Name:

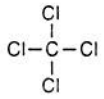
Bonding Review Packet
Lewis Dot and Polarity

1. Which compound has hydrogen bonding between its molecules?
   1) CH_4
   2) CaH_2
   3) KH
   4) NH_3

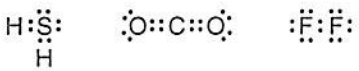
2. The degree of polarity of a chemical bond in a molecule of a compound can be predicted by determining the difference in the
   1) melting points of the elements in the compound
   2) densities of the elements in the compound
   3) electronegativities of the bonded atoms in a molecule of the compound
   4) atomic masses of the bonded atoms in a molecule of the compound

3. Which formula represents a nonpolar molecule containing polar covalent bonds?
   1) H_2O
   2) CCl_4
   3) NH_3
   4) H_2

4. Which formula represents a nonpolar molecule?
   1) CH_4
   2) HCl
   3) H_2O
   4) NH_3

5. Which molecule contains a nonpolar covalent bond?
   1) O=C=O
   2) C≡O
   3) Br–Br
   4) 

Base your answers to questions 6 and 7 on your knowledge of chemical bonding and on the Lewis electron-dot diagrams of H_2S, CO_2, and F_2 below.



6. Explain, in terms of electronegativity, why a C–O bond in CO_2 is more polar than the F–F bond in F_2.

7. Explain, in terms of structure and/or distribution of charge, why CO_2 is a nonpolar molecule.

8. The bonds between hydrogen and oxygen in a water molecule are classified as
   1) polar covalent
   2) nonpolar covalent
   3) ionic
   4) metallic

9. Which type of molecule is CF_4?
   1) polar, with a symmetrical distribution of charge
   2) polar, with an asymmetrical distribution of charge
   3) nonpolar, with a symmetrical distribution of charge
   4) nonpolar, with an asymmetrical distribution of charge

10. Which formulas represent two polar molecules?
    1) CO_2 and HCl
    2) CO_2 and CH_4
    3) H_2O and HCl
    4) H_2O and CH_4

11. Which formula represents a polar molecule?
    1) Br_2
    2) CO_2
    3) CH_4
    4) NH_3

12. Which substance is correctly paired with its type of bonding?
    1) NaBr–nonpolar covalent
    2) HCl–nonpolar covalent
    3) NH_3–polar covalent
    4) Br_2–polar covalent

13. Which molecule is nonpolar?
    1) H_2O
    2) NH_3
    3) CO
    4) CO_2

14. Which of these substances has the strongest intermolecular forces?
    1) H_2O
    2) H_2S
    3) H_2Se
    4) H_2Te

15. Which electron-dot structure represents a non-polar molecule?
    1) 
    2) 
    3) 
    4) 

16. Which molecule is the most polar?
    1) H_2O
    2) H_2S
    3) H_2Se
    4) H_2Te

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17. Which pair of characteristics describes the molecule illustrated below?

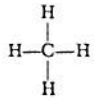
    1) symmetrical and polar
    2) symmetrical and nonpolar
    3) asymmetrical and polar
    4) asymmetrical and nonpolar

18. Which structural formula represents a polar molecule?
    1) 
    2) O=C=O
    3) 
    4) N≡N

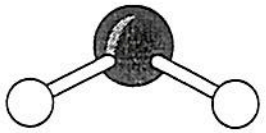
19. The four single bonds of a carbon atom in CH_4 are directed toward the corners of a
    1) square
    2) tetrahedron
    3) rectangle
    4) parallelogram

20. The symmetrical structure of the CH_4 molecule is due to the fact that the four single bonds between carbon and hydrogen atoms are directed toward the corners of a
    1) triangle
    2) tetrahedron
    3) square
    4) rectangle

21. The shape and bonding in a diatomic bromine molecule are best described as
    1) symmetrical and polar
    2) symmetrical and nonpolar
    3) asymmetrical and polar
    4) asymmetrical and nonpolar

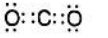
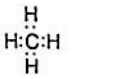
22. Which structural formula represents a nonpolar symmetrical molecule?
    1) 
    2) 
    3) 
    4) 

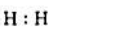
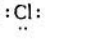
23. The diagram below represents a water molecule.



This molecule is best described as
    1) polar with polar covalent bonds
    2) polar with nonpolar covalent bonds
    3) nonpolar with polar covalent bonds
    4) nonpolar with nonpolar covalent bonds

24. Which is the formula of a nonpolar molecule containing nonpolar bonds?
    1) CO_2
    2) H_2
    3) NH_3
    4) H_2O

25. Which electron dot formula represents a polar molecule?
    1) 
    2) 
    3) 
    4) 

26. Which electron dot formula represents a polar molecule?
    1) 
    2) 
    3) 
    4) 

27. When two atoms form a chemical bond by sharing electrons, the resulting molecule will be
    1) polar, only
    2) nonpolar, only
    3) either polar or nonpolar
    4) neither polar nor nonpolar

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28. a) Draw the Lewis Dot Diagram for H_2O.
    b) What is the shape of this molecule?
    c) Is this molecule polar or nonpolar? Explain your answer.

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Answer Key
[New Exam]

1. 4
2. 3
3. 2
4. 1
5. 3
6. Responses include, but are not limited to: The electronegativity difference in a carbon-oxygen bond is greater than the electronegativity difference in a fluorine-fluorine bond • The EN difference for C and O is 0.9 and the EN difference for F and F is 0.
7. Responses include, but are not limited to: CO_2 is symmetrical • CO_2 has an even distribution of charge • CO_2 is linear with O at each end.
8. 1
9. 3
10. 3
11. 4
12. 3
13. 4
14. 1
15. 2
16. 1
17. 3
18. 1
19. 2
20. 2
21. 2
22. 2
23. 1
24. 2
25. 3
26. 2
27. 3
28. 1