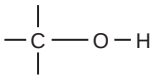
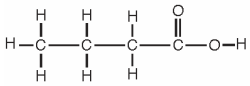
Practice Smells Unit Test

1. Which functional group is shown in the molecule below?



(A) amine (B) alcohol (C) carboxylic acid (D) ester

2. What is the functional group of the molecule shown below?



$C_4H_8O_2$

(A) ester (B) aldehyde (C) carboxylic acid (D) alcohol

3. What is the smell of the molecule shown in Question 2?

(A) fishy (B) camphor (C) minty (D) putrid

4. You have a liquid that smells putrid. Which chemical could it be?

(A) butyric acid (B) ethyl acetate (C) phenylethylamine (D) 1-carvone

5. The shape of a molecule is determined by what principle?

(A) Electron domains like to be as far apart from each other as possible.
(B) Electron domains like to be as close to each other as possible.
(C) Electron domains attract each other.
(D) Electron domains have to be at 90^o angles from each other.

6. The shape of a SF_2 molecule is

(A) tetrahedral (B) pyramidal (C) bent (D) linear

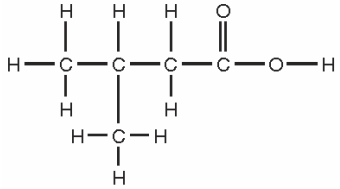
7. The intermolecular forces that nonpolar molecules exhibit are called

(A) London disperson forces (B) dipole-dipole interactions (C) hydrogen bonding (D) none of these

8. Unless they are large molecules, nonpolar molecules are likely to be

(A) liquids (B) gases
(C) solids (D) plasma

9. The picture below is what type of representation of a molecule?

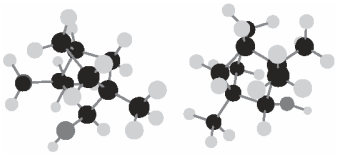


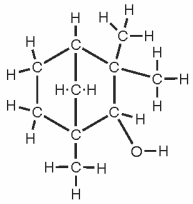
(A) Lewis dot diagram (B) structural formula
(C) molecular formula (D) ball-and-stick model

10. The strongest intermolecular forces are

(A) hydrogen bonding (B) Van der Waals forces (C) dipole-dipole interactions (D) London dispersion forces

11. What is the functional group of the molecule pictured below?





$C_{10}H_{18}O$

(A) alcohol (B) ketone (C) ester (D) aldehyde

12. Hydrogen bonding is

(A) a very strong attraction between molecules that contain H bonded to N, O, or F

(B) a bond that occurs between molecules that contain H bonded to N, O, or F

(C) a very strong attraction that occurs between any molecules that contain H

(D) a bond that occurs between molecules that contain H

13. The smell of rotten food would be

(A) sweet (B) putrid (C) fishy (D) camphor

14. Nonpolar molecules have low boiling points

(A) True (B) Fals

15. Nonpolar molecules evaporate easily

(A) True (B) False

16. Polar molecules dissolve nonpolar molecules

(A) True (B) False

17. The molecule CO2

(A) smells because it fits into a flat receptor site
(B) smells because it is polar
(C) does not smell because it is nonpolar
(D) does not smell because it does not travel to the nose

18. The parts of your nose that allow you to smell molecules are called

(A) nose hairs (B) nose buds (C) receptor sites (D) functional groups

19. Which of these elements has the greatest electronegativity?

(A) Fr (B) At (C) Li (D) O

20. If the electronegativity difference between two atoms is extremely small (0.4 or less), what type of bond will they form?

(A) ionic (B) polar covalent (C) nonpolar covalent (D) nonpolar ionic

21. The molecule HF (s)

(A) smells because it fits into a flat receptor site
(B) smells because it is polar
(C) does not smell because it is nonpolar
(D) does not smell because it does not travel into the nose

22. Which of the following will smell?
(A) small polar molecules
(B) metals
(C) small nonpolar molecules

23. You can only smell molecules that are in this phase.
(A) gas (B) liquid (C) solid (D) aqueous

24. In order to smell a liquid,
(A) the separate atoms in the liquid join together as they float out and form a molecule that floats to your nose.
(B) the molecules in the liquid break apart into atoms that float to your nose.
(C) the molecules in the liquid break apart into pieces that float into your nose.
(D) the molecules in the liquid float out of the liquid and into your nose.

25. Polar molecules
(A) are not attracted to a charge
(B) do not have partial charges on parts of the molecule
(C) are not attracted to each other
(D) bend towards a charged wand

26. In a nonpolar covalent bond, the electrons
(A) are shared equally
(B) are shared unequally
(C) are not shared at all
(D) are not involved in bonding

27. Which of these elements has the lowest electronegativity?
(A) F (B) At (C) Li (D) Fr

28. If the electronegativity difference between two atoms is extremely large (greater than 2.0), what type of bond will they form?
(A) ionic (B) polar covalent (C) nonpolar covalent (D) nonpolar ionic

29. Acetone is polar. Which of the following statements is correct?
(A) Acetone will not smell.
(B) Acetone will dissolve in water.
(C) Acetone will dissolve in hexane.
(D) Acetone will not be attracted toward a charged wand.

