LESSON 35
FOLLOW-UP

Making Scents
Analyzing Ester Synthesis

Name _____

Date _____ Period _____

Purpose

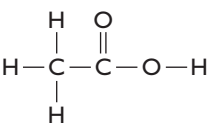
To analyze the results of the ester synthesis lab.

Analysis

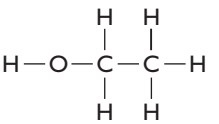
1. In the ester synthesis lab, how did the smell of the mixtures before heating compare to the smell of the mixtures after heating?

2. Based on the smell of the mixtures after heating, what functional group must be present in the final molecules that were produced? Draw it.

3. Using these two structural formulas, build a new molecule that contains the functional group you identified in Question 2. This is a chemical reaction, so you are allowed to break bonds and make new ones.



Acetic acid



Ethanol

4. Are there any atoms that were not used to make the sweet-smelling molecule in Question 3? If so, what molecule do these pieces make?

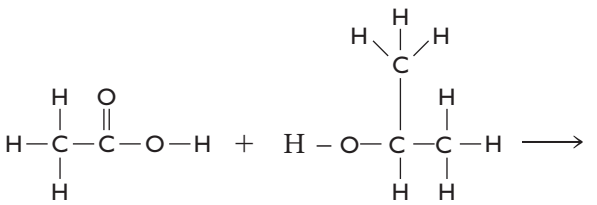
5. Complete this chemical equation. Make sure that the equation is balanced (the same number of carbon, hydrogen, and oxygen atoms on both sides of the arrow).

   $C_2H_4O_2 + C_4H_{10}O$

6. What evidence do you have that this reaction took place in your test tube?

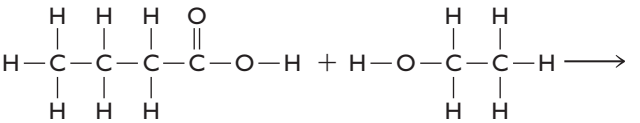
Living By Chemistry 2e Teacher's Resource Materials
© 2015 W.H. Freeman and Company/BFW

7. The reaction between acetic acid and isopropanol produces a sweet smell. Draw the structural formulas of the products, water and isopropyl acetate.



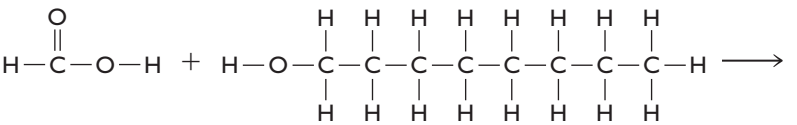
Acetic acid Isopropanol

8. The reaction between butyric acid ($C_4H_8O_2$) and ethanol (C_2H_6O) produces a sweet smell. Draw the structural formulas of the products, water and ethyl butyrate.



Butyric acid Ethanol

9. Imagine that you used the following acid and alcohol in the lab to create a sweet-smelling molecule. Draw the structural formulas of the products, water and octyl formate.



Formic acid Octanol

10. What are the molecular formulas of the sweet-smelling products in Questions 5 and 8? Draw the structural formulas of these two molecules next to each other. Why do you think the molecules in Questions 5 and 8 smell different?

11. Making Sense Use your own words to describe what happens on a *molecular* level when an acid and an alcohol react.

12. If You Finish Early See if you can figure out how the products of these reactions are named. What would be the name of the product in Question 3?

© 2015 W.H. Freeman and Company/BFW