CST:
Chem 10b,e

Molecules in 2D

ChemCatalyst:

Q: List 3 differences & 3 similarities of these 2 drawings of molecules you've already smelled.

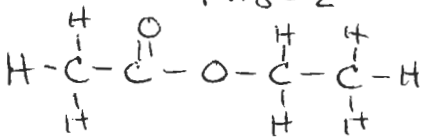
* Show Transparency *

Notes:

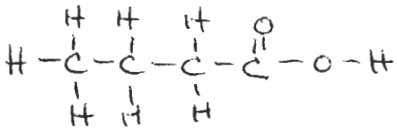
- What is a structural formula?

- a drawing to show how the atoms in a molecule are connected
- ex:

Ethyl Acetate
$C_4H_8O_2$



Butyric Acid
$C_4H_8O_2$



- What kinds of atoms make up these molecules?
  - NONMETALS !
- What kinds of bonds hold these atoms together in the molecule?
  - COVALENT ! = sharing 1 pair of e- (2e- total)
- What do the double lines represent?
  - double bonds = sharing 2 pairs of e- (4 e- total)

LESSON 2 ACTIVITY

Molecules in Two Dimensions
Structural Formulas

Name _____

Date _____ Period _____

Purpose

To compare the structures of molecules.

Materials

- vials F–H

Part 1: Test Your Predictions

Write your predictions in the table. Then carefully smell vials F, G, and H.

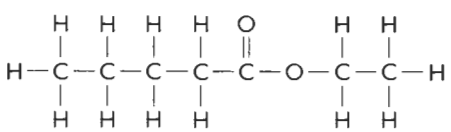
Vial	Chemical name	Molecular formula	Predicted smell	Actual smell
F	ethyl pentanoate	$C_7H_{14}O_2$		
G	butyric acid	$C_4H_8O_2$		
H	ethyl acetate	$C_4H_8O_2$		

1. What name would you give to the smell category that vial G might belong in?

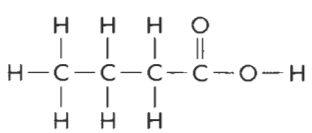
2. What could account for two molecules with the same molecular formula having different smells?

Part 2: Examine the Structures

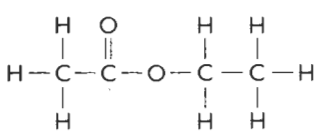
Below are structural formulas of each of the three substances. They show how the atoms in each molecule are connected.



Molecule F



Molecule G



Molecule H

Questions

1. List three similarities between molecules G and H.

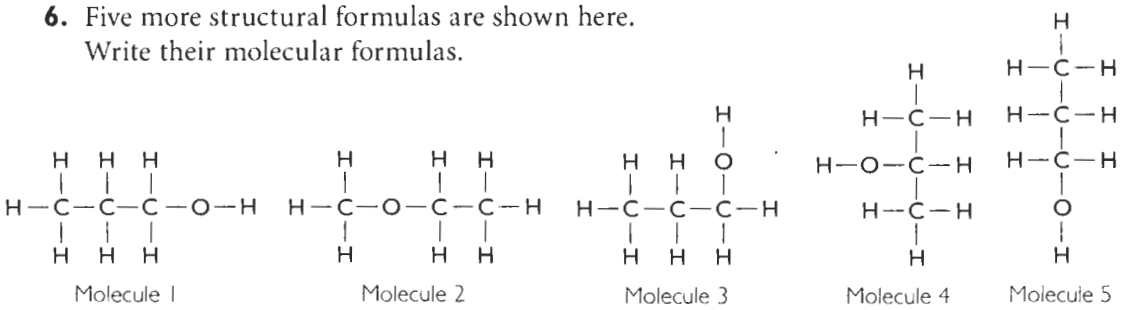
2. List two differences between molecules G and H.

3. List three similarities between the two sweet-smelling molecules.

4. What do you suppose the lines in these drawings represent?

5. From the evidence you have seen so far, how would you explain the differences in smell between molecules G and H?

6. Five more structural formulas are shown here. Write their molecular formulas.



7. Molecules 1, 3, and 5 smell exactly the same. They represent the same molecule. Explain why.

8. Molecules 1, 2, and 4 have different smells. Explain why.

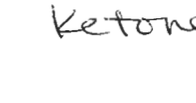
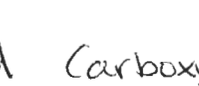
9. **Making Sense** What evidence is there that the structure of a molecule is related to how it smells?

10. **If You Finish Early** Draw molecule 4 so that it looks different on paper but still represents the same molecule.

Making Sense Notes

What is a functional group?

- smell is related to the arrangement of atoms in a molecule => functional group

Smell	Functional Group	structure	Name ending
Minty	Ketone	 oxygen double bonded to carbon	-one
Fishy	Amine	 nitrogen bonded to carbon	-ine
Putrid	Carboxylic Acid	 oxygen double bonded to carbon with -O-H @ end	-ic acid
Sweet	Ester	 oxygen double bonded to carbon in "coockie" arrangement	-ate

* functional groups produce different physical properties (like smell) & chemical properties (like what kind of rxns they undergo)

Check-In:

Q: If a molecule is sweet, what other things do you know about it?

1. ester group
2. 
3. name ends in -ate
4. has 2 O's in it