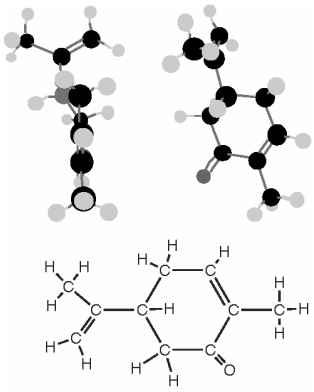
30. According to the smell rules, which substance should smell but does not?
(A) copper (B) salt (C) water (D) Styrofoam

Short Answer

31. Complete the chart below.

Formula	Lewis dot diagram	Number of Domains on Central Atom	Number of Lone Pairs on Central Atom	Sketch shape (use paddles to show lone pairs)	Name of Shape
AsH_3					
CBr_4					

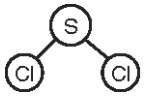
32. What is the functional group of the large molecule shown? (Different views of the same molecules are shown.)



$C_{10}H_{14}O$

What is the smell of this chemical? Explain your reasoning.

33. Look at the molecule below. The electronegativity of S is 2.58, and Cl is 3.16. Copy this picture on your paper and then answer the following questions.



a. What is the difference in electronegativity of these two atoms? Is this a polar bond?
b. Draw in the partial negative and partial positive charges.
b. Using arrows, draw the directions of each dipole, and then draw the overall dipole for the molecule.
c. Will this molecule smell? Why or why not?

34. A student conducts an experiment with mineral oil. She finds that the oil is not attracted to a charged wand and that oil spreads out when placed onto wax paper. According to these results, is mineral oil polar or nonpolar? Explain your answer.

35. Is the bond in the molecule HBr polar? On which end of the hydrogen bromide molecule would you find a partial negative charge? Would you expect HBr to have a smell? Explain your reasoning.

36. Complete the chart below (Be sure to calculate the electronegativity difference—don't just assume a dipole exists) .

Formula	Lewis Dot Diagram	Geometry	Shape (name and sketch) *Show direction of all dipoles	Symmetrical shape?	All surrounding atoms identical?	Polar or Nonpolar?	Dissolves in water?	Will it smell?	Type of IMF's?
CH_4									
H_2Se									
NH_3									
CO_2									

37. Using your table of electronegativities, place the bonds in order of increasing polarity:
Si—O Si—H Si—I Si—F I—I

Answers: **1. B 2. C 3. D 4. A 5.A 6. C 7. A 8. B 9. B 10. A 11. A 12. A 13. B 14. A 15. A 16. B 17.C 18.C 19. D 20. C 21. B 22. A 23. A 24. D 25. D 26. A 27. D 28. A 29. B 30. C**

Short Answer

31.

Formula	Lewis dot diagram	Number of Domains on Central Atom	Number of Lone Pairs on Central Atom	Structural Formula	Name of Shape
AsH_3	See teacher for answer	4	1	See teacher for answer	pyramidal
CBr_4	See teacher for answer	4	0	See teacher for answer	tetrahedral

32. Ketone; minty, because it has the C=O bonded to two carbons on each side (you may also circle the functional group in the structure as your explanation)

33. (a.) 0.58; polar (because the difference is greater than 0.4) (b.) S is δ+ and each Cl is δ- (because Cl is more electronegative than S) (c.)The arrows should point toward Cl from S (there should be two arrows for the two polar bonds), The arrow showing the overall dipole should point straight down (d.) Yes, it is polar.

34. Mineral oil is nonpolar because it is not attracted to a charged wand and it does not bead up into a droplet. It does not have charges so cannot be attracted to a charged wand. The molecules are not attracted to each other because the molecules do not have partial charges, so it cannot form a droplet--it spreads out on wax paper.

35. HBr is polar because there is an electronegativity difference of 0.86 between the atoms. The partial negative charge would be on the Br because Bromine has a greater electronegativity then H and more strongly attracts the electrons. HBr would have a smell because it is a polar molecule that can dissolve in water in the nose so it can land on a receptor site.

36. Complete the chart below.

Formula	Lewis Dot Diagram	Geometry	Shape (name and sketch) *Show direction of all dipoles	Symmetrical shape?	All surrounding atoms identical?	Polar or Nonpolar?	Dissolves in water?	Will it smell?	Type of IMF's?
CH_4	See teacher for answer	Tetrahedral	See teacher for answer	Yes	Yes	Nonpolar	No	No	London dispersion (or van der waals)
H_2Se	See teacher for answer	Tetrahedral	See teacher for answer	no	Yes	Polar	Yes	Yes	Dipole-dipole interactions
NH_3	See teacher for answer	Tetrahedral	See teacher for answer	no	Yes	Polar	Yes	Yes	Hydrogen bonding
CO_2	See teacher for answer	linear	See teacher for answer	yes	yes	nonpolar	no	no	London dispersion (or van der waals)

37. I-I, Si-H, Si-I, Si-O, Si-F