The index of hydrogen deficiency (IHD): the sum of the number of rings and pi bonds in a molecule. To determine IHD, compare the number of hydrogens in an unknown compound with the number in a reference hydrocarbon of the same number of carbons and with no rings or pi bonds.

The molecular formula of the reference hydrocarbon is $C_nH_{2n+2}$

$$IHD = \frac{(H_{\text{reference}} - H_{\text{molecule}})}{2}$$

- for each atom of a Group 7 element (F, Cl, Br, I), add one H
- no correction is necessary for the addition of atoms of Group 6 elements (O, S) to the reference hydrocarbon
- for each atom of a Group 5 element (N, P), add one hydrogen

**Problem:** isopentyl acetate has a molecular formula of $C_7H_{14}O_2$. Calculate its IHD

- reference hydrocarbon $C_7H_{16}$
- $IHD = (16-14)/2 = 1$

**Problem:** calculate the IHD for niacin, molecular formula $C_6H_6N_2O$

- reference hydrocarbon $C_6H_{16}$
- $IHD = (16 - 6)/2 = 5$