ORGANIC CHEM SMELL LAB

(80/1200) name: _____

Objective: to familiarize ourselves with organic functional groups and to learn how to recognize them in organic chemical diagrams.

Procedure: There are 20 different organic chemicals in tiny jars spread out in the back of the room. Smell them properly, attempt to differentiate the smells from each other. Each smell is due to organic molecules, all drawn inside this lab.

1. You are to smell each of them and attempt to name the scent that the chemical produces [put the LETTER of the jar in the "VIAL" columns]. Making errors with your nose will not be counted against you!

2. The jars and lids ARE NOT TO BE MIXED under any circumstances. Keep them at their stations and DO NOT MOVE THE JARS AROUND THE ROOM.

3. Careful smelling technique will be shown by your teacher, do not spill any of these chemicals on your skin or in your eyes. Only waft, no snorting.

4. After smelling the scents you will be able to look at the organic chemical structural formulas. You will locate and name ALL of the FUNCTIONAL GROUPS which are outlined in TABLE R.

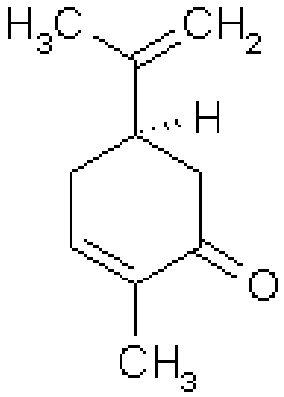
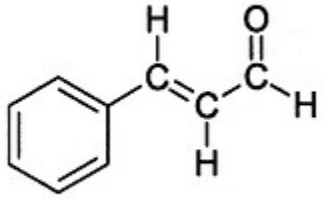
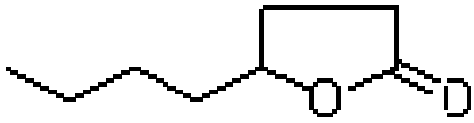
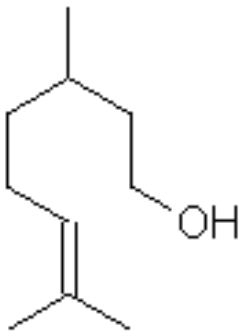
   Some of these molecules have more than 1 functional group, circle ALL of them and name them in the side columns of the tables.

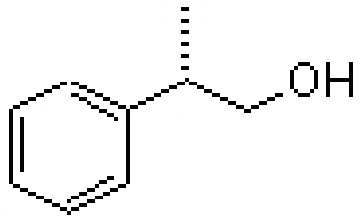
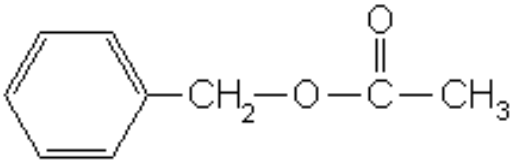
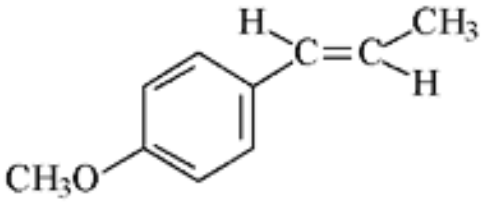
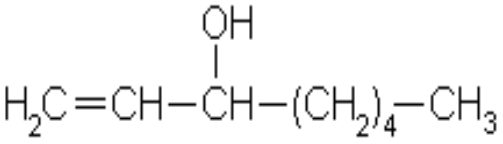
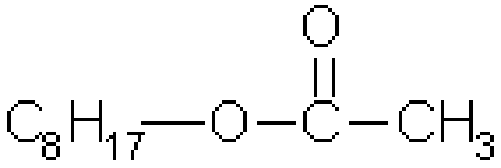
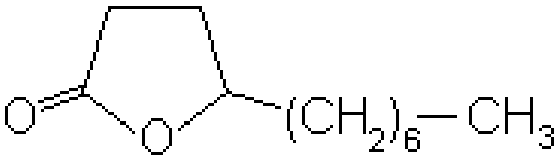
5. Next, you will draw a MODIFIED VERSION of TABLE Q. Use Butane, 1-butene, and 2 butyne. Your table should help you discern the differences between the 3 types of chained hydrocarbons, just like Table Q does for you now. Fill in the table drawn for you at the end of this lab report.

