

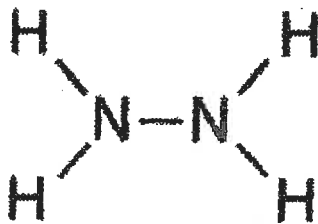
Name: \_\_\_\_\_

# Bonding

1. Which type of substance is soft, has a low melting point, and is a poor conductor of heat and electricity?

- 1) metallic solid                      2) ionic solid  
3) molecular solid                    4) network solid

2. Given the formula for hydrazine:



How many pairs of electrons are shared between the two nitrogen atoms?

- 1) 1                      2) 2                      3) 3                      4) 4

3. In which compound have electrons been transferred to the oxygen atom?

- 1)  $\text{N}_2\text{O}$                       2)  $\text{CO}_2$                       3)  $\text{NO}_2$                       4)  $\text{Na}_2\text{O}$

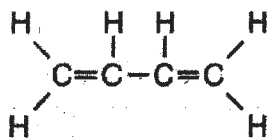
4. Which is the correct electron-dot formula for a molecule of chlorine?

- 1)  $\begin{array}{cc} \cdot\cdot & \cdot\cdot \\ : \text{Cl} : & \text{Cl} : \\ \cdot\cdot & \cdot\cdot \end{array}$                       2)  $\begin{array}{cc} \cdot\cdot & \cdot\cdot \\ : \text{Cl} : & : \text{Cl} : \\ \cdot\cdot & \cdot\cdot \end{array}$   
3)  $\begin{array}{cc} \cdot\cdot & \cdot\cdot \\ : \text{Cl} : & : \text{Cl} : \\ \cdot\cdot & \cdot\cdot \end{array}$                       4)  $\begin{array}{cc} \cdot\cdot & \cdot\cdot \\ \cdot \text{Cl} : & \text{Cl} \cdot \\ \cdot\cdot & \cdot\cdot \end{array}$

5. Which type of molecule is  $\text{CF}_4$ ?

- 1) nonpolar, with a symmetrical distribution of charge  
2) polar, with a symmetrical distribution of charge  
3) nonpolar, with an asymmetrical distribution of charge  
4) polar, with an asymmetrical distribution of charge

6. Given the formula of a substance:



What is the total number of shared electrons in a molecule of this substance?

- 1) 9                      2) 6                      3) 22                      4) 11

7. Which compound contains both ionic and covalent bonds?

- 1)  $\text{NaBr}$                       2)  $\text{HBr}$                       3)  $\text{NaOH}$                       4)  $\text{CBr}_4$

8. Which element has atoms that can form single, double, and triple covalent bonds with other atoms of the same element?

- 1) fluorine                      2) carbon  
3) oxygen                      4) hydrogen

9. Which formula represents a molecule with the most polar bond?

- 1)  $\text{NO}$                       2)  $\text{CO}$                       3)  $\text{HI}$                       4)  $\text{HCl}$

10. Which compound contains a bond with the least ionic character?

- 1)  $\text{CO}$                       2)  $\text{K}_2\text{O}$                       3)  $\text{CaO}$                       4)  $\text{Li}_2\text{O}$

11. Which formula correctly represents the compound calcium hydroxide?

- 1)  $\text{CaOH}_2$                       2)  $\text{Ca}(\text{OH})_2$   
3)  $\text{CaOH}$                       4)  $\text{Ca}_2\text{OH}$

12. In a bond between an atom of carbon and an atom of fluorine, the fluorine atom has a

- 1) larger number of first-shell electrons  
2) weaker attraction for electrons  
3) stronger attraction for electrons  
4) smaller number of first-shell electrons

13. Which substance contains bonds that involved the transfer of electrons from one atom to another?

- 1)  $\text{CO}_2$                       2)  $\text{NH}_3$                       3)  $\text{KBr}$                       4)  $\text{Cl}_2$

14. Which substance is an electrolyte?

- 1)  $\text{CH}_3\text{OH}$                       2)  $\text{H}_2\text{O}$                       3)  $\text{KOH}$                       4)  $\text{C}_6\text{H}_{12}\text{O}_6$

15. Which formula represents a nonpolar molecule containing polar covalent bonds?

- 1)  $\text{NH}_3$                       2)  $\text{H}_2$                       3)  $\text{CCl}_4$                       4)  $\text{H}_2\text{O}$

16. What is the total number of electrons shared in the bonds between the two carbon atoms in a the molecule shown below?



