Smells Study Guide Answers

pg 252 #1-8 and pgs 253-255, #1-20 (except #14)

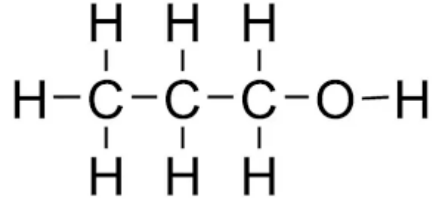
1) Isomers are molecules that have the same molecular formula but different structural formulas.
2) One isomer is an aldehyde, the other an alcohol with a double bond.
3) A molecular formula provides the elements and number of atoms per element in a compound. A structural formula shows the way in which these atoms are bound to each other. A ball and stick model provides a three dimensional image of the bonds. A space filling model shows the amount of space each atom takes up, with atoms that are sharing electrons overlapped in space.

4) ester group, hydroxyl (alcohol group)

5) a. Yes, each hydrogen atom is part of one covalent bond, each oxygen atom is part of two bonds (counting double bonds twice) and each carbon atom is part of four bonds.

b. $C_8H_8O_3$ c. The molecule has a flat section with the ester functional group attached to its side, similar to the shape of a frying pan. d. The bond is bent because there are four electron domains. The oxygen atom has two bonded pairs and two lone pairs. The shape that separates the four domains as much as possible is tetrahedral, which causes the two bonds to be bent.

6.



b. (Change structural formula to bonding pairs. Two lone pairs should be added to oxygen.)

c. The dipoles are the carbon-oxygen bonds (the arrow pointing toward carbon atom), the carbon-hydrogen bonds (the arrow pointing toward the carbon atom) and the hydrogen-oxygen bonds (the arrow pointing toward the oxygen) d. Each carbon atom has four electron domains. The shape that allows them to be as far apart as possible is a tetrahedron. e. The name of the molecule might end in −ol because it has a hydroxyl function group and is an alcohol.

7. A dipole has two ends, one that is positively charged and one that is negatively charged. In a methane molecule each of the bonds is a polar bond because the electronegativities of carbon and hydrogen are different. The hydrogen has a partial positive charge and the carbon has a partial negative charge. However, methane has a tetrahedral shape to keep the electron domains as far apart as possible. This means that the outside of the molecule has four identical partial positive charges. Therefore, the entire methane molecule does not have two poles and is not a dipole.

8. D

1. D
2. B,C
3. B
4. A
5. D
6. D
7. C
8. A
9. C
10. A
11. C
12. C
13. C
14. N/A
15. D
16. A,D
17. B
18. C
19. B
20. A