine the ionic charge on a cation in a ternary ionic compound.  
 • To write systematic names and formulas for ternary ionic compounds.*  
  
7.7 BINARY MOLECULAR COMPOUNDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write systematic names and formulas for binary molecular compounds.*  
  
7.8 BINARY ACIDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write systematic names and formulas for binary acids.*   
  
7.9 TERNARY ACIDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To write systematic names and formulas for ternary oxyacids.*   
  
12.1 THE CHEMICAL BOND CONCEPT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To explain the concept of a chemical bond.  
 • To predict whether a bond is ionic or covalent.*12.2 IONIC BONDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To describe the formation of an ionic bond between a metal atom and a nonmetal atom.*12.3 COVALENT BONDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To describe the formation of a covalent bond between two nonmetal atoms.*12.4 ELECTRON DOT FORMULAS OF MOLECULES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To draw the electron dot formula for a molecule.  
 • To draw the structural formula for a molecule.*12.5 ELECTRON DOT FORMULAS OF PLYATOMIC IONS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To draw the electron dot formula for a polyatomic ion.  
 • To draw the structural formula for a polyatomic ion.*12.6 POLAR COVALENT BONDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To describe and identify a polar covalent bond.  
 • To state the electronegativity trends in the periodic table.  
 • To apply delta notation (http://wps.prenhall.com/wps/media/objects/1041/1066238/delta.GIF+ and http://wps.prenhall.com/wps/media/objects/1041/1066238/delta.GIF-) to a polar bond.*12.7 NONPOLAR COVALENT BONDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To describe and identify a nonpolar covalent bond.  
 • To identify seven elements that occur naturally as diatomic molecules: H2, N2, O2, F2, Cl2, Br2, I2.*12.8 COORDINATE COVALENT BONDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To describe and identify a coordinate covalent bond.*12.9 SHAPES OF MOLECULES \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 *• To determine the shape of a molecule by applying VSEPR theory.  
 • To explain how a molecule with polar bonds can be nonpolar.*

**Vocabulary** – Chemical Bonds

|  |  |  |  |
| --- | --- | --- | --- |
| octet rule | monatomic ion | polar covalent bond | molecular formula |
| cation | binary compound | hydrogen bond | polymer |
| anion | polyatomic ions | single bond | structural formula |
| ionic compound | covalent bond | Lewis structure | organic compound |
| salt | molecular compound | double bond |  |
| crystal lattice | nonpolar covalent bond | triple bond |  |

**Labs/Activities**

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| (1) [Chemical Bonding Activity (pink/blue)](http://www.unit5.org/chemistry/Nomenclature/Word/4bondingact.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4bondingact.pdf) | (4) [Animation of Balancing an Ionic Formula](http://www.chemfiles.com/flash/formulas.html) |
| (2) [*Chemical Bonding Activity Pieces*](http://www.unit5.org/chemistry/Nomenclature/Word/Chemical%20Bonding%20Activity%20pieces.docx)[pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/Chemical%20Bonding%20Activity%20pieces.pdf) | (5) [Polyatomic Ion Flash Cards](http://www.unit5.org/chemistry/Nomenclature/PowerPoint/PolyatomicIonsCards.pptx) & [digital flash cards](http://jchemed.chem.wisc.edu/JCEDLib/WebWare/collection/open/JCE2005WWOR002/nom/nom1.html) |
| (3) [Molecular Model's Activity](http://www.unit5.org/chemistry/Nomenclature/Word/4modellab.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4modellab.pdf) | (6) [Formula of a Hydrate](http://www.unit5.org/chemistry/Labs_and_Activities/Hydrate%20Lab/Hydrate%20Lab.docx)  [PowerPoint](http://www.unit5.org/chemistry/Labs_and_Activities/Hydrate%20Lab/Hydrate%20Lab.pptx)  [pdf](http://www.unit5.org/chemistry/Labs_and_Activities/Hydrate%20Lab/Hydrate%20Lab.pdf) (7) [Molecular Model's Activity](http://www.unit5.org/chemistry/Labs_and_Activities/Bonding%20Activity/4modellab.docx)  [pdf](http://www.unit5.org/chemistry/Labs_and_Activities/Bonding%20Activity/4modellab.pdf)   [PowerPoint](http://www.unit5.org/chemistry/Labs_and_Activities/Bonding%20Activity/Molecular%20Models%20Activity.pptx) |