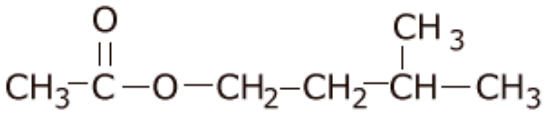
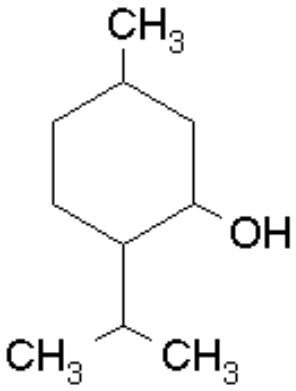
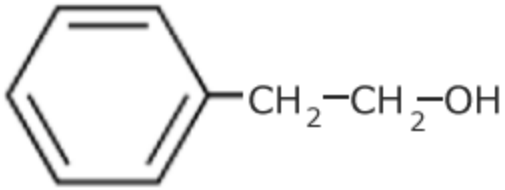
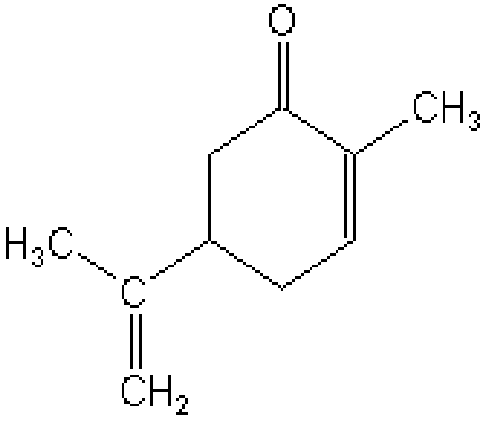
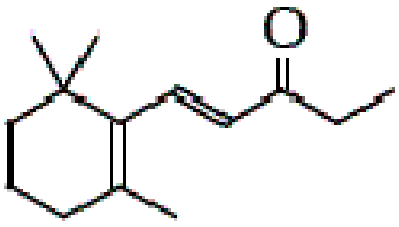
6. On the other side of this page are 36 different organic molecules that you are to draw. Follow these directions: only SIX molecules per page, ONLY use the FRONT SIDE of the page (to aid in grading).

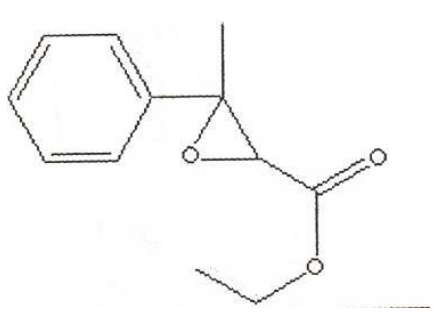
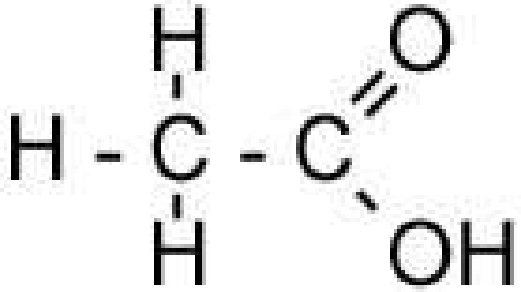
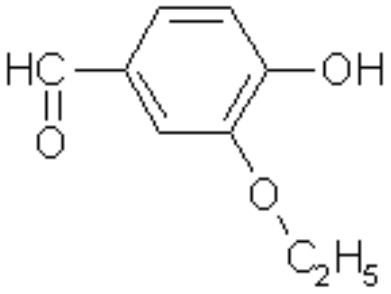
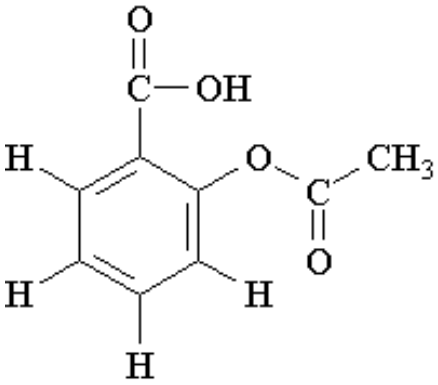
7. Finally, the last page shows several organic reactions, please label which each of the reactions is.

page	Draw these compounds Draw 6 per page, spread them out, make them big, you do NOT have to draw all of the hydrogen. Use pencil, no big cross outs will be accepted!
page 1	propane ethanol pentane 3-nonene di-propyl ether 2-butyne
page 2	1-bromo-2-hexyne octane 4-nonyne butane 2,3,6, tri-chloro decane propene
page 3	1-butanol pentanal tri-iodo methane methyl-propyl ether propanoic acid hexanal
page 4	ethanoic acid chloromethane ethyl butanoate 1 bromo, 4 chloro 2-pentene butyl hexyl ether 1-bromo, 3-chloro, 4-fluro, 6-iodio nonane
page 5	ethanal hexanamide ethene 3-heptanone methyl-ethyl ether propyl hexanoate
page 6	4 ethyl,2-methyl octane 2-octene 3-hexanamine ethyl ethanoate 2-octyne pentanamide

