PS 100 Worksheet 9 Chapter 19

worksheet 9 Chapter 19		Date	
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Title: Mass Spectrometers and IR spectra.

Instructions: Mass spectra are commonly used to determine whether or not a molecule is present in a sample. Below you are given mass and IR spectra for formic acid, HCOOH, and acetic acid, CH₃COOH. The spectra were obtained from <u>http://www.aist.go.jp/RIODB/SDBS/</u> (National Institute of Advanced Industrial Science and Technology, 2 Mar 2006) You are not told which is which; you're going to figure it out.

Data



- 1. Use the molecular model sets to assemble both formic and acietic acid molecules.
- 2. If mass spectra are created by taking molecules, breaking them into pieces, and you compare the mass of the molecules to the mass of the fragments then what would you expect to see?

Complete the table for each of the molecules				
	Formic acid	Acetic acid		
Number of C				
Number of O				
Number of H				
Mass				

Complete the table for each of the molecules

- 3. Based on your prediction above and your calculated mass, which graph is for which molecule?
- 4. Based on the models you've built, what pieces are easy to "break off?" Find the masses of these pieces and compare them to the masses of large peaks on the mass spectra above. Use the models you've built to draw a picture of each molecule. Circle the fragments that could be responsible for the three largest peaks on each mass spectrum.

IR Spectra:



1. What do the lines on the graphs represent?

2. What features do the IR spectra for atoms in the same family have in common? Why?

3. What specific features should spectra for formic, acetic and any other member of the same family have in common

4. What do you see when you look at the pictures for sample A and sample B?

5. Which of the two samples at the bottom is a member of the same family? How do you know?