**Honors Chemistry** Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**WS Bonding Practice** Period \_\_\_\_\_\_\_\_

1. What are valence electrons?

2. Use the periodic table to find the number of valence electrons in each of these atoms:

 a) sodium \_\_\_\_ b) carbon \_\_\_\_ c) bromine \_\_\_\_ d) phosphorous \_\_\_\_

3. Indicate if the value **increases** or **decreases** with the given change on the periodic table.

|  |  |  |
| --- | --- | --- |
|  Property  |  Across row (left to right)  |  Down column (top to bottom)  |
|  Atomic Size  |
|  Ionization Energy  |
|  Electronegativity  |



**4. Use the chart of electronegativities above to complete this table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Bonding between: | More electronegative element and value | Less electronegative element and value | Difference in electronegativity | Bond Type (covalent or ionic) |
| Sulfur and Cesium |  |  |  |  |
| Chlorine and Bromine |  |  |  |  |
| Calcium and Chlorine |  |  |  |  |
| Oxygen and Hydrogen |  |  |  |  |
| Nitrogen and Hydrogen |  |  |  |  |
| Iodine and Iodine |  |  |  |  |
| Copper and Sulfur |  |  |  |  |
| Hydrogen andFluorine |  |  |  |  |
| Carbon and Oxygen |  |  |  |  |

5. Explain how atoms form ionic bonds.

6. Explain how atoms form covalent bonds.

7. For each of the following:

 **Lewis structure Shape Bond angles**

 a) NCl3

 b) OF2

 c) NH4+

 d) AsCl3

8. Mothballs are compose of naphthalene, C10H8, a molecule that consists of two six-membered rings of

 carbon fused along an edge, as shown in this Lewis structure.

 

 a) Draw all of the resonance structures of naphthalene in the space above. How many are there?

 b) Do you expect the C – C bond lengths in the molecule to be similar to those of C – C single bonds,

 C = C double bonds, or intermediate between the single and double bonds?

 c) Not all of the C – C bond lengths in naphthalene are equivalent. Based on your resonance

 structures, how many C – C bonds in the molecule do you expect to be shorter than the others?

9. Write electron configurations and orbital diagrams for the following then fill in the blanks.

 (Hint: The number of covalent bonds can be predicted by the number of half-filled orbitals.)

 a) **Fluorine**

 Electron configuration:

 Orbital diagram:

 Fluorine has \_\_\_\_ valence electrons

 Fluorine has \_\_\_\_ half-filled orbital(s) and makes \_\_\_\_\_ bond(s) in compounds.

 b) **Oxygen**

 Electron configuration:

 Orbital diagram:

 Oxygen has \_\_\_\_ valence electrons

 Oxygen has \_\_\_\_ half-filled orbital(s) and makes \_\_\_\_\_ bond(s) in compounds.

 c) **Nitrogen**

 Electron configuration:

 Orbital diagram:

 Nitrogen has \_\_\_\_ valence electrons

 Nitrogen has \_\_\_\_ half-filled orbital(s) and makes \_\_\_\_\_ bond(s) in compounds.

 D) **Carbon**

 Electron configuration:

 Orbital diagram:

 Carbon has \_\_\_\_ valence electrons

 Carbon has \_\_\_\_ half-filled orbital(s) and you would think it makes \_\_\_\_\_ bond(s) in compounds.

 BUT … carbon atoms form **four** bonds. How can this be? How can it get four half-filled orbitals??