

Physical Properties of Alkanes

1. From $C_1 - C_4$ gases

$C_5 - C_{15}$ liquids

C_{18} and over solids

The bonds are covalent — non-polar hence low B.P.

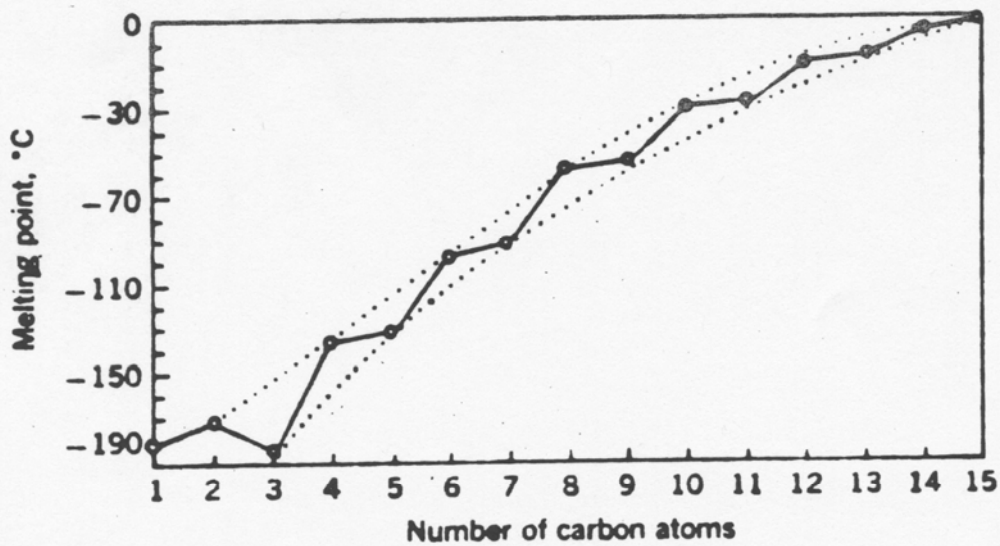
The B.P. depends on intermolecular forces — the larger the surface contact, the higher is the B.P.

For alkanes — the boiling point increases by $20^\circ\text{C} - 30^\circ\text{C}$ for each CH_2 added

Branching lowers the boiling point because branching decreases the surface area and hence decreases the intermolecular forces.

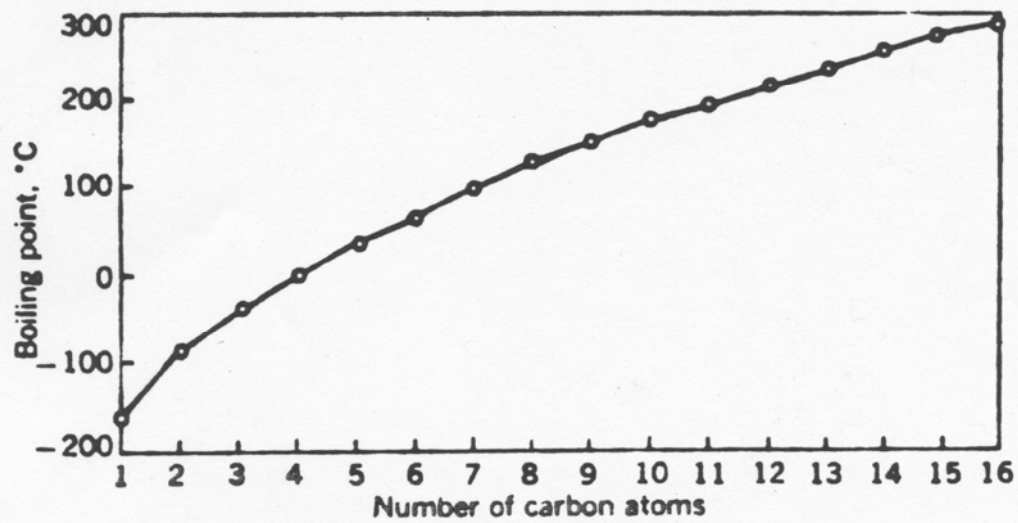
2. Melting points rise with increase in number of C but the increase in M.P. is NOT as regular as an increase in B.P.

Note: Even and odd numbers of C. Even number if alkane fits closely in crystal state hence more attractive forces.



Melting points of normal alkanes.

CHEMISTRY OF ORGANIC COMPOUNDS



Boiling points of normal alkanes.

3. Alkanes dissolve in non-polar solvents “likes dissolve likes”
4. The density of alkanes increase with size of molecules and levels off at about .8 g/ml — less dense than water.

Chemical Properties of Alkanes

1. Alkanes are un-reactive towards most reagents, they do not react with bases or acids, oxidizing or reducing agents HF. HF is so reactive it is kept in paraffin bottles.
2. Alkanes are attacked by a number of non-aqueous reagents such as halogen gas, oxygen and concentrate HNO_3

Source

- I. Industrial — principle source is petroleum and natural gas which is a mixture — separation is not important but if done we use fractional distillation.