

CHM1032 Study Guide for Test 2 (Chapters 4 & 6)  
*Revised March 11, 2015*

This may NOT be a complete list of what will be on the Test. You must also study class notes, the homework, and the textbook. This is just a study guide to help you.

**Know definitions and identify examples of:** matter, pure substance, elements, compounds, mixtures, homogeneous mixture, heterogeneous mixture, elements names and symbols, physical properties, metals, non-metals, metalloids, periods, groups, atoms, proton, electron, neutron, nucleus, structure of atoms, Rutherford's experiment and results, atomic number, mass number, atomic mass, average atomic mass, isotope, orbital, n=1 energy level or shell, n=2 energy level or shell, etc., changes in electron energy level, valence electrons, octet rule, electron dot symbols, periodic trends, atomic size (radius), ionization energy, cation is a positive ion, anion is a negative ion, fixed charge (atoms that only form one particular charge), variable charge (atoms that can form different charged ions), ionic compound, covalent compound, chemical formula, polyatomic ions, chemical names, Electron Dot Symbols of elements, Electron Dot Structures of compounds, octet rule, single bond, double bond, triple bond, lone pair or nonbonding pair of electrons, bonding pair of electrons, electronegativity, bond polarity, polar molecule, nonpolar molecule, nonpolar covalent bond, polar covalent bond, dipole, electron groups, electron group geometry, molecular geometries of molecules, attractive forces in molecules.

- 1) Know the chemical symbols and English names of elements #1- 38, 47, 48, 50, 53-56, 78-80, 82, 86 - 88, and 92. These will most likely be fill-in-the-blanks.
  - 2) Be able to identify any element as a metal, non-metal, or metalloid.
  - 3) Be able to identify any element as an alkali metal, alkaline earth metal, transition metal, halogen, or noble gas.
  - 4) Be able to identify how many protons or electrons an element has. If given the mass number be able to identify how many neutrons an element has. Be able to identify the mass number if given the element and number of neutrons. Be able to identify the element if given the number of protons.
  - 5) Be able to calculate the average atomic mass of an element.
  - 6) Be able to identify the number of valence electrons an element has for elements #1-20, 31-38, and 49-56.
  - 7) Be able to write the electron dot symbol for any of the elements written in #5 above.
  - 8) Be able to identify periodic trends in atomic radii and ionization energy. For example, given several atoms, identify which has the smallest atomic radius, or which has the highest ionization energy.
  - 9) Know all of the fixed charge ions (ions that form only one specific charge) given in class. Also see table on next page.
  - 10) Given the chemical name of an ionic or covalent compound, be able to write the chemical formula.
  - 11) Given the chemical formula of an ionic or covalent compound, be able to write the systematic name.
- Know common names of compounds given in class.
- 12) Know the names, formulas and charges of the following polyatomic ions:

Hydroxide, ammonium, nitrate, nitrite, chlorate, chlorite, carbonate, bicarbonate, acetate, sulfate, sulfite, bisulfate, bisulfite, phosphate.

- 13) Be able to write the Electron Dot Structures of atoms and of simple molecules.
- 14) Be able to identify which atom in a list has a higher (or lower) electronegativity.
- 15) Be able to identify which atom in a list has a smaller (or larger) radius.
- 16) Be able to identify which atom in a list has a larger (or smaller) ionization energy.
- 17) Be able to identify which atom in a list has a smaller (or larger) metallic character.
- 18) Be able to identify the number of electron groups and electron group geometry of a molecule.

Be able to identify the molecular geometry of a molecule.

- 19) Be able to identify a polar bond and a nonpolar bond.
- 20) Be able to identify a polar molecule and a nonpolar molecule.
- 21) Be able to classify a compound as ionic or covalent.
- 22) Know octet rule and exceptions to the octet rule.
- 23) Know and be able to classify the attractive (intermolecular) forces for any compound.

Polyatomic Ions you must know				
$\text{ClO}_2^-$	chlorite		$\text{NH}_4^+$	ammonium
$\text{ClO}_3^-$	chlorate		$\text{OH}^-$	hydroxide
$\text{NO}_2^-$	nitrite		$\text{C}_2\text{H}_3\text{O}_2^-$	acetate
$\text{NO}_3^-$	nitrate		$\text{PO}_4^{3-}$	phosphate
$\text{SO}_3^{2-}$	sulfite		$\text{HSO}_3^-$	bisulfite
$\text{SO}_4^{2-}$	sulfate		$\text{HSO}_4^-$	bisulfate
$\text{CO}_3^{2-}$	carbonate		$\text{HCO}_3^-$	bicarbonate

# Fixed Charged Ions CHM1032

	1 1A																		
1		2 2A											13 3A	14 4A	15 5A	16 6A	17 7A		
2	3 <b>Li<sup>+</sup></b>														7 <b>N<sup>-3</sup></b>	8 <b>O<sup>-2</sup></b>	9 <b>F<sup>-1</sup></b>		
3	11 <b>Na<sup>+</sup></b>	12 <b>Mg<sup>+2</sup></b>											13 <b>Al<sup>+3</sup></b>		15 <b>P<sup>-3</sup></b>	16 <b>S<sup>-2</sup></b>	17 <b>Cl<sup>-1</sup></b>		
4	19 <b>K<sup>+</sup></b>	20 <b>Ca<sup>+2</sup></b>													33 <b>As<sup>-3</sup></b>	34 <b>Se<sup>-2</sup></b>	35 <b>Br<sup>-1</sup></b>		
5	37 <b>Rb<sup>+</sup></b>	38 <b>Sr<sup>+2</sup></b>														52 <b>Te<sup>-2</sup></b>	53 <b>I<sup>-1</sup></b>		
6	55 <b>Cs<sup>+</sup></b>	56 <b>Ba<sup>+2</sup></b>																	
7	87 <b>Fr<sup>+</sup></b>	88 <b>Ra<sup>+2</sup></b>																	