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الملف Worksheet about Organic chemistry structures

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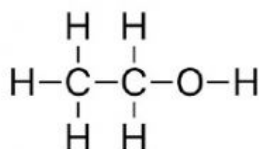
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ALCOHOLS

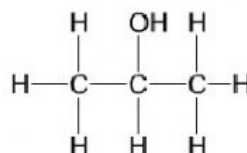


- - ol
- Functional group **-OH** (hydroxyl group)
- Polar (miscible in water)
- Hydrogen bonds (1 site)
- Ethanol (alcoholic drinks)

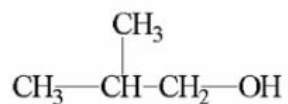
e.g. 1) Ethanol



2) propan-2-ol



3) 2-methylpropan-1-ol (*Start counting from the carbon closest to the -OH)



Fill in the molecular formula or the following and draw their structures in your books:

1.) ethanol

2.) butan-2-ol

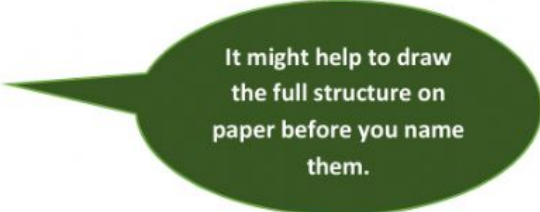
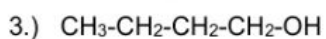
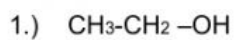
3) ethan-1,2-diol

4) hexan-3-ol

5) 2-methylpropan-2-ol

6) 3-methylbutan-2-ol

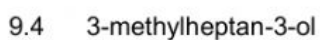
Name the following (remember to put a number to indicate which carbon the alcohol is on):



It might help to draw the full structure on paper before you name them.

Question 9

Draw the structural formulae for the following in your books:



6

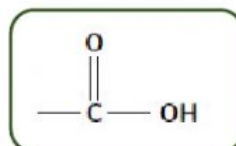
CARBOXYLIC ACIDS



- - oic acid
- Functional group $-COOH$ (carboxyl group)
- Polar
- Hydrogen bonds (2 sites)
- Empirical formula $C_nH_{2n}O_2$ (same as ester)
- Start numbering at C of $COOH$

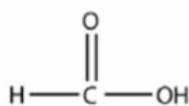
- General formula: $C_nH_{2n}O_2$ or $C_nH_{2n+1}COOH$

- Functional group is called **Carboxyl** group:

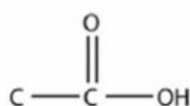


- Note that the carboxyl group is ALWAYS at the end of the main carbon chain. You must start counting with the Carboxyl carbon being number 1 in the chain, and it is not necessary to use a number in the name to say where the functional group is, because it will always be Carbon number 1.

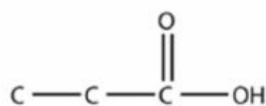
e.g.



Methanoic acid



Ethanoic acid



Propanoic acid

(The H's around the C's have been left out of the diagrams above! Don't forget - 4 bonds for every Carbon. If there are 2 bonds going to an O then that C can only have 2 more bonds.)

Fill in the molecular formulae for the following and draw the full structures in your books:

- | | |
|------------------|--------------------------|
| 1) ethanoic acid | 2) 3-methylbutanoic acid |
| 3) hexanoic acid | 4) propanoic acid |

Question 10

Draw the structural formulae for the following in your books:

10.1 2,2-dimethylbutanoic acid

10.2 2,3-dimethylhexanoic acid

10.3 2-chlorobutanoic acid

10.4 2-ethylpentanoic acid

Question 12

Give the IUPAC name for the following:

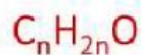
12.1 $\text{CH}_3(\text{CH}_2)_4\text{COOH}$

12.2 CH_3CHCOOH

12.3
$$\begin{array}{ccccccc} \text{CH}_3 & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_2 & - & \text{C} & - & \text{OH} \\ & & & & | & & & & || & & \\ & & & & \text{Br} & & & & \text{O} & & \end{array}$$

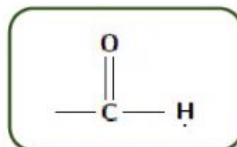
12.4
$$\begin{array}{ccccccc} \text{CH}_3 & - & \text{CH} & - & \text{CH}_2 & - & \text{CH}_2 & - & \text{CH}_2 & - & \text{COOH} \\ & & | & & & & & & & & \\ & & \text{Cl} & & & & & & & & \end{array}$$

7 ALDEHYDES



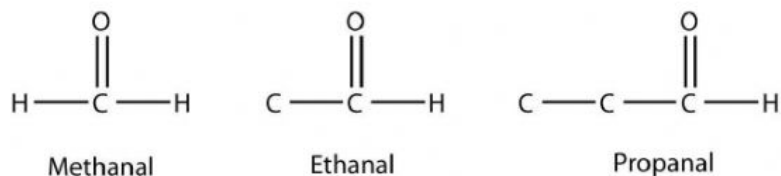
- -al
- Functional group – formyl
- Saturated
- Polar
- Dipole-dipole forces
- Same structural formula as ketone but =O is always on end, not between carbons

- Contains **formyl** functional group



- Note that the formyl group is ALWAYS at the end of the molecule, so no need for numbers when naming aldehydes as you always start numbering at the formyl carbon.

e.g.



(The H's around the C's have been left out of the diagrams above!)

