Hydrocarbons containing only single bonds between carbon and hydrogen are said to be saturated. All noncyclic saturated hydrocarbons fit the formula \( \text{C}_n\text{H}_{2n+2} \).

Suppose a molecule has a molecular formula of \( \text{C}_4\text{H}_{10} \), is it saturated? Completing the formula, where \( n = 4 \) (the number of carbons), and \( 2(4)+2=10 \). Therefore, we conclude the molecule is saturated, and any 4 carbon noncyclic isomer with only single bonds will fit this formula.

Suppose our molecule has a formula of \( \text{C}_4\text{H}_8 \). This compound is 2 hydrogens short of saturation, or equal to 1 degree of unsaturation. Therefore, any 4 carbon isomer with 1 double bond, or 1 ring will fit this formula.

How does oxygen effect this formula? Not at all. If a compound has the formula \( \text{C}_3\text{H}_8\text{O} \) the compound is saturated. If the compound has a formula \( \text{C}_3\text{H}_6\text{O} \), it has one degree of unsaturation in the form of a double bond or a ring.
For every nitrogen in the formula, one additional hydrogen needs to be added to the formula. Therefore, a compound with a formula of C₃H₉N would be saturated, while a compound with formula C₃H₇N would have one degree of unsaturation.

Halogens (F, Cl, Br, I) are similar to hydrogen in that they form one bond with other atoms. Therefore, for every halogen present subtract one hydrogen from the total. So C₃H₇Br is a saturated compound.