

*Write all answers on a separate sheet of paper!*

### **Bonding Review Sheet**

1. What is an electron dot (Lewis) structure?
2. Write the electron dot structure for each of the following elements: potassium, arsenic, bromine, silicon, tellurium, and aluminum.
3. Draw the electron dot structure for each of the following molecules:  $\text{Cl}_2$ ,  $\text{SiF}_4$ ,  $\text{H}_2\text{O}$ ,  $\text{C}_3\text{H}_8$ .
4. Describe a double and a triple bond? Give an example of each.
5. State the basic assumption of the VSEPR theory.
6. Why do sets of shared pairs of electrons in a molecule repel each other?
7. Why do bond angles in  $\text{CH}_4$ ,  $\text{NH}_3$ , and  $\text{H}_2\text{O}$  differ?
8. Describe the shapes of the following molecules:  $\text{GaH}_3$ ,  $\text{GeH}_4$ ,  $\text{PCl}_3$ , and  $\text{SO}_2$ .
9. Identify the kind of bond contained in each of the following:  $\text{HI}$ ,  $\text{F}_2$ ,  $\text{CsCl}$ ,  $\text{MgO}$ ,  $\text{O}_2$ ,  $\text{KBr}$ ,  $\text{AsH}_3$ ,  $\text{PCl}_3$ .
10. How can the differences between a covalent bond, a polar covalent bond, and an ionic bond be categorized using the concept of electro-negativity?
11. Explain how an ionic bond forms. Draw an example.
12. What is a hydrogen bond? How is it different from other chemical bonds?
13. For molecules having two, three, or four covalent bonds respectively, no lone pairs of electrons, explain why the shapes linear, trigonal planer and tetrahedral are predicted.
14. Give examples of two molecules, containing polar bonds, that are non-polar. Give examples of two molecules, containing polar bonds, that are polar.
15. How is it possible for a molecule to be nonpolar if it contains polar bonds?

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16. Which are most stable under ordinary conditions. hydrogen atoms or hydrogen molecules? Give reasoning for your answer.
17. Describe the properties that are characteristic of an ionic solid?
18. Where would you look on the periodic table for elements that are frequently involved in covalent bonding? For elements that are frequently involved in ionic bonding?
19. Relate the octet rule to the electron configuration of an elements outermost s and p orbitals.
20. Write the formula you would expect for a combination of each of the following. Identify each combination as ionic, covalent, polar covalent, or no bond.
  - a. F and Na
  - b. C and F
  - c. F and F
  - d. As and Cl
21. Predict whether a molecule with the formula  $\text{CH}_3\text{F}$  is polar or non-polar. Explain your reasoning.
22. Classify the bonds in each of the following circumstances as covalent, polar covalent, covalent, or ionic:
  - a.  $\text{K}_2\text{O}$
  - b.  $\text{BeO}$
  - c.  $\text{KH}$
  - d.  $\text{SiF}_4$
  - e.  $\text{KCl}$
  - f.  $\text{CBr}_4$
  - g.  $\text{N}_2$
23. Explain how the valence shell electron pair repulsion theory is used to predict molecular shapes.
24. What is the difference between a polar bond and a nonpolar bond?
25. Predict the shape of each of the following substances: a.  $\text{PH}_3$  b.  $\text{H}_2\text{S}$  c.  $\text{PH}_4$  d.  $\text{CF}_4$
26. Draw electron dot structures for:
  - a.  $\text{NF}_3$
  - b.  $\text{CH}_3\text{Cl}$
  - c.  $\text{N}_2\text{F}_2$
  - d.  $\text{CHCl}_3$
  - e.  $\text{C}_2\text{H}_2$
  - f.  $\text{CH}_2\text{Cl}_2$
  - g.  $\text{CCl}_4$
  - h.  $\text{H}_2\text{O}_2$
27. What is a metallic bond?
28. What is an alloy? Give two examples.

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