VIAL	SCENT	STRUCTURAL FORMULA	Types of Functional Groups present
	banana	$CH_3\text{-}O\text{-}C\text{-}C_5H_{11}$ (C double-bonded to O)	
	caraway (rye bread)		
	cinnamon		
	coconut		
	geraniums (flowers)		

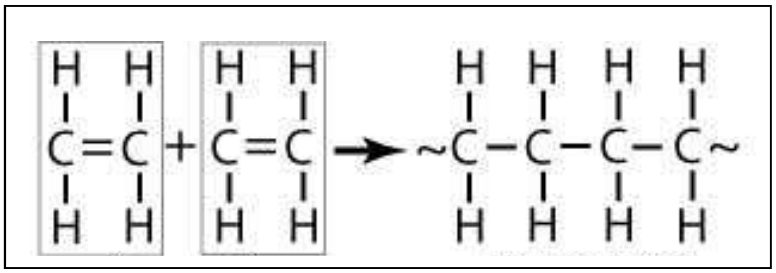
VIAL	SCENT	STRUCTURAL FORMULA	Types of Functional Groups present
	hyacinth (flowers)		
	jasmine		
	licorice		
	mushroom		
	orange		
	peach		

VIAL	SCENT	STRUCTURAL FORMULA	Types of Functional Groups present
	pear		
	pepper-mint		
	roses		
	spearmint		
	violets		

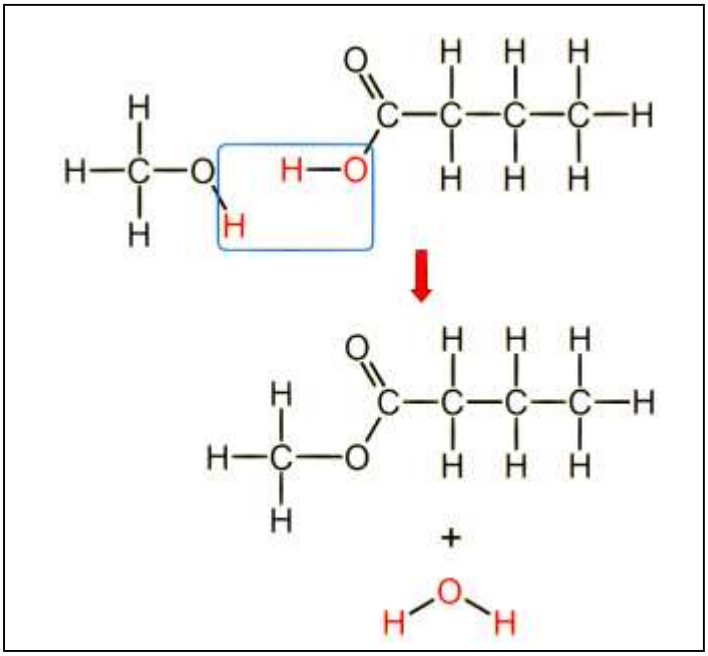
VIAL	SCENT	STRUCTURAL FORMULA	Types of Functional Groups present
	strawberry		
	vinegar (ethanoic acid)		
	vanilla		
	winter-green (Canada Pink Mint Candies)		

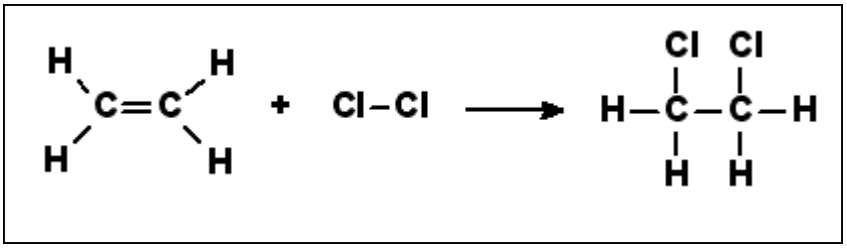
Chain name	general formula n = number of carbon atoms	EXAMPLES	
		Name (4 Carbon chains)	Structural Formulas (draw all hydrogen atoms)
alkanes		butane	
alkenes		1-butene	
alkynes		2-butyne	

For each of the following organic reactions, name each type of reaction shown.



$$CH_4 + Cl_2 \longrightarrow CH_3Cl + HCl$$





$$C_6H_{12}O_{6(AQ)} \xrightarrow{\text{enzymes}} CO_{2(G)} + C_2H_5OH_{(AQ)}$$

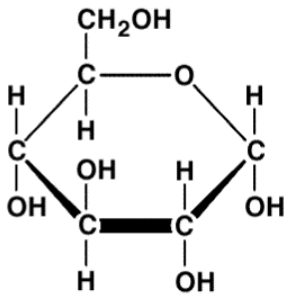
Substitution Reactions start only with saturated hydrocarbons (alkanes) which combine with halogens, and a single atom of the halogen swaps places with a single atom of hydrogen. The left over halogen atom combines to the bumped hydrogen. Substitution reactions occur ONLY one atom at a time.

