Name:		Date		
Chemistry ~ Ms. Hart	<u>Class:</u>	Anions or	Cations	SCHOOL FOR CRIMINAL IUSTICE
<u>12.3 Funct</u> By the end of today, you will have an SPARK:	ional Group answer to: <i>Wh</i>	e <mark>s</mark> hat puts the FU	UN in Functio	nal Groups?
• Explain in-terms of electrons,	why the bond	ing in C ₄ H ₁₀ is	different tha	n the bonding in CaCl ₂ .
 How many bonds must carbon <u>always</u> make?				
In box 1 is the molecule butane, C_4H_{10}	b. Please draw	and name on	e isomer of th	is structure.
#1		#2		
H H H H H-C-C-C-C-C H H H H	Η □ □ Η Η			
Name:		Name:		
1. Which compound is an isomer of CH_3CH_2OH ?(1) CH_3CHO (3) CH_3OCH_3 (2) CH_3COCH_3 (4) CH_3CH_2COOH				
2. Which compound is an isomer of CH_3COOCH_3 ? (1) CH_3OCH_3 (3) CH_3CH_2COOH (2) CH_3COCH_3 (4) $CH_3CH_2CH_2OH$				
CATALYST Review: CH ₃ CH ₂	CH ₃ is the cond mula?	lensed formul	a for butane.	

Hint: Number of bonds carbon ALWAYS MAKES: _______

What about CH₃CHCHCH₃?:

One More Aspect to Organic (Carbon/Hydrogen chemistry) Functional Groups:

- Are an atom or group of atoms that always react in a certain way.
 - These can easily add themselves to organic compounds.

Functional Group Notes

- **Functional Groups** change the properties of the original hydrocarbon.
- **Table R** lists important properties and naming rules for functional groups.
- Can Include
 - Double bonds
 - o Rings
 - Halogens (group 17)
 Oxygens in different
 - arrangements
 - Nitrogens

• The *R*-

 Stands for the original hydrocarbon group.

Quick Check:

1. Which class of compounds is represented by R–OH?

What is the example given in Table R?

What is the R in the example?

2. Which class of compounds is

represented by

What is the example from Table R?

What is the R in the example?

	Table R	
Organic	Functional	Groups

Class of Compound	Functional Group	General Formula	Example
halide (halocarbon)	-F (fluoro-) -Cl (chloro-) -Br (bromo-) -I (iodo-)	<i>R—X</i> (X represents any halogen)	CH ₃ CHClCH ₃ 2-chloropropane
alcohol	—он	R—OH	CH₃CH₂CH₂OH 1-propanol
ether	-0-	R - O - R'	$\begin{array}{l} {\rm CH_3OCH_2CH_3} \\ {\rm methyl \ ethyl \ ether} \end{array}$
aldehyde	О —С <i>—</i> Н	О <i>R</i> —С—Н	O CH ₃ CH ₂ C—H propanal
ketone	0 -C-	$\stackrel{O}{\stackrel{ }{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_$	$\begin{matrix} {\rm O}\\ {\rm II}\\ {\rm CH}_3{\rm CCH}_2{\rm CH}_2{\rm CH}_3\\ {\rm 2-pentanone}\end{matrix}$
organic acid	о -С—ОН	О <i>R</i> —С—ОН	O CH ₃ CH ₂ C—OH propanoic acid
ester	0 -C-O-	$\stackrel{O}{\underset{R-C-O-R'}{\overset{H}}}$	$\begin{array}{c} & \\ & \\ & \\ \mathrm{CH}_{3}\mathrm{CH}_{2}\mathrm{COCH}_{3} \\ \\ \mathrm{methyl} \ \mathrm{propanoate} \end{array}$
amine	 N	$R' \mid R - N - R''$	$\begin{array}{c} \mathrm{CH_3CH_2CH_2NH_2} \\ 1\text{-propanamine} \end{array}$
amide	О -С—NH	$\begin{array}{c} O & R' \\ \parallel & \parallel \\ R - C - NH \end{array}$	$\begin{array}{c} & {\rm O} \\ \parallel \\ {\rm CH}_{3}{\rm CH}_{2}{\rm C-\!\!-\!NH}_{2} \\ {\rm propanamide} \end{array}$

 ${\it R}$ represents a bonded atom or group of atoms.

Table R Scavenger Hunt!!!



For each of the structures below, circle the functional group **and** *identify* the class of each compound.



