CfE Higher Chemistry Homework

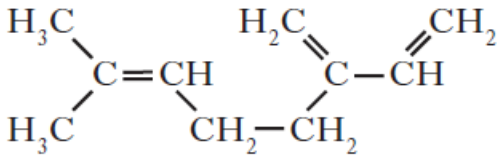
Unit 2: Natures Chemistry

Soaps, Fragrances and Skin Care

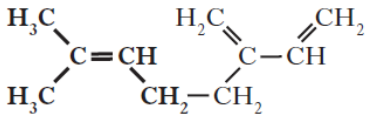
1. In which line of the table are fat, protein and soap correctly classified.

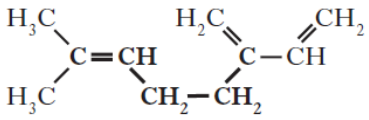
	Amides	Salts	Esters
A	Fat	Soap	Protein
B	Fat	Protein	Soap
C	Soap	Fat	Protein
D	Protein	Soap	Fat

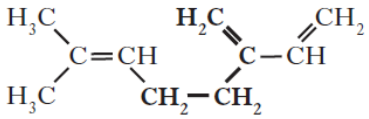
2. Myrcene is a simple terpene

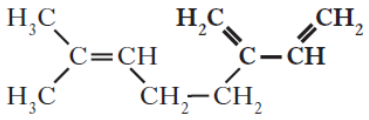


Terpenes contain at least one isoprene unit.
Which of the following correctly highlights an isoprene unit?

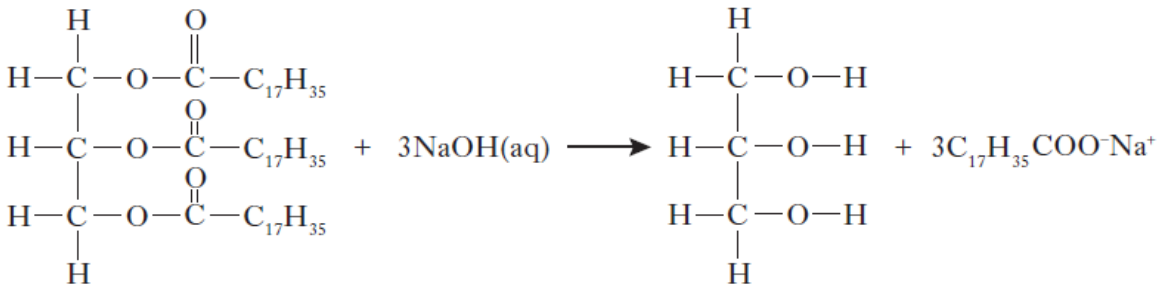
A 

B 

C 

D 

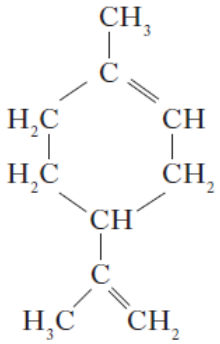
3. Soaps are produced from the following reaction



The reaction is an example of

a. Condensation
b. Esterification
c. Hydrolysis
d. Oxidation

4. Limonene is one of the terpene molecules responsible for the flavour of lemons.



How many isoprene molecules are used in the production of one limonene molecule.

a. 1
b. 2
c. 3
d. 4

5. Which of the following substances could be used as a soap?
   a. Calcium Stearate
   b. Stearic Acid
   c. Potassium Stearate
   d. Ethyl Stearate

6. Which of the following represents a propagation step in a chain reaction?

A $Cl\bullet + Cl\bullet \rightarrow Cl_2$

B $Cl\bullet + CH_4 \rightarrow CH_3\bullet + HCl$

C $CH_3\bullet + Cl\bullet \rightarrow CH_3Cl$

D $Cl_2 \rightarrow Cl\bullet + Cl\bullet$

7. The reaction between chlorine and ethane to give chloroethane is a chain reaction.
   Which of the following reactions will be "chain-stopping" (i.e. will not propagate the chain)

