

Clayton Valley Charter High School

Chemistry

Benchmark #3

STUDY GUIDE

2017-2018

Name: _____ Period: _____

Standards:

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (*Polarity, Bonding*)

HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (*Polarity, Bonding*)

HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (*Bonding*)

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (*Balancing Chemical Equations, Reaction Stoichiometry*)

Unit 4 Workbook 1

Look at the *Light up My Life* lab.

1. Copy the flow chart (Workbook Unit 4 Section 1, page 5) in the space below:

2. For the substances below, identify the type of bonding and justify your answer.

a. NaCl (aq)

e. TiO₂ (s)

b. C₂H₆ (l)

f. F₂ (g)

c. C₆₀ (s)

g. PCl₃ (g)

d. Li (s)

h. SO₂ (g)

3. How do you name ionic compounds? Include transition naming rules.

4. Name the following compounds OR write the chemical formula.

a. Thallium (III) Chloride

d. Mg₃N₂

b. Sulfur trioxide

e. C₃H₈

c. Aluminum carbonate

f. CuCl

5. Draw a shell model for magnesium.

a. Does this lose or gain electrons? Show it on the figure you drew above.

6. Draw a shell model for fluorine.

a. Does Fluorine lose or gain electrons? Show it on the figure you drew above.

7. Write the formula and give the name for the compound that forms between magnesium and fluorine.

Unit 4 Workbook 2

Name that Bond

8. Explain how to name ionic compounds (include all cases) and how to name covalent compounds. Explain what is different about them.

How to Name Ionic Compounds	How to Name Covalent Compounds
What is different?	

9. Name the following compounds or molecules. They may be ionic or covalent, so make sure you check.

a. Na_2O _____

b. P_2Cl_6 _____

c. C_4H_{10} _____

d. NF_3 _____

e. Sr_3N_2 _____

Drawing a Covalent Molecule (Structural Formula)

10. Explain how you determine the central atom (the one in the middle).

11. How do you determine the electrons used for drawing the compound? Use H_2O_2 as an example.

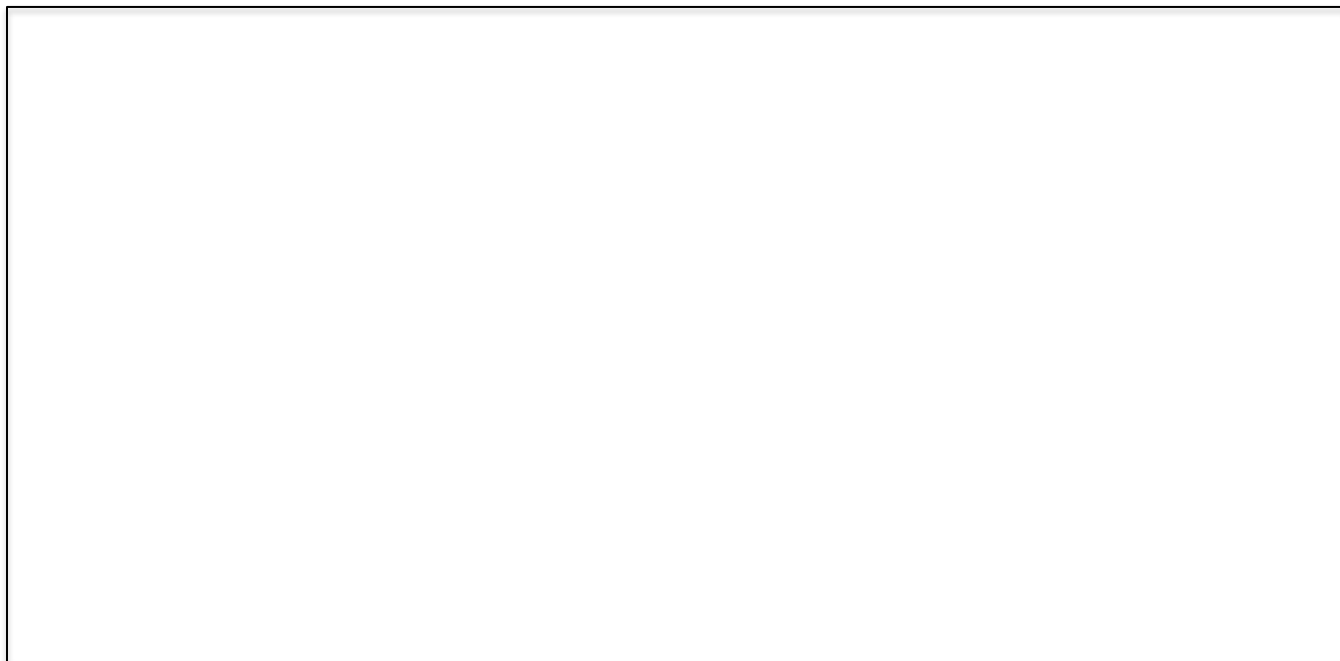
12. For the following, determine total valence electrons, draw the structure, and determine the geometry of the molecule:

Compound	Total Valence Electrons	Structural Formula	3D Shape	Molecular Geometry
HSiP				
CH ₂ Cl ₂				
NCl ₂ H				
CN ¹⁻				
CH ₄ O				