- 1) 8                      2) 2                      3) 6                      4) 3

17. When lithium reacts with bromine to form the compound  $\text{LiBr}$ , each lithium atom

- 1) gains three electrons and becomes a negatively charged ion  
2) loses one electron and becomes a positively charged ion  
3) gains one electron and becomes a negatively charged ion  
4) loses three electrons and becomes a positively charged ion

18. Which formula represents a polar molecule?

- 1)  $\text{H}_2$                       2)  $\text{H}_2\text{O}$                       3)  $\text{CO}_2$                       4)  $\text{CCl}_4$

19. Two atoms with an electronegativity difference of 0.4 form a bond that is

- 1) ionic, because electrons are shared  
2) ionic, because electrons are transferred  
3) covalent, because electrons are transferred  
4) covalent, because electrons are shared

20. The data table below represents the properties determined by the analysis of substances A, B, C, and D.

Substance	Melting Point (°C)	Boiling Point (°C)	Conductivity
A	-80	-20	none
B	20	190	none
C	320	770	as solid
D	800	1250	in solution

Which substance is an ionic compound?

- 1) A                      2) B                      3) C                      4) D

21. Given the electron dot diagram:



The electrons in the bond between hydrogen and fluorine are more strongly attracted to the atom of

- 1) hydrogen, which has the lower electronegativity
- 2) fluorine, which has the lower electronegativity
- 3) fluorine, which has the higher electronegativity
- 4) hydrogen, which has the higher electronegativity

22. The correct name of the compound with the formula  $\text{PbO}_2$  is

- 1) lead (I) oxide                      2) lead (II) oxide
- 3) lead (III) oxide                      4) lead (IV) oxide

23. Which statement best describes the substance that results when electrons are transferred from a metal to a nonmetal?

- 1) It contains covalent bonds and has a high melting point.
- 2) It contains ionic bonds and has a high melting point.
- 3) It contains ionic bonds and has a low melting point.
- 4) It contains covalent bonds and has a low melting point.

24. A correct name for  $\text{N}_2\text{O}_3$  is

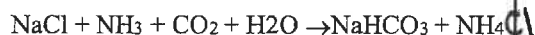
- 1) nitrogen (I) oxide                      2) nitrogen (II) oxide
- 3) nitrogen (III) oxide                      4) nitrogen (IV) oxide

25. Which electron-dot diagram represents  $\text{H}_2$ ?

- 1)  $\text{H}:\text{H}$                       2)  $\begin{array}{c} \cdot\cdot \\ \cdot\text{H}\cdot\text{H}\cdot \\ \cdot\cdot \end{array}$
- 3)  $\text{H}\cdot\text{H}$                       4)  $\begin{array}{c} \cdot\cdot \\ \cdot\text{H}:\text{H}: \\ \cdot\cdot \end{array}$

Base your answers to questions 26 through 28 on the information below.

In 1864, the Solvay process was developed to make soda ash. One step in the process is represented by the balanced equation below.



26. In the space draw a Lewis electron-dot diagram for the reactant containing nitrogen in the equation.

27. Write the chemical formula for *one* compound in the equation that contains both ionic bonds and covalent bonds.

28. Explain, in terms of electronegativity difference, why the bond between hydrogen and oxygen in a water molecule is more polar than the bond between hydrogen and nitrogen in an ammonia molecule.

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