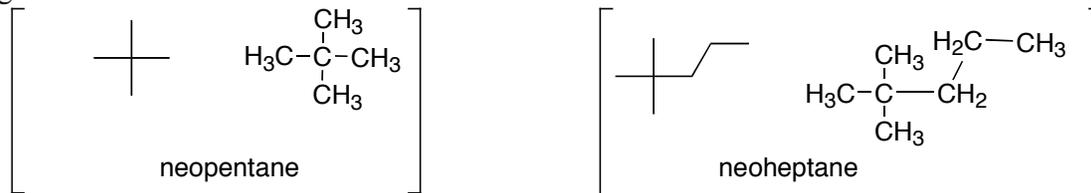


- molecule with tert-butyl group is also called with the prefix “neo”

eg.

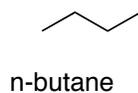


Systematic Nomenclature (IUPAC)

RULES:

1. use common name for straight chain alkanes
2. find the longest chain with maximum number of branches
3. number from end of the chain, so 1st branch point has lowest number
4. name the chain, then add prefixes (for the groups attached) with number and name the groups attached

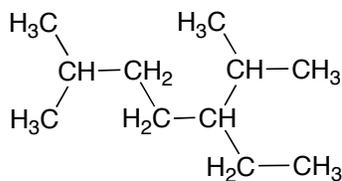
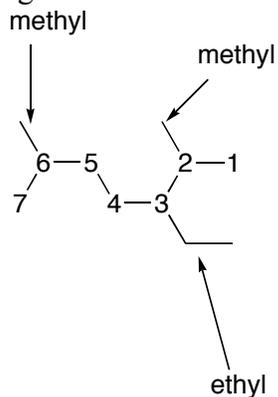
eg.



isobutane (common name)
2-methyl propane (systematic name)

Number	2	3	4	5	6	7	8	9
Prefix	di	tri	tetra	penta	hexa	hepta	octa	nona

eg.



3-ethyl-2,6-dimethylheptane

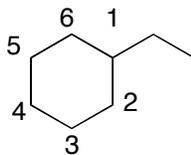
Ring Structures and Naming:

- start with numbering at point of maximum branches

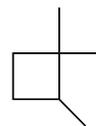
eg.



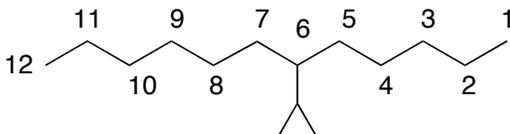
cyclohexane



1-ethylcyclohexane



1,1,2-trimethylcyclobutane



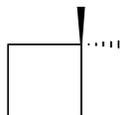
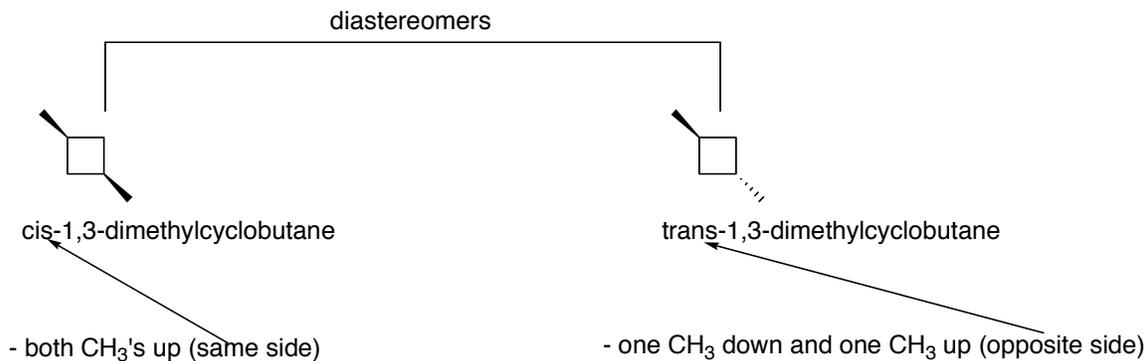
6-cyclopropyldecane

Isomers – have same molecular formula but different compounds

1. structural/constitutional isomers
 - compounds with same molecular formula and different names, numbers
2. Stereoisomers – have normally same name but different 3-D structure
 - (a) diastereomers/diastereoisomers (geometric isomers)
 - (b) enantiomers (mirror images of same molecule)

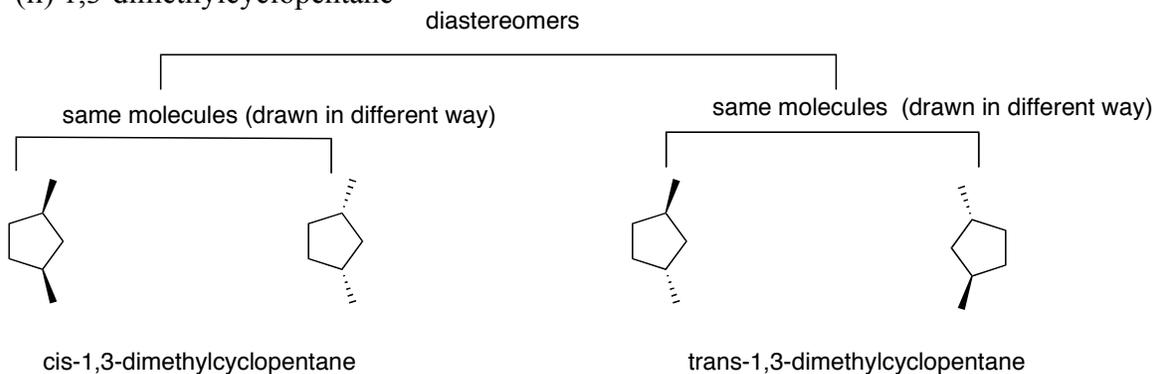
eg.

