

Chemical Bonds Review

Ionic Compounds

1. Why do atoms bond?
2. What is the difference between an ionic and a covalent bond? How does each type form?
3. List some properties of ionic bonds.
4. List some properties of covalent bonds.
5. Be able to predict the formation of ions and write the appropriate electron configurations.
6. What is oxidation number? What is the oxidation number of Fe^{+2} , Fe^{+3} , Pb^{+4} , V^{+5} ?
7. Be able to identify common polyatomic ions.
8. Identify the following ions:
 - a. bromide ion _____
 - b. phosphide ion _____
 - c. barium ion _____
 - d. rubidium ion _____

- e. aluminum ion _____
- f. oxide ion _____
- g. lead (II) ion _____
- h. tin (IV) ion _____
- i. silver (I) ion _____
- j. mercury (II) ion _____
- k. ammonium _____
- l. nitrate _____
- m. nitrite _____
- n. cyanide _____
- o. permanganate _____
- p. chromate _____
- q. dichromate _____
- r. sulfate _____
- s. phosphate _____

9. Write the formulas and the names for the ionic compounds made from the following pairs of ions.

- a. Ca^{2+} , P^{3-} _____
- b. K^+ , Cl^- _____
- c. Ca^{2+} , S^{2-} _____
- d. Al^{3+} , N^{3-} _____
- e. Sn^{4+} , O^{2-} _____
- f. Mg^{2+} , N^{3-} _____
- g. Ag^+ , O^{2-} _____

- h. $\text{Fe}^{2+}, \text{S}^{2-}$ _____
- i. $\text{Ca}^{2+}, \text{NO}_3^-$ _____
- j. $\text{K}^+, \text{SO}_4^{2-}$ _____
- k. $\text{Pb}^{4+}, \text{OH}^-$ _____
- l. $\text{Sn}^{2+}, \text{PO}_4^{3-}$ _____
- m. $\text{Na}^+, \text{CrO}_4^{2-}$ _____

10. Why are noble gases not likely to form a chemical bond?

11. How many valence electrons are in the following elements?

- cesium
- rubidium
- gallium
- zinc
- strontium

Covalent Compounds

12. How do covalent bonds form? (Note: You may use a reaction example as long as you explain it!)

13. Explain the differences between sigma and pi bonds. Why are there two different types of bonds?

14. What is a Lewis structure? What are the advantages and disadvantages of Lewis structures?

15. Why do multiple bonds form?

16. Name the following covalent compounds.

a. N_2O _____

b. PCl_3 _____

c. AlCl_3 _____

d. SF_6 _____

e. Cl_2O_7 _____

17. Write the formulas for the following compounds.

a. carbon dioxide _____

b. dinitrogen tetrahydride _____

c. carbon tetrabromide _____

d. diphosphorous trioxide _____

e. boron trichloride _____

18. Draw Lewis structures and provide the molecular geometry for the following compounds.

a. NF_3

b. CS_2

c. ClO_4^-

d. BF_4^-

e. SO_2

f. ClF_5

19. What is the octet rule? What are some of the exceptions to the octet rule?

20. What are resonance structures?

21. What is the VSEPR model? Explain completely!

22. What is bond angle?

Ionic and Covalent Compounds

23. Would you expect the following combinations of elements to form ionic or covalent compounds?

a. Li and S _____

b. O and S _____

c. Al and O _____

d. F and Cl _____

e. I and K _____

f. H and N _____

24. Complete the following table.

Type of Bond	Chemical Formula	Chemical Name
		potassium sulfide
		iron (III) carbonate
		carbon tetrachloride
	CaO	
	K ₃ P	
	H ₂ S	
	NF ₃	
	Na ₃ PO ₄	
		ammonium chloride
		tetraphosphorous decoxide
	PbS	
	PCl ₅	
		selenium hexaflouride
	Ca(OH) ₂	
		ammonium sulfate
		magnesium bromide