**Worksheets**

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| --- | --- |
| (6) [Criss-cross Grid of Ions](http://www.unit5.org/chemistry/Nomenclature/Word/4charthw.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4charthw.pdf) | (20) [Ions in Chemical Formulas](http://www.unit5.org/chemistry/Nomenclature/Word/4Ions%20in%20Chemical%20Formulas.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Ions%20in%20Chemical%20Formulas.pdf) |
| (7) [Nomenclature Packet (6 pages)](http://www.unit5.org/chemistry/Nomenclature/Word/4u5bighw.docx) [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4u5bighw.pdf" \t "_blank)[*Bonding*](http://www.unit5.org/chemistry/Nomenclature/Word/4u6bighw.docx)[pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4u6bighw.pdf) | (21) [Empirical and Molecular Formulas](http://www.unit5.org/chemistry/Nomenclature/Word/4Empirical%20&%20Molecular%20Formulas.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Empirical%20&%20Molecular%20Formulas.pdf)  [II](http://www.unit5.org/chemistry/Nomenclature/Word/4empformws.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4empformws.pdf) |
| (8) [Bonding](http://www.unit5.org/chemistry/Nomenclature/Word/4Bonding.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Bonding.pdf) | (22) [Ionic Formula (Bin., Poly, Trans. Metals)](http://www.unit5.org/chemistry/Nomenclature/Word/4ionicformws.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4ionicformws.pdf) |
| (9) [Names and Formulas of Compounds](http://www.unit5.org/chemistry/Nomenclature/Word/4nameformws.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4nameformws.pdf) | (23) [Errors Chemical Formulas & Nomenclature](http://www.unit5.org/chemistry/Nomenclature/Word/4errors.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4errors.pdf) |
| (10 ) [Binary Compounds](http://www.unit5.org/chemistry/Nomenclature/Word/4bincomphw.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4bincomphw.pdf) | (24) [Oxidation Numbers and Ionic Compounds](http://www.unit5.org/chemistry/Nomenclature/Word/4chargews.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4chargews.pdf) |
| (11) [Ionic Binary Cmpds:  Single-Charge Cations](http://www.unit5.org/chemistry/Nomenclature/Word/4Binary%20Single%20Charge.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Binary%20Single%20Charge.pdf) (12) [Ionic Binary Cmpds:  Multiple Charge Cations](http://www.unit5.org/chemistry/Nomenclature/PDF/4Ionic%20Cmpds%20Multiple%20Charge.pdf)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Ionic%20Cmpds%20Multiple%20Charge.pdf) (13) [Ionic Compounds:  Polyatomic Ions](http://www.unit5.org/chemistry/Nomenclature/Word/4Ionic%20Polyatomic.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Ionic%20Polyatomic.pdf) (14) [Polyatomic Ions w Multiple-Charge Cations](http://www.unit5.org/chemistry/Nomenclature/Word/4Ionic%20Cmpds%20Multiple%20Charge.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Ionic%20Cmpds%20Multiple%20Charge.pdf)  (15) [Traditional System of Nomenclature](http://www.unit5.org/chemistry/Nomenclature/Word/4Ionic%20Cmpds%20Traditional.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Ionic%20Cmpds%20Traditional.pdf)  (16) [Covalent Binary Cmpds:  Nonmetal-Nonmetal](http://www.unit5.org/chemistry/Nomenclature/Word/4Covalent%20Binary%20Nonmetal.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Covalent%20Binary%20Nonmetal.pdf) (17) [*Chart of the Ions and Polyatomic Ions*](http://www.unit5.org/chemistry/Nomenclature/Word/4ionchart.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4ionchart.pdf)    (18) [*Polyatomic Ions Grid to Memorize*](http://www.unit5.org/chemistry/Nomenclature/Word/Polyatomic%20Ion.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/Polyatomic%20Ion.pdf) | (25) [Ionic Compounds](http://www.unit5.org/chemistry/Nomenclature/Word/4Bonding.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4Bonding.pdf) (26) [Vocabulary:  Chemical Bonds](http://www.unit5.org/chemistry/Nomenclature/Word/4u5vocab.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4u5vocab.pdf) (27) [Ch 5 Study Guide questions](http://www.unit5.org/chemistry/Nomenclature/Word/4ch5qs.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4ch5qs.pdf) (28) [Ch 6 Study Guide questions](http://www.unit5.org/chemistry/Nomenclature/Word/4ch6qs.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4ch6qs.pdf) (29) [Test Review](http://www.unit5.org/chemistry/Nomenclature/Word/4testrev9899.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/4testrev9899.pdf) (30) [Textbook Questions](http://www.unit5.org/chemistry/Outlines/Text%20Notes%20-%20General/u5textnotes.docx)  [pdf](http://www.unit5.org/chemistry/Outlines/Text%20Notes%20-%20General/u5textnotes.pdf) (31) [Molar Mass and Percentage Composition](http://www.unit5.org/chemistry/Formula/Word/Molar%20Mass%20Percent.docx)  [pdf](http://www.unit5.org/chemistry/Formula/PDF/Molar%20Mass%20Percent.pdf) (32) [Empirical and Molecular Formulas](http://www.unit5.org/chemistry/Formula/Word/Percent%20Comp%20Emp%20Mol.docx)  [pdf](http://www.unit5.org/chemistry/Formula/PDF/PercentCompEmpMol.pdf) |
| LECTURE OUTLINE: [Unit 5 Notes - Nomenclature](http://www.unit5.org/chemistry/Nomenclature/Word/u5ohnotes18f2005.docx)  [pdf](http://www.unit5.org/chemistry/Nomenclature/PDF/u5ohnotes18f2005.pdf) (13 pages) ([students](http://www.unit5.org/chemistry/Outlines/Student%20Notes/u5lectout.docx))  [pdf](http://www.unit5.org/chemistry/Outlines/Student%20Notes/u5lectout.pdf) | |

**Calendar**

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| --- | --- |
| Day 1 – Criss-Cross Rule (5),(6), (17), (18) | Day 7 – QUIZ: Nomenclature |
| Day 2 – Nomenclature (11), (12), (13), (14) | Day 8 – Empirical Formula (21) |
| Day 3 – Nomenclature Work Day (16) | Day 9 – Work Day (31), (32) |
| Day 4 – Nomenclature Continued (15) | Day 10 – Formula of a Hydrate (6) |
| Day 5 – LAB: Bonding (1), (2), (23), (21), (5) | Day 11 – LAB: Formula of a Hydrate |
| Day 6 – Nomenclature | [WEBSITE for Chemistry Textbook](http://wps.prenhall.com/esm_corwin_chemistry_4/16/4163/1065964.cw/index.html) |

UNIT 5 – Nomenclature & Bonding  
Honors Chemistry