(i) 1,3-dimethylcyclobutane



- * 1,1-dimethylcyclobutane
- * no stereoisomers
- * structural isomer with respect to 1,3-dimethylcyclobutane

(ii) 1,3-dimethylcyclopentane



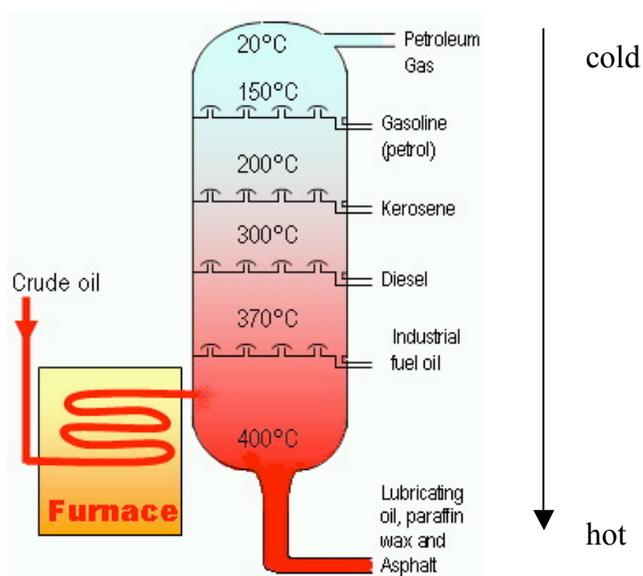
Sources of alkanes + Physical properties

- sun: 99% of earth's energy
- 30% of sun's energy reflected from earth
- 47% energy – heating earth
- 23% energy – water cycle
- 0.2% energy – wind
- 0.02% energy – photosynthesis ($\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$)

- 10^{11} metric tons of CO_2 fixed per year

- $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow$ petroleum and natural gas (CH_4)
- Petroleum \rightarrow >500 hydrocarbon

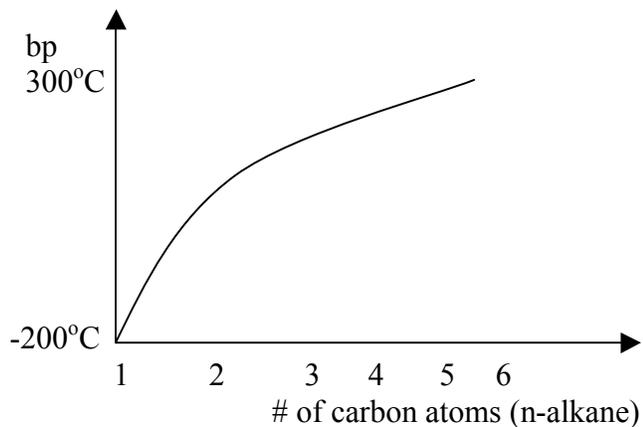
Distillation of petroleum



Physical Properties:

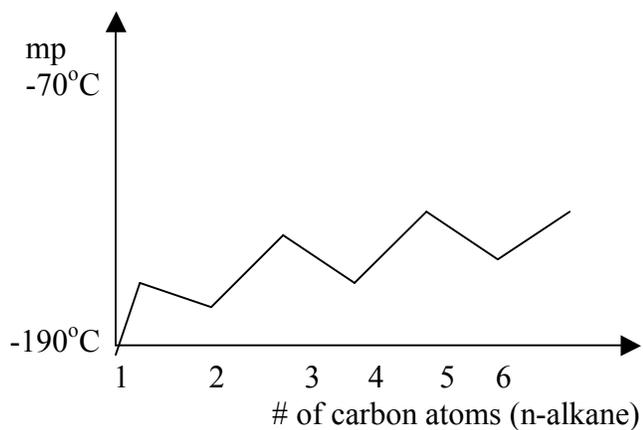
- hydrocarbons – alkanes are non-polar – H and C have similar electronegativity
- soluble in other organic solvents (like dissolves like)
- immiscible with water (not infinitely soluble in water)

boiling point trend:



- increasing the straight chain length increases the bp.

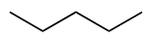
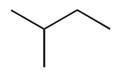
melting point trend:



Density (ρ - RHO):

- hydrocarbons are less dense than water (1.0 g/cm^3)
- density ranges from $0.65 - 0.75 \text{ g/cm}^3$

eg.

	mp (°C)	bp (°C)
	-129	36
	-160	28
	-13	9

- n-pentane has high bp due to multiple contacts of straight chains (London Forces)
- neopentane has high mp due to round shape and well-packed crystal structure

Conformations

- different 3-D shapes a molecule can assume by rotation around single bonds

eg.

Ethane : $\text{H}_3\text{C} - \text{CH}_3$