Substitute in a fluorine atom with ethane, forming fluoro-ethane + HF
Substitute in a iodine atom with propane, forming 1-iodo-propane + HI
Substitute in an iodine atom with propane, this time forming 2-iodo-propane + HI

Fermentation reactions occur with sugars being reacted upon by yeast cells undergoing anaerobic respiration, releasing carbon dioxide gas and ethanol alcohol.

Draw the proper structural diagrams for the products of when glucose is fermented by yeast cells. You'll need the proper number of molecules as products (not 1 of each)

Structural model of
GLCUOSE



Water with yeast cells →

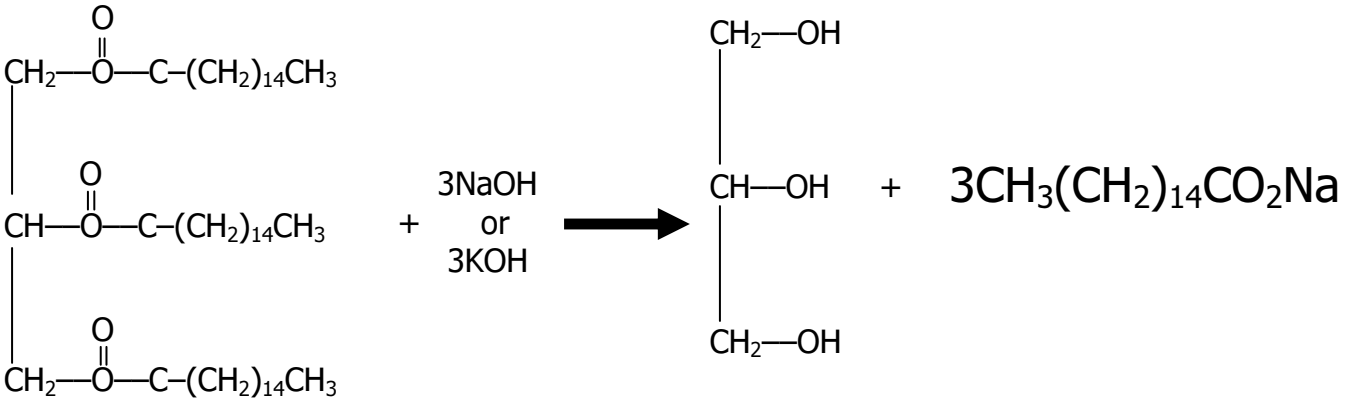
Write balance equation in rectangle below

Addition reactions require you to start with an *unsaturated* hydrocarbon, so you have the room in the molecule to add either F_2, Cl_2, Br_2, I_2, or even H_2. You must start with an alkene, or alkyne. Alkenes open the double bond to a single, allowing two places to open to add the diatomic halogen (or hydrogen). If you start with an alkyne, you convert the triple bond to a double, then add in the two new atoms.

In each box, draw structural formulas + write the balanced chemical equations for:

Add a bromine molecule to 2-pentene
Add a chlorine molecule to 2-butyne
Add a hydrogen molecule to propene

Saponification is the production of soap. Reorganize the first 4 letters of this reaction name to remember this one. Label the triple ester (FAT), the base, the triple alcohol (in this case glycerol) and the SOAP molecule.



Esterification is the process of combining organic acids to alcohols by the removal of $HOH_{(L)}$, forming an ester. Strangely, acids are known for liberating hydrogen ions when ionizing in water. Alcohols do not ionize at all. In this reaction, the acid will lose the –OH part of the COOH group, and the alcohol will lose just the H from its –OH group. The HOH forms water, and the molecules join with a COO group in the middle. We always name esters this way: FIRST name is the group attached to the oxygen "tail", the second name contains all the other carbons.

Draw the structural diagrams for propanoic acid and for ethanol. Make sure the functional groups are both drawn towards each other. Circle the OH and the H that makes the water, then draw and properly name the ester that forms.

Now combine methanol with hexanoic acid to produce the wonderful smell of bananas! Do the same as above, draw 2 diagrams for the acid and the alcohol, circle the –OH and the –H that forms water, then draw and properly name the new ester.