

Name: \_\_\_\_\_

## Organic Chemistry: Functional Groups

<u>Functional Group</u>	<u>Key Points</u>	<u>Examples</u>
<u>Halide</u>	<ul style="list-style-type: none"> <li>A halogen (group 17 elements such as F, Cl, Br, I) replaces a hydrogen atom in an alkane</li> </ul> <p>Ex) 2-chloropropane or 1-chloropropane (isomer)</p> $\begin{array}{c}   &   &   \\ -C & -C & -C- \\   &   &   \\ & Cl & \end{array}$	<p>Ex) <math>\begin{array}{c}   \\ -C- \\   \\ Cl \end{array}</math> chloromethane</p> <p><math>\begin{array}{c} Br &amp; Br \\   &amp;   \\ C-C-C-C-C \\   &amp;   &amp;   &amp;   &amp;   \\ &amp; &amp; &amp; &amp; \end{array}</math> 2,3-dibromopentane</p>
<u>Alcohol</u>	<ul style="list-style-type: none"> <li>One or more of the H's is replaced by an -OH group</li> <li>"-e" ending on hydrocarbon is replaced by "-ol"</li> <li>Remember: <u>alcohols are NOT bases</u></li> </ul> <p>1-propanol</p> $\begin{array}{c}   &   &   \\ -C & -C & -C-OH \\   &   &   \\ & & \end{array}$	<p><math>\begin{array}{c} &amp; OH \\ &amp;   \\ -C &amp; -C &amp; -C- \\   &amp;   &amp;   \\ &amp; &amp; \end{array}</math> 2-propanol</p> <p>* <math>\begin{array}{c} &amp; OH &amp; OH \\ &amp;   &amp;   \\ -C &amp; -C &amp; -C &amp; -C &amp; -C- \\   &amp;   &amp;   &amp;   &amp;   \\ &amp; &amp; &amp; &amp; \end{array}</math> 2,3-pentandiol</p>
<u>Ether</u>	<ul style="list-style-type: none"> <li>look for -O- bridging two hydrocarbon chains</li> <li>Name pieces on either side of O and end with ether</li> </ul> <p>methyl ethyl ether</p> $\begin{array}{c}   & &   &   \\ -C & -O & -C & -C- \\   & &   &   \\ & & \end{array}$	<p><math>\begin{array}{c}   &amp;   &amp; &amp;   &amp;   \\ -C &amp; -C &amp; -O &amp; -C &amp; -C- \\   &amp;   &amp; &amp;   &amp;   \\ &amp; &amp; &amp; \end{array}</math> diethyl ether</p>
<u>Aldehyde</u>	<ul style="list-style-type: none"> <li>Double bonded oxygen and a hydrogen off the end of a carbon chain</li> <li>**Ending: drop the -e and add -al</li> <li>No need for a number</li> </ul> <p>propanal</p> $\begin{array}{c} & & O \\ & &    \\ -C & -C & -C-H \\   &   &   \\ & & \end{array}$	<p><math>\begin{array}{c} &amp; &amp; &amp; &amp; O \\ &amp; &amp; &amp; &amp;    \\ -C &amp; -C &amp; -C &amp; -C &amp; -C-H \\   &amp;   &amp;   &amp;   &amp;   \\ &amp; &amp; &amp; &amp; \end{array}</math> pentanal</p>

<p><u>Ketone</u></p>	<ul style="list-style-type: none"> <li>• Double-bonded oxygen in the middle of a carbon chain</li> <li>• Drop the -e and add -one</li> <li>• Number position of the oxygen</li> </ul> $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_2-\text{CH}_3$ <p>2-pentanone</p>	$\text{CH}_3-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\text{CH}_3$ <p>3-hexanone</p>
<p><u>Organic Acid</u></p>	<ul style="list-style-type: none"> <li>• COOH group at the end of a chain</li> <li>• **Ending: drop the -e and add -oic acid</li> <li>• No need for a number</li> </ul> $\text{CH}_3\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$ <p>propanoic acid</p>	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\   \quad   \quad   \quad   \end{array}$ <p>pentanoic acid</p>
<p><u>Ester</u></p>	<ul style="list-style-type: none"> <li>• -COO- group in the middle of a chain</li> <li>• Change ending to -oate</li> </ul> $\text{CH}_3\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OCH}_3$ <p>methyl propanoate</p>	$\text{CH}_3\text{CH}_2\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2\text{CH}_3$ <p>ethyl butanoate</p>
<p><u>Amine</u></p>	<ul style="list-style-type: none"> <li>• -NH<sub>2</sub> group added to a carbon chain</li> <li>• Drop the -e and add -amine</li> <li>• Add number for which C atom contains the amine</li> </ul> $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ <p>1-propanamine</p>	$\begin{array}{c} \text{NH}_2 \\   \\ \text{CH}_3-\text{C}-\text{CH}_2-\text{CH}_3 \\   \\ \text{H} \end{array}$ <p>2-butanamine</p>
<p><u>Amide</u></p>	<ul style="list-style-type: none"> <li>• -CONH<sub>2</sub> group at the end of a chain</li> <li>• Ending: drop the -e and add -amide</li> </ul> $\text{CH}_3\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ <p>propanamide</p>	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{C}-\text{C}-\text{C}-\text{NH}_2 \\   \quad   \quad   \end{array}$ <p>butanamide</p>