Cis- trans isomerism in cycloalkanes

* ① If a cyclic has 2 substituents (not 1 nor 3) and these 2 substituents are not located at same Carbon

⇓

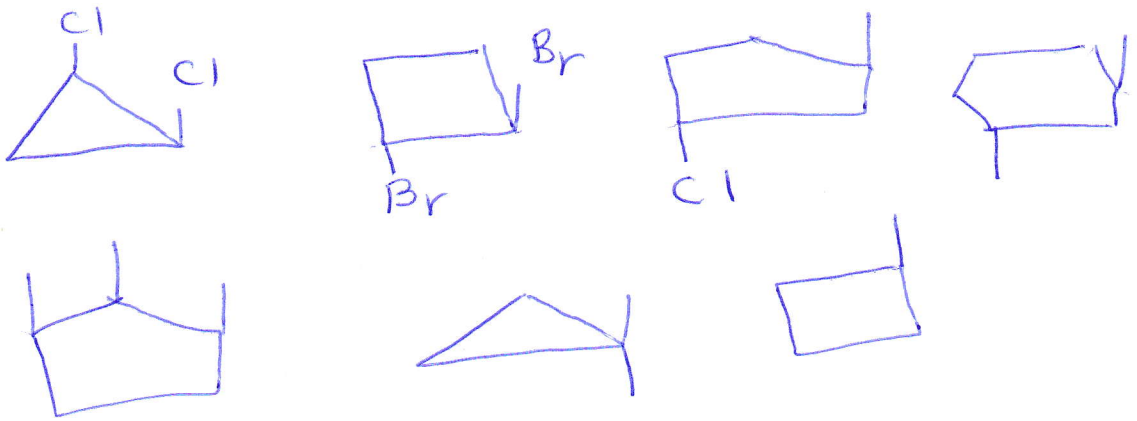
we should use the term of cis- trans.

* ② cis: same sides (up-up) or (down- down)

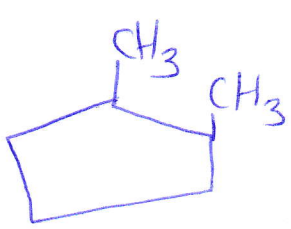
trans: opposite sides (up- down).

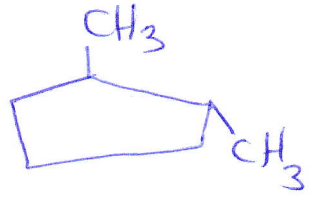
* ③ Include cis- trans in the naming of the molecule.

* ④ Assign the followings as cis, trans or none.



*(5) The relationship between:-



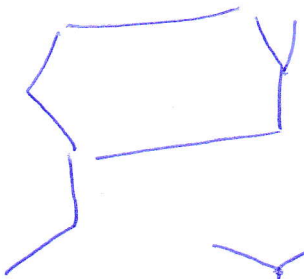


is cis-trans isomerism "geometric" isomers

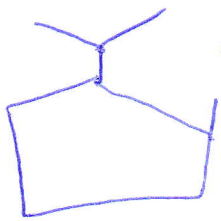
These isomers can't be generated by rotation around σ- bond.

*(6) They have different physical properties (boiling points, melting points,) and can be separated using physical methods (such as distillation).

*(7) Name the following molecules:



trans-1-Ethyl-3-methylcyclohexane



cis-1-Bromo-2-isopropyl cyclopentane

Summary of Isomerism:

(1) Isomers (same molecular formula)?

(2) Structural isomers (Constitutional isomers)

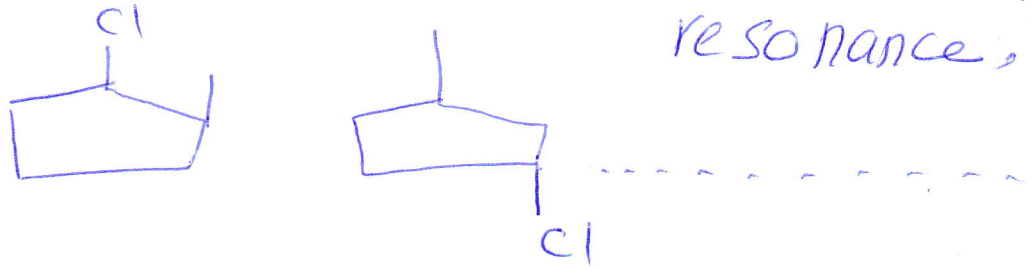
(3) Stereoisomers (same arrangment of atoms).

- Conformers: rotation around σ-bond.
  - examples:- eclipsed-staggered, ring flip of cyclohexane
- cis-trans

Note: You can't find a relationship (cis-trans) and (conformers) at same time.

* The relationship (cis-trans, conformers, identical, constitutional isomers, resonance, not isomers)

(1)



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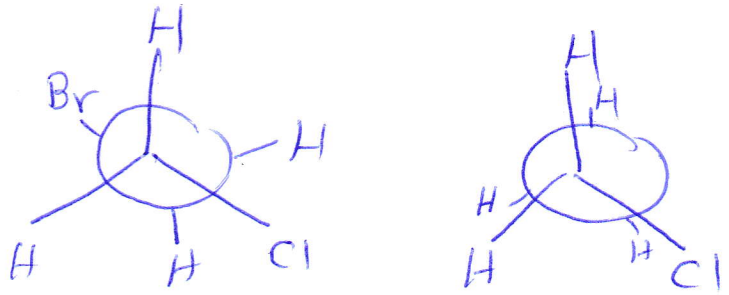

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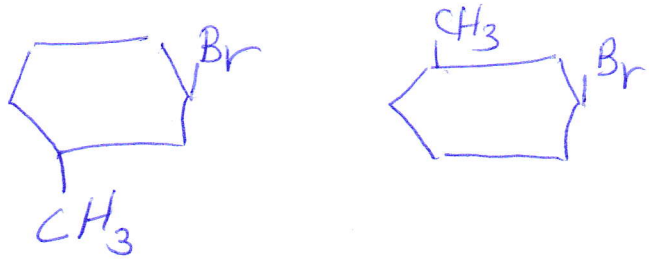

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