A $C_2H_6 + Cl\cdot \rightarrow C_2H_5\cdot + HCl$

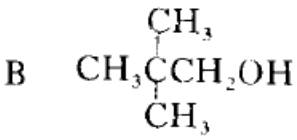
B $C_2H_5\cdot + Cl\cdot \rightarrow C_2H_5Cl$

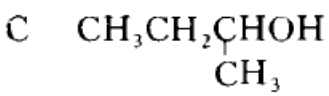
C $C_2H_5\cdot + Cl_2 \rightarrow C_2H_5Cl + Cl\cdot$

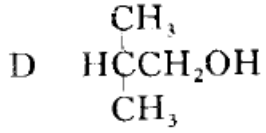
D $C_2H_5\cdot + C_2H_5\cdot \rightarrow C_4H_{10}$

8. Which of the following can be oxidised to butanoic acid?

A $CH_3CH_2CH_2CH_2OH$

B 

C 

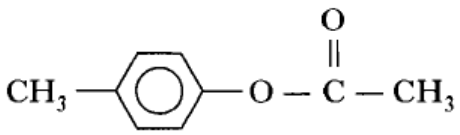
D 

9. Free radical scavengers are
    a. Compounds which combines with free radicals to form stable molecules.
    b. Compounds which cause free radical chain reactions
    c. Stable compounds used in skin care products which are made of vitamins.
    d. Compounds which break covalent bonds to form radicals.

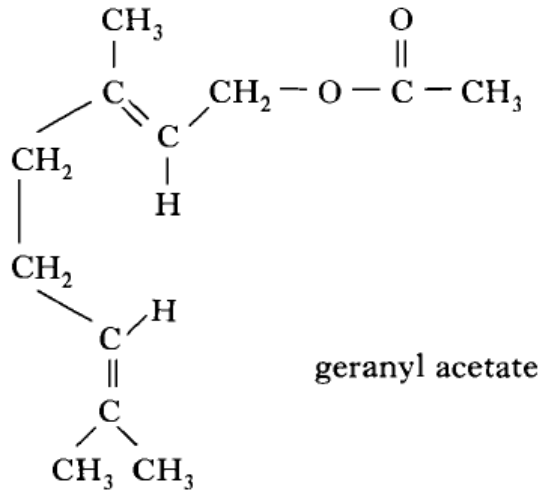
10. An essential oil is
    a. An oil which is essential in creating fragrance
    b. A concentrated extract of the aroma compounds from plants
    c. An unsaturated water soluble compound
    d. A synthetic inorganic compound.

Long Answer Questions!

1. Perfumes normally contain three components called the top note, the middle note and the end note.
   The top note components of a perfume form vapours most easily. Two compounds found in top note vapours are



p-cresyl acetate

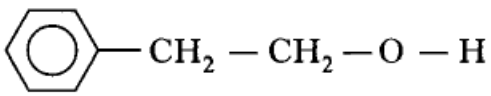


geranyl acetate

   a. With reference to the structure of these compounds why are they likely to have pleasant smells?
   b. Describe a chemical test which would distinguish between the two compounds and give the results.

The middle note compounds form vapours less readily than the top note. A typical compound of the middle note is

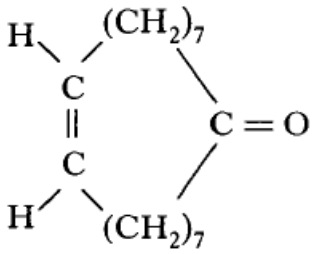
2-phenylethanol



c. Due to Hydrogen bonding 2-phenylethanol forms a vapour less readily that *p*-cresyl acetate.
Draw another molecule of 2-phenylethanol and use a dotted line to show where a hydrogen bond exists between the two molecules

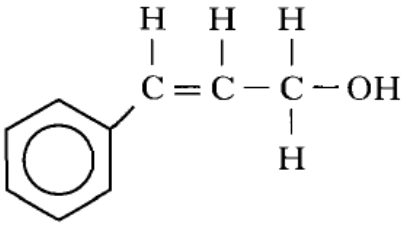
The end note of a perfume has a long lasting odour which stays with the user. An example of an end note compound is civetone.

civetone



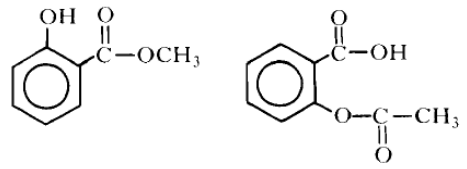
Draw the structure of the alcohol which would be formed by the reduction of civetone.

