

Formula Characterization Questions

$$H = [2C + 2] - [2 \times (\text{deg. unsat.})] + N - X$$

	deg. unsat.	other considerations
alkane	$0^\circ \text{C}_n\text{H}_{2n+2}$	only C and H
alkene	$1^\circ \text{C}_n\text{H}_{2n}$	only C and H
alkyne	$2^\circ \text{C}_n\text{H}_{2n-2}$	only C and H
alcohol	$0^\circ \text{C}_n\text{H}_{2n+2}\text{O}$	one O
aldehyde	$1^\circ \text{C}_n\text{H}_{2n}\text{O}$	one O
ketone	$1^\circ \text{C}_n\text{H}_{2n}\text{O}$	one O
carboxylic acid	$1^\circ \text{C}_n\text{H}_{2n}\text{O}_2$	two O
ester	$1^\circ \text{C}_n\text{H}_{2n}\text{O}_2$	two O
amide	$1^\circ \text{C}_n\text{H}_{2n}\text{NO}$	one O and one N
ether	$0^\circ \text{C}_n\text{H}_{2n+2}\text{O}$	one O
amine	$0^\circ \text{C}_n\text{H}_{2n+2}\text{N}$	one N
rings	one deg. per ring	5 and 6 members

C_5H_{10} one deg unsat

- alkene
- alkane + ring

C_5H_8 two deg unsat

- alkene + alkene
- alkyne
- alkene ring
- (alkane ring if long enough)

$C_5H_{12}O$ zero degree unsat

- alcohol
- ether

$C_5H_{10}O$ one deg unsat

- aldehyde
- ketone
- alcohol + alkene
- alcohol + ring
- ether alkene
- ether ring

$C_8H_{14}O_2$ two deg unsat

- carb. acid + alkene
- carb. acid + ring
- ester + alkene
- ester + ring
- aldehyde aldehyde
- ketone ketone
- ketone aldehyde
- alkyne alcohol alcohol
- alkyne ether ether
- alkyne alcohol ether
- ketone alkene alcohol
- ketone alkene ether
- ketone ring alcohol
- ketone ring ether
- aldehyde alkene alcohol
- aldehyde alkene ether
- aldehyde ring alcohol
- aldehyde ring ether
- etc. ☺