

## When it comes to Chemical Bonding , I can...

1. I can state the 3 types of chemical bonds. They are called: \_\_\_\_\_ bonds , \_\_\_\_\_ bonds, and \_\_\_\_\_ bonds.
2. I can state the number of valence electrons that an atom attains to be most stable.
3. I can state the 2 types of compounds.
4. I can define ionic bond, covalent bond, and metallic bond in terms of the types of elements (metals, nonmetals) from which they are formed.
5. I can define ionic and covalent bonds based on what happens to the valence electrons.
6. In terms of valence electrons, explain why the bonding in methane (CH<sub>4</sub>) is similar to the bonding in water (H<sub>2</sub>O).
7. In terms of valence electrons, explain, why the bonding in HCl is different than that bonding in NaCl.
8. I can draw a Lewis dot diagram to represent an ionic compound, like lithium bromide and calcium chloride.
9. I can draw a Lewis dot diagram to represent a molecular (covalently bonded) compound, like water, methane, carbon dioxide and iodine.
10. I can draw a Lewis dot diagram to represent atoms on the periodic table, or ions they form into, such as H, He, B, Mg, Al, Cu<sup>+2</sup>, Mn<sup>+4</sup>, or Bi
11. I can state the number of electrons that are shared in single and multiple covalent bonds. I can also state the number of pairs of electrons that are shared. I know the difference between these two concepts as well.

	# electrons shared	# pairs of electrons shared	Provide 2 examples
Single covalent bond			
Double covalent bond			
Triple covalent bond			

12. I can explain why the Lewis dot diagrams of ionic compounds have brackets and the Lewis dot diagrams of molecular compounds do not. Lewis dot diagrams for ionic compounds have brackets because \_\_\_\_\_. Lewis dot diagrams for molecular compounds do NOT have brackets because \_\_\_\_\_. (not fill in a word, fill in a sentence)

13. skip

14. I can state the type of bonding that occurs in the polyatomic ions (Reference Table E) and explain why they have that type of bonding.

15. Given a compound's chemical formula I can determine all types of bonding in the compound. Use NaCl, Hg, CO<sub>2</sub>, and Na<sub>3</sub>PO<sub>4</sub> in your full explanation.

16. I can state the important statement about bonding + energy which starts:  
When bonds form...

17. I can state the reverse of that important bonding statement as well.

18. Given the balanced equation:  $N + N \rightarrow N_2$

Which statement describes the process represented by this equation?

A. A bond is formed as energy is absorbed.

B. A bond is formed as energy is released.

C. A bond is broken as energy is absorbed.

D. A bond is broken as energy is released.

19. I can explain the difference between a polar covalent bond and a nonpolar covalent bond in terms of the atoms involved.

Polar covalent bonds are formed when nonmetals atoms with different \_\_\_\_\_ share electrons unevenly. Nonpolar covalent bonds form when... \_\_\_\_\_

20. I can explain how to determine the degree of polarity of a covalent bond. The degree of polarity of a covalent bond is determined by the \_\_\_\_ between the elements.

21. I can explain why one covalent bond is more or less polar than another covalent bond, based on electronegativity difference. For example in terms of electronegativity difference, why the bond between carbon and oxygen in a carbon dioxide molecule is less polar than the bond between hydrogen and oxygen in a water molecule.

22. I can define symmetrical molecules and asymmetrical molecules. I can also state in terms of having radial symmetry or not what can be said about a molecule's polarity.
23. I can draw  $CO_2$ ,  $H_2O$  and  $CH_4$ , and  $C_3H_8$  and determine if they have radial symmetry.
24. Why is a molecule of  $CH_4$  nonpolar even though the bonds between the carbon and hydrogen are polar?
- The shape of the  $CH_4$  molecule is symmetrical.
  - The shape of the  $CH_4$  molecule is asymmetrical.
  - The  $CH_4$  molecule has an excess of electrons.
  - The  $CH_4$  molecule has a deficiency of electrons.
25. Explain, in terms of charge distribution, why a molecule of water ( $H_2O$ ) is polar.
26. I can determine if a molecular is polar or nonpolar.  
Examples to use are:  $H_2O$ ,  $CO_2$ ,  $CH_4$ , and  $F_2$
27. I can explain and apply the expression "like dissolves like" and give an example.
28. Explain, in terms of molecular polarity, why ammonia is more soluble than methane in water at  $20^\circ C$  at standard pressure.
29. I can define intramolecular forces and intermolecular forces and give examples of each.
30. I can list the intramolecular forces from STRONGEST to WEAKEST.
31. I can list the intermolecular forces from STRONGEST to WEAKEST.
32. I can state the relationship between polarity and intermolecular forces (IMF) strength.  
As the polarity of the molecule \_\_\_\_ the strength of the intermolecular forces \_\_\_\_.
33. Given the physical state of some substances, I can compare the relative strength of the IMF. Use  $F_2$  and  $Br_2$  at STP to explain this



45. I can state 5 physical properties of molecular substances.

46. I can identify a substance as "molecular" based on its properties. For example: When a chemist performs the same tests on two homogeneous white crystalline solids A and B, the results she measured are in this table.

	Solid A	Solid B
Melting point	High, 801°C	Low, decomposes at 186°C
Solubility in water (g/100.0g water at 0°C)	35.7	3.2
Electrical conductivity in aqueous solution	Good conductor	Non-conductor

The results suggest that

- A. both solids contain only ionic bonds
- B. both solids contain only covalent bonds
- C. Solid A contains only covalent bonds, solid B contains only ionic bonds
- D. Solid A contains only ionic bonds, and solid B contains only covalent bonds.

47. Which terms describe a substance that has a low melting point and poor electrical conductivity?

- A. covalent and metallic
- B. covalent and molecular
- C. ionic and molecular
- D. ionic and metallic