2. Synthetic perfumes are cheaper and easier to produce than natural perfumes.
    a. Cinnamyl alchol smells pleasantly of hyacinths; it can be described as aromatic.



Give another term which could be used to describe this alcohol.

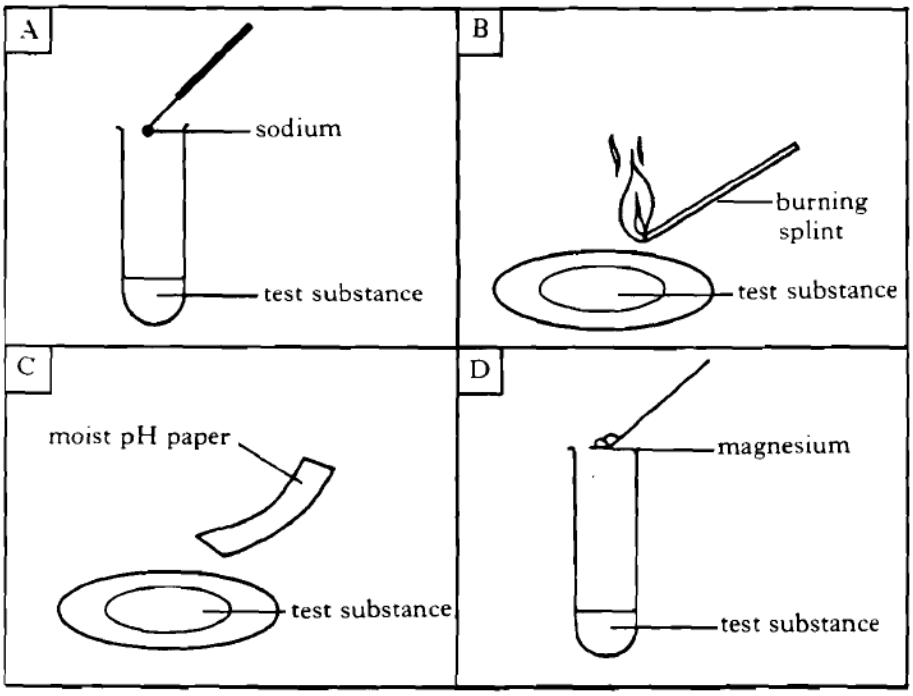
3. Oil of wintergreen and aspirin are used in medicine. The structures are shown below.



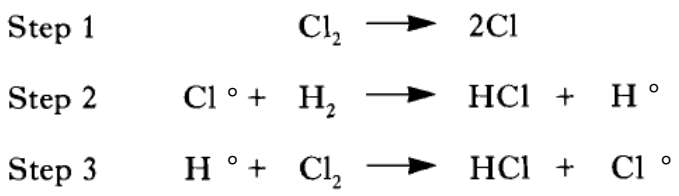
Oil of wintergreen Aspirin

What term can be applied to aspirin but not oil of wintergreen?

4. A student carried out four tests on ethanol and ethanoic acids to compare the properties of the two homologous series, alcohols and carboxylic acids.
   a. Choose one test in which ethanol and ethanoic acid will give different results and state the results.
   b. Choose one test in which ethanol and ethanoic acid will give similar results and state the result.



5. A mixture of hydrogen and chlorine gases reacts explosively when exposed to ultraviolet light. The reaction involves very reactive chlorine atoms (Cl) and hydrogen atoms (H).



a. Explain why halogen radicals are produced rather than hydrogen radicals in the initiation reaction.
b. Suggest why step 1 is speeded up when the mixture of gases is exposed to ultraviolet light.