Fill in the molecular formulae for the following and draw the structures in your books:

- 1) ethanal
- 2) butanal
- 3) hexanal

Question 15

Draw structural formulae for the following:

15.1 3-methylbutanal

15.4 2-methylpentanal

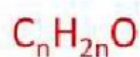
15.2 2-methylpropanal

15.5 3-chlorobutanal

15.3 3-ethylhexanal

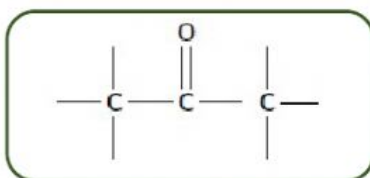
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KETONES

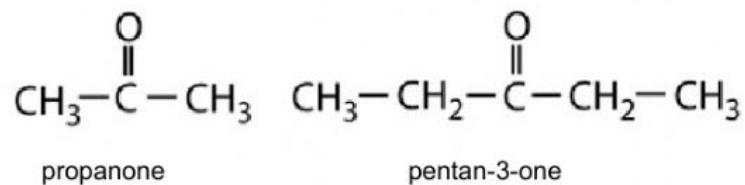


- - one
- Functional group – carbonyl C=O
- Saturated (double bond not between carbons)
- Polar
- Dipole-dipole forces
- Shortest ketone = propanone (acetone = nail polish remover)

- Contains a **carbonyl** functional group, but it has to be between 2 carbon atoms not at the end of the structure like aldehydes!



eg.



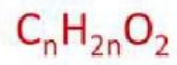
Fill in the molecular formulae for the following and draw the structures in your books:

- 1) hexan-2-one
- 2) butan-2-one

Question 17

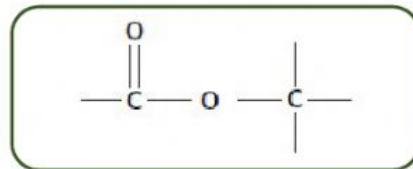
Draw structural formulae for the following in your books:

- 17.1 5-methylhexan-2-one
- 17.2 hexan-3-one
- 17.3 4-chlorobutan-2-one

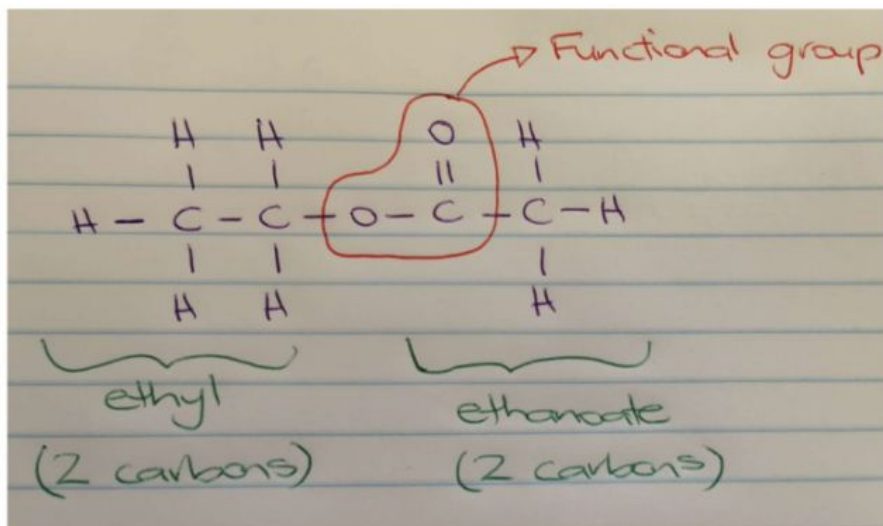
9**ESTERS**

- - oate
- Functional group -COO
- Saturated
- Polar
- Dipole-dipole forces
- Pleasant smell (fruit, flower perfume)

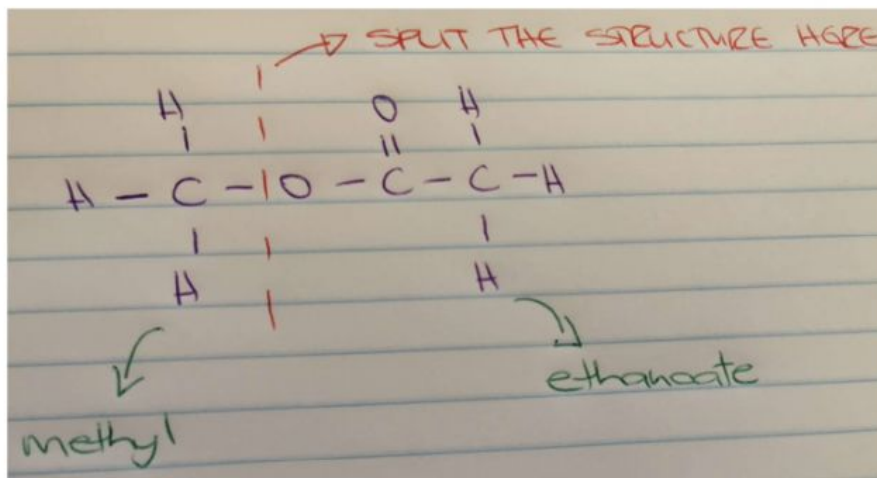
- Contains functional group :



eg. 1) ethyl ethanoate



2) methyl ethanoate



Fill in the molecular formulae for the following and draw the structures in your books:

1) butyl hexanoate

2) ethyl propanoate

Question 14

Draw structural formulae for the following in your books:

14.1 ethyl butanoate

14.2 propyl hexanoate

14.3 butyl pentanoate

14.4 methyl heptanoate