

**Unit 1: Introduction to Chemistry, Organic****Introduction**

- \_\_\_ Define chemistry, branches of chemistry
- \_\_\_ Understand/distinguish between elements and compounds
- \_\_\_ Differentiate chemical symbols, formulas, and equations

**Physical and Chemical Changes**

- \_\_\_ Differentiate physical and chemical processes
  - \_\_\_ 4 indications of chemical change
  - \_\_\_ Physical manipulation vs. phase change (phase change diagram)

**Organic Chemistry**

- \_\_\_ Differentiate organic and inorganic chemistry
- \_\_\_ Name hydrocarbon structures (alkanes, alkenes, alkynes, branched hydrocarbons, alcohols)
  - \_\_\_ Structural formulas, carbon backbone structure, stick structures
- \_\_\_ Model/draw hydrocarbon structures from the name and determine the molecular formula
- \_\_\_ Differentiate a complete combustion reaction from an incomplete reaction, and balance

**Unit 2: Atomic Structure and Periodic Trends****Subatomic Particles**

- \_\_\_ Interpret/model the properties of all subatomic particles.  
(know/understand 3 subatomic particles, their charges and location)
- \_\_\_ Understand/apply mass number, average atomic mass, atomic number
- \_\_\_ Model how and why different atoms of the same element have different masses
  - \_\_\_ Isotopes, nuclear symbols
- \_\_\_ Model/understand how an atom acquires a charge, (protons vs. electrons)

**Periodic Table**

- \_\_\_ Label the various parts of the periodic table.  
metals, nonmetals, metalloids, alkali metals, alkali earth metals,  
transitions metals, halogens, noble gases, families or groups, and periods.
- \_\_\_ Determine an atom's most common charge and why.  
(Octet rule, determine common charges on periodic table)
- \_\_\_ Predict numbers of electrons, determine internal vs. external (valence) electrons.
- \_\_\_ Draw/interpret Bohr models and electron dot diagrams.

**Periodic Trends**

- \_\_\_ Understand/apply atomic radius, reactivity, and ionization energy.
- \_\_\_ Determine how e<sup>-</sup> shells and effective nuclear charge affect (determine periodic trends)
  - \_\_\_ atomic radius
  - \_\_\_ reactivity
  - \_\_\_ ionization energy
- \_\_\_ Explain/apply valence electrons tendencies in metals vs. nonmetals that determine reactivity on Periodic Table.
- \_\_\_ Explain/apply Coulomb's law in regard to nuclear charge and e<sup>-</sup> distance, as well as trends on the Periodic Table.

## Unit 3: Atomic Bonding

### Ionic and Covalent Bonds

- \_\_\_ Define/apply chemical bond, octet rule, valence electrons.
- \_\_\_ Understand/apply ionic bond, cation, anion.
- \_\_\_ Understand/apply covalent bond, single bond, double bond, triple bond, polar, nonpolar .
- \_\_\_ Characterize compounds and their properties as ionic and covalent compounds
  - \_\_\_ crystals vs. molecules

### Naming/Writing Formulas

- \_\_\_ Differentiate ionic, covalent, and acidic compound names and formulas.
- \_\_\_ Apply rules to determine names/formulas of
  - \_\_\_ ionic compounds
  - \_\_\_ covalent compound
  - \_\_\_ acids

### Percent Composition

- \_\_\_ Calculate percent composition based on quantities.
- \_\_\_ Calculate percent composition based on atomic mass.

## Unit 4: Chemical Reactions

### Identify and Balance Reactions

- \_\_\_ Law of Conservation of Matter (Mass and Energy)
- \_\_\_ Count atoms in a molecule.
- \_\_\_ Identify the 7 naturally occurring diatomic molecules in name and formula.
- \_\_\_ Write out/translate reactions from formulas or names and balance.
- \_\_\_ Differentiate double replacement, single replacement, combustion, decomposition and composition (synthesis) reactions.

### Double replacement reaction

- \_\_\_ Predict products and balance.
- \_\_\_ Predict solubility using a solubility chart
- \_\_\_ Write relative molecular, ionic and net ionic equation .

