

Chemistry Unit #1 Review

1. Fill the blanks.

Element	Number of Protons	Atomic Number	Number of Electrons	Atomic Mass	Number of Neutrons
C - 12	6	6	6	12	6
C - 14	6	6	6	14	8
Na - 23	11	11	11	23	12
Sn - 119	50	50	50	119	69
U - 235	92	92	92	235	143
U - 238	92	92	92	238	146

2. If a sample of 3 isotopes of magnesium is determined to have the following composition: 79% Mg - 24; 10% Mg - 25; and 11% Mg - 26, what is the average atomic mass?

$$\begin{array}{l}
 24 \times 0.79 = 18.96 \\
 25 \times 0.1 = 2.5 \\
 26 \times 0.11 = 2.86
 \end{array}
 \left. \vphantom{\begin{array}{l} 24 \\ 25 \\ 26 \end{array}} \right\} 24.32 \text{ g}$$

3. Define the term *Isotope*.

An isotope is a different version of the same element.

a. How does one isotope vary from another isotope of the same type?

(more or less neutrons)

b. Would an isotope of C-14 react the same as an isotope of C-12?

YES. Neutrons don't dictate reactivity
Electrons do (C-12; C-14 have the same # of e⁻)

c. What is a radio-isotope?

An isotope that is RADIOACTIVE (IT WILL DECAY TO A SMALLER ISOTOPE)

4. There are different types of compounds that are formed when atoms bond together. Complete the following chart to show the difference between these types.

Characteristic	Ionic compound	Polar compound	Non-Polar compound
Electronegativity Difference	1.0 - 3.2	0.5 - 1.7	0 - 0.4
Bond type: (ionic or covalent)	ionic	COVALENT	COVALENT
Electrons: (shared or transferred)	transferred	shared	shared
Dissolve in water? (Y or N)	Y	Maybe	N
Boiling Point (high, med., low)	HIGH	MED	LOW
Example:	NaCl	H ₂ O	O ₂

5. Show the bonding for the following compounds:

Compound formula	Type of compound (ionic/molecular)	Lewis dot diagram (show sharing or transfer)	Shape and Bond Angles (if covalent)	Polar or Non-Polar Molecule
CaCl ₂	Cl - 3.0 Ca - 1.0 2.0 (I)		/	/
H ₂ O	O - 3.5 H - 2.1 1.4 PL		109°	Really Bent polar
H ₂ CO	O - 3.5 C - 2.5 H - 2.1 C		120°	Trigonal Planar polar
AlCl ₃			Trigonal planar	Non polar

6. Name the following compounds:

- | | |
|-------------------|------------------------|
| a. NaCl | Sodium chloride |
| b. $Mg_3(PO_4)_2$ | magnesium phosphate |
| c. CaF_2 | calcium fluoride |
| d. $Sr(ClO)_2$ | strontium hypochlorite |
| e. P_2O_5 | diphosphorus pentoxide |
| f. Hg_2SO_3 | mercury (I) sulphite |
| g. CCl_4 | carbon tetrachloride |
| h. $Fe(OH)_2$ | iron (II) hydroxide |
| i. $(NH_4)_2O$ | ammonium oxide |
| j. $CuCH_3COO$ | copper (I) acetate |

7. Identify the chemical formula for the following names:

- | | |
|--------------------------|---------------|
| a. Calcium nitrite | $Ca(NO_2)_2$ |
| b. Iron (III) chloride | $FeCl_3$ |
| c. Hydrochloric acid | HCl |
| d. Magnesium perchlorate | $Mg(ClO_4)_2$ |
| e. Sulphur trioxide | SO_3 |
| f. Gold (I) phosphate | Au_2PO_4 |
| g. Sodium bicarbonate | $NaHCO_3$ |
| h. Argon Gas | Ar |
| i. Chlorine Gas | Cl_2 |
| j. Iron (II) sulphite | $FeSO_3$ |

8. Describe how life would be different if water was a non-polar molecule

- Water would boil at a much lower temp
- No swimming - No drinking through straws

9. What are the similarities and differences between CCl_4 and CF_4 ? In your answer, make reference to shape, polarity, and boiling point.

CF_4 is more polar and will have higher bp
Both Polar, Both tetrahedrals

10. Compare and contrast a polar covalent bond with a non-polar covalent bond. What about them is the same? What is different?

both share, polar doesn't share equally

11. Draw the Lewis structure of a water molecule. Indicate which side of the molecule is slightly positive and which is slightly negative.