Part 1: Writing out the st	ructural formulas from th	e condensed formula:
1. $CH_3CH_2CH_2CH_3$	2. CH ₃ CHCHCH ₃	3. CH ₃ CCCH ₃

Part 2: For each of the structures below, circle the functional group.



Part 3: For each of the functional groups found on Table R

- 1) Draw the entire structural formula.
- 2) Circle the "R" part of the molecule:
- 5.

CH₃CHClCH₃ 2-chloropropane R-

6.

R-OH CH₃CH₂CH₂OH 1-propanol

7.
$$\begin{array}{c|c} O \\ R-C-O-R' \end{array} \begin{vmatrix} O \\ I \\ CH_3CH_2COCH_3 \\ methyl propanoate \end{vmatrix} \begin{array}{c} 8. \\ R-C-OH \\ R-C-OH \end{vmatrix} \begin{vmatrix} O \\ I \\ CH_3CH_2C-OH \\ propanoic acid \end{vmatrix}$$

Regents Practice

A reaction between bromine and a hydrocarbon is represented by the balanced equation below.

$$\begin{array}{ccccccc} H & H & H & H & H & H \\ I & I & I & I & I \\ Br_2 + H - C = C - C - H & \longrightarrow & H - C - C - C - H \\ I & I & I & I \\ H & H & Br & Br & H \end{array}$$

9. Write the name of the homologous series to which the hydrocarbon belongs. [1]

Glycine, NH₂CH₂COOH, is an organic compound found in proteins. Acetamide, CH₃CONH₂, is an organic compound that is an excellent solvent. Both glycine and acetamide consists of the same four elements, but the compounds have different functional groups.

10. Identify *one* functional group in a glycine molecule. [1]

11. In the space *below*, draw a structural formula for acetamide. [1]

acetamide

MC Regents-Practice

12. What is the total number of pairs of electrons shared between the carbon atom and the oxygen atom in a molecule of methanal?

 $(1) 1 \quad (2) 3 \quad (3) 2 \quad (4) 4$

13. A molecule of a compound contains a total of 10 hydrogen atoms and has the general formula CnH_{2n+2} . Which prefix is used in the name of this compound?

(1) but- (2) oct-(3) dec- (4) pent-

14. Which compound is a saturated hydrocarbon?

(1) CH2CH2	(2) CH3CHO
(3) CH3CH3	(4) CH3CH2OH

15. Compounds which have the same molecular formula but different molecular structures are called(1) isomers(3) allotropes

(1) isomers	(3) allotropes		
(2) isotopes	(4) homologs		

Short Answer Regents Practice:

19. Explain, in terms of bonding, why the hydrocarbon 2-methylpropane is saturated. [1]

16. Which general formula represents the homologous series of hydrocarbons that includes the compound l-heptyne?

(1) CnH2n–6	(3) CnH2n
(2) CnH2n–2	(4) CnH2n+2

17. Which two compounds are isomers of each other?

(1) CH3CH2COOH and CH3COOCH2CH3

(2) CH3CH2CHO and CH3COCH3

- (3) CH3CHBrCH3 and CH2BrCHBrCH3
- (4) CH3CHOHCH3 and CH3CHOHCH2OH

18. Which compound is an isomer of CH₃COOH?(1) HCOOCH₃(3) CH₃CH₂OH

(2) CH_3CH_2COOH (4) CH_3COOCH_3

20. Name the following:

CH ₃ CH ₃ CH ₃ CHCH ₂ CHCH ₃	b) CH ₃ CH ₂	CH ₃ CH ₃
5 _ 5		CH ₃ CHCH ₂ CHCH ₂ CH ₃
	CH ₃ CHCH ₂ CH ₂ CHCH ₂ CHCH ₃	
Draw the following structural formul	as:	
2-methyl butane	3-ethyl,2-methylpentane	2,4-dimethylhexane

Short Answer Regents Practice:

During a break-making process, glucose is converted to ethanol and carbon dioxide, causing the bread dough to rise. Zymase, an enzyme produced by yeast, is a catalyst needed for this reaction.

21. In the space *in your answer booklet*, draw a structural formula for the alcohol formed in this reaction. [1]

The hydrocarbon 2-methylpropane reacts with iodine as represented by the balanced reaction below. At standard pressure, the boiling point of 2-methylpropane is lower than the boiling point of 2-iodo-2-methylpropane.



2-methylpropane

2-iodo-2-methylpropane

22. To which class of organic compounds does this organic product below? [1]