Name KEY Date_____ Period_____

Molecular Structure and Bond Practice Test

1. In order to be stable, the outer electron shell hydrogen should contain how many electrons?
a. 2 b. 4 c. 8 d. 10

2. In order to be stable, the outer electron shells of the elements in the main group should contain how many electrons?
a. 2 b. 4 c. 8 d. 10

3. Ionic bonds are bonds between
a. one atom that donates electrons and one that accepts them
b. atoms that only donate electrons
c. atoms that only accept electrons
d. 2 atoms that share electrons

4. Covalent bonds are bonds between
a. one atom that donates electrons and one that accepts them
b. atoms that only donate electrons
c. atoms that only accept electrons
d. 2 atoms that share electrons

5. Polar bonds are formed _____.
a. when two atoms pull unequally on shared electrons
b. when two atoms pull equally on shared electrons
c. when one atom donates electrons and the other accepts them
d. between two metals

6. How many electrons does Silicon have in its outer electron shell?
a. 4 b. 5 c. 6 d. 7

7. How many electrons does Phosphorus have in its outer electron shell?
a. 4 b. 5 c. 6 d. 7

8. How many electrons does Sulfur have in its outer electron shell?
a. 4 b. 5 c. 6 d. 7

9. When forming an ionic bond, what charge will Aluminum take on?
a. +3 b. -3 c. -2 d. +2

10. When forming an ionic bond, what charge will Phosphorus take on?
a. +3 b. -3 c. -2 d. +2

11. What is the formula of the ionic compound that forms from aluminum and oxygen
a. Al_2O b. AlO_2 c. Al_2O_3 d. Al_3O_2

12. When forming an ionic bond, what charge will Sulfur take on?
a. +3 b. -3 c. -2 d. +2

13. How many electrons are shared in a triple bond?
a. 2 b. 3 c. 4 d. 6

14. According to the VSEPR theory, non-bonding, unshared pair of electrons of a molecule will_____.
a. push the bond angles of the molecule to the minimum distance.
b. push the bond angles of the molecule to the maximum distance.
c. have no effect on the bond angles.

15. Ionic bonds results when electrons are _____ between two atoms, while covalent bonds results when electrons are _____ between two atoms.
a. shared, transferred b. shared, shared
c. transferred, transferred d. transferred, shared

16. In a bond between N and H, which atom will pull on the bonding electrons more closely to itself (which atom is more electronegative)?
a. Nitrogen b. Hydrogen c. both d. neither

17. A polar molecule will mix with _____.
a. polar molecules b. non-polar molecules c. both d. neither

18. A polar molecule and a non-polar molecule will_____.
a. mix b. not mix c. explode d. will not talk to each other at a party

19. If a molecule has very strong intermolecular force acting upon it, _____.
a. the melting point and boiling point will be very high temperatures.
b. the melting point and boiling point will be very low temperatures.
c. the melting point will have a high temperature but the boiling point will have a very low temperature.
d. he boiling point will have a high temperature but the melting point will have a very low temperature.

20. Ionic Bonds are between
a. metals and non metals
b. non-metals only
c. metals only
d metalloids only

21. Covalent Bonds are between
a. metals and non metals
b. non-metals only
c. metals only
d metalloids only

22. Which molecule would experience the most London Dispersion Force?
a. C_2H_6 b. C_8H_{18} c. $C_{25}H_{52}$

23. Which molecule would most likely be a solid at room temperature?
a. C_2H_6 b. C_8H_{18} c. $C_{25}H_{52}$

24. Which of the following is the strongest intermolecular force?
a. London Dispersion Force b. Dipole-Dipole attractions
c. Hydrogen bonds d. Ionic bonds

25. Which of the following is a very strong dipole-dipole intermolecular force that exists between polar molecules like water and alcohols?
a. London Dispersion Force b. Dipole-Dipole attractions
c. Hydrogen bonds d. Ionic bonds

26. Which of the following is the only intermolecular force that takes into account non-polar molecules?
a. London Dispersion Force b. Dipole-Dipole attractions
c. Hydrogen bonds d. Ionic bonds