### Single replacement reaction

- \_\_\_ Determine if a reaction is possible via an activity series.
- \_\_\_ Predict the products of a single displacement reaction and balance

### Combustion

- \_\_\_ Predict the products and balance.

### Decomposition reaction

- \_\_\_ Predict the products (to elements) and balance.

### Composition (synthesis) reaction

- \_\_\_ Predict the products and balance.

## Unit 5: Mathematical Relationships

### Linear Relationships

- \_\_\_ Graph a linear relationship.
- \_\_\_ Use proportions to calculate linear relationships.
- \_\_\_ Use factor label (dimensional analysis) to calculate linear relationships.
- \_\_\_ Convert English and metric systems with factor label.

### Reciprocal relationships

- \_\_\_ Graph a reciprocal relationship.
- \_\_\_ Use proportions to calculate a reciprocal relationship.

### Measure

- \_\_\_ Using significant figures.

NAME  
CHEMISTRY MONSTER REVIEW PACKET

VOCABULARY

1. Ionization energy:
2. Valence Electrons:
3. Alkali metals:
4. Ground state:
5. Electronegativity:
6. Composition Reaction:
7. Single replacement reaction
8. Decomposition:
9. Double Replacement:
10. Activity series
11. Soluble:
12. Insoluble:
13. Oxyacid:
18. Diatomic molecule:

- | FORMULA                                 | NAME |
|---|------|
| 1. $\text{KMnO}_4$                      |      |
| 2. $\text{CuCl}_2$                      |      |
| 3. $\text{H}_2\text{S}_{(\text{aq})}$   |      |
| 4. $\text{H}_3\text{PO}_{4(\text{aq})}$ |      |
| 5. $\text{SF}_6$                        |      |

- | NAME                    | FORMULA |
|-------------------------|---------|
| 6. Copper II nitrate    |         |
| 7. Oxygen tetrafluoride |         |
| 8. Hydrofluoric acid    |         |
| 9. Sulfuric acid        |         |
| 10. Sodium sulfate      |         |

(2 points each)

ELEMENT	SYMBOL	# PROTONS	# e <sup>-</sup>	l <sub>on</sub>	Atomic #	mass #	charge
Iron	_____	_____	_____	_____	_____	57	0
_____	Zr	_____	39	93	_____	_____	_____
silver	_____	_____	_____	_____	_____	108	-2
_____	_____	_____	25	29	_____	_____	0

TRENDS OF THE PERIODIC TABLE(TWO POINTS)

31. Rank in order of atomic radius from smallest to largest. Al, Fe, Ta, O, F

32. Rank in order of ionization energy from smallest to largest. Elements: Fr, F, Cl, Mo, Ga

Writing ionic formulas ( 2 points/each)

39. Na/Cl

40. Al/Cl

41. Na/Nitrate

42. Ammonium/Cl

43. Al/S

45. In class we discussed several factors that affect reactivity. In lab we discovered that Barium an Alkali earth metal element is much more reactive than Mg. In an essay form explain the factors which contribute.

For each question:

- Translate into chemical formula, if necessary.
- Indicate products of reaction or Indicate NO REACTION
- Make SURE YOU INDICATE PHASE FOR ALL SINGLE AND DOUBLE DISPLACEMENT REACTIONS
- Indicate type of reaction.
- Balance

60.  $\text{HCl}_{(aq)} + \text{NH}_4\text{OH}_{(aq)} \rightarrow$

61. Magnesium Metal + Oxygen gas  $\rightarrow$

62. Hydrobromic Acid + Aqueous Sodium Nitrate  $\rightarrow$

63. 125 ft → \_\_\_\_\_ in

64. .25 miles → \_\_\_\_\_ yards

65. 126 miles → \_\_\_\_\_ inches

66. 2 gallons → \_\_\_\_\_ pints

67. 27 quarts → \_\_\_\_\_ Liters

68. 2 pints → \_\_\_\_\_ gallons

69. 250 pounds → \_\_\_\_\_ tons