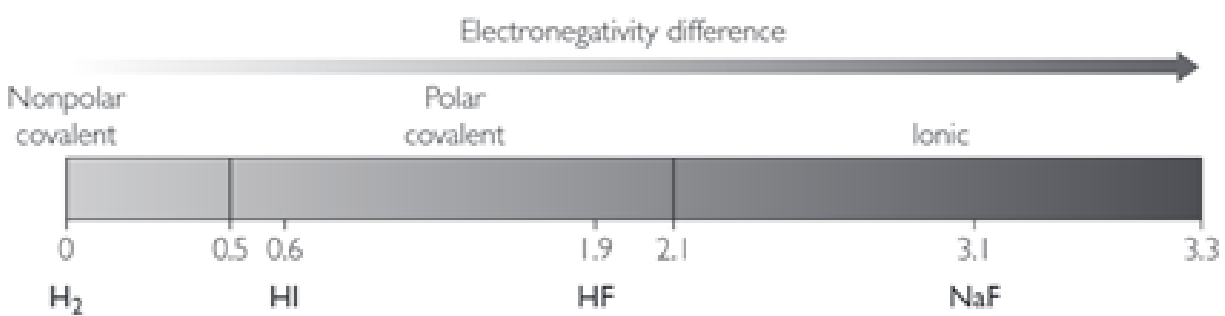
Unit 4 Workbook 3

13. Define electronegativity in your own words:

14. Construct an explanation as to what is going on in the figure on Workbook Unit 4 Section 3, page 3:



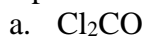
15. Look at the scale below. Use the scale to determine if the following compounds are nonpolar covalent, polar covalent or ionic. Use table on Workbook Unit 4 Section 3, page 16.



Bonding between atoms is on a continuum.

- | | |
|------------------------------------|-----------------------------------|
| a. HCl | e. KCl |
| b. CO ₂ | f. BeI ₂ |
| c. CH ₄ | g. O ₂ |
| d. SiH ₂ I ₂ | h. Fe ₂ O ₃ |

16. Draw structural formulas for the following molecules. After you have drawn them, circle whether they are polar or non-polar



Polar

Non-Polar



Polar

Non-Polar



Polar

Non-Polar

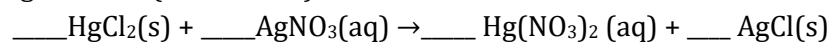


Polar

Non-Polar

Unit 4 Workbook 4

17. Balance the following reaction (Show work):



18. What type of reaction is this?

19. Explain what you might expect to observe (see, hear, smell?) in this reaction.

Beta-carotene ($\text{C}_{40}\text{H}_{56}$) is used as a dietary supplement because of its ability to react with oxygen gas (O_2) in the body to form retinal (Vitamin A, $\text{C}_{20}\text{H}_{28}\text{O}$)

20. List the reactants and products for this reaction:

Reactants:

Products:

21. What kind of reaction is this?

22. Write a balanced reaction for the synthesis of Vitamin A

23. Carrot juice contains 22 mg of beta-carotene per serving. If you drink one serving of carrot juice, how much Vitamin A should you produce (remember that 1000 mg=1 g)

Ethanol (C_2H_5OH) is combusted with oxygen to form carbon dioxide and water

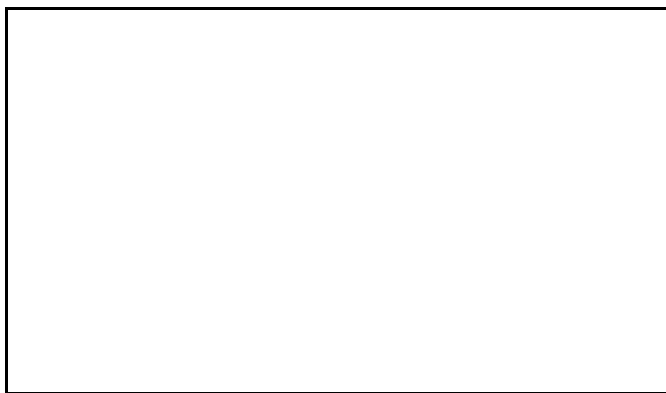
24. Write a key for each atom:

C=

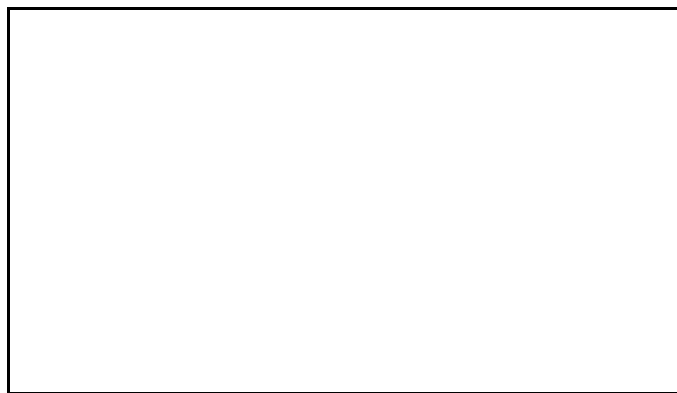
H=

O=

25. Next, draw **one** molecule of each reactant and product (look above for what the reactants are and products are for the combustion of methane). Then, balance your reaction by drawing additional molecules until it is balanced.



→



26. Write the ***balanced*** chemical equation for question #25.
27. Why do we have to make sure that the number of atoms on both sides of the reaction are the same?
28. You combust 30.0g C_2H_5OH in this reaction. How many moles is that?
29. How many moles of water would you produce in this reaction if you start with 0.65mol C_2H_5OH ?
30. How many grams of water do you produce from 0.65mol C_2H_5OH ?