27. Any type of bond counts as _____ electron doman(s).
a. 1 b. 2 c. 3 d. 4

28. A **bond** is considered polar if two bonded atoms share electrons _____.
a. equally b. unequally

29. The _____ the intermolecular force, the higher the melting and boiling point.
a. stronger b. weaker

30. You attempt to dissolve an unknown covalent substance in a very polar solvent such as water. The substance does not dissolve. Therefore the substance is
a. polar b. non-polar

31. Why does sugar mix with water while oil does not?
a. sugar and oil are both polar
b. sugar and oil are both non-polar
c. sugar is polar and oil is non-polar
d. sugar is non-polar and oil is polar

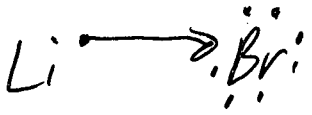
32. Why does your skin feel cool when it is touched by something very non-polar like acetone (finger nail polish remover)

EVAPORATES & TRANSFERS HEAT FROM YOUR HAND

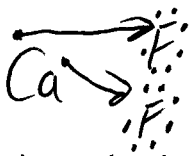
33. Soap can dissolve in **polar substances** such as water, ***as well*** as in **non-polar** substances such as oil. Without knowing the exact molecular structure of soap, describe what must be true about a soap molecule with regard to molecular polarity.

BOTH POLAR & NON POLAR

34. Using dots and arrows draw the Lewis dot structures for the following **ionic compounds** that form from the two elements. **Write the formula!**

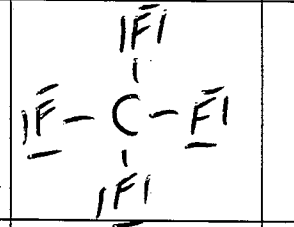
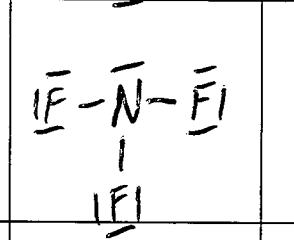
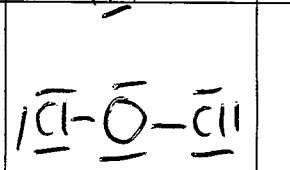
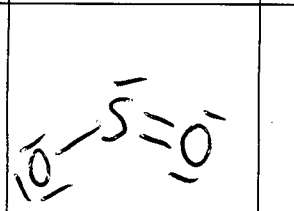
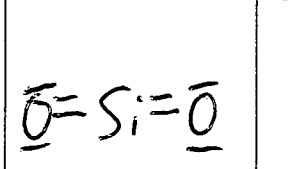
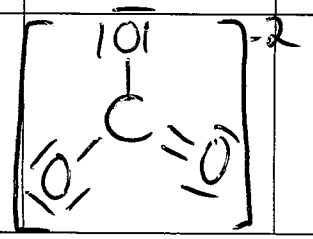
a. Li and Br  Formula $LiBr$

b. Al and S  Formula Al_2S_3

c. Ca and F  Formula CaF_2

35. For the following molecules, **completely fill in the chart on the back of this page**.

a. CF_4 b. NF_3 c. OCl_2 d. SO_2 e. SiO_2 f. CO_3^{-2}

#) Formula	Lewis Structure	Total # of e⁻ domains	E.D.G. (no pic necessary)	# of bonding domains	# of non-bonding domains	3-D Structure	Molecular Geometry	Approx Bond Angle	Polar Bonds? Dipole Moment? Yes or No?	IMFs Exhibited
CF_4 32e⁻		4	TETRAHEDRAL	4	0		TETRAHEDRAL	109.5°	YES / NO	LDF
NF_3 26e⁻		4	TETRAHEDRAL	3	1		TRIGONAL PYRAMIDAL	107.5°	YES / YES	Dipole-Dipole
OCl_2		4	TETRAHEDRAL	2	2		BENT	104.5°	YES / YES	Dipole-Dipole
SO_2 18e⁻		3	TRIGONAL PLANAR	2	1		BENT	~120°	YES / YES	Dipole-Dipole
SiO_2 16e⁻		2	LINEAR	2	0		LINEAR	180°	YES / NO	LDF
CO_3^{-2} 24		3	TRIGONAL PLANAR	3	0		TRIGONAL PLANAR	120°	YES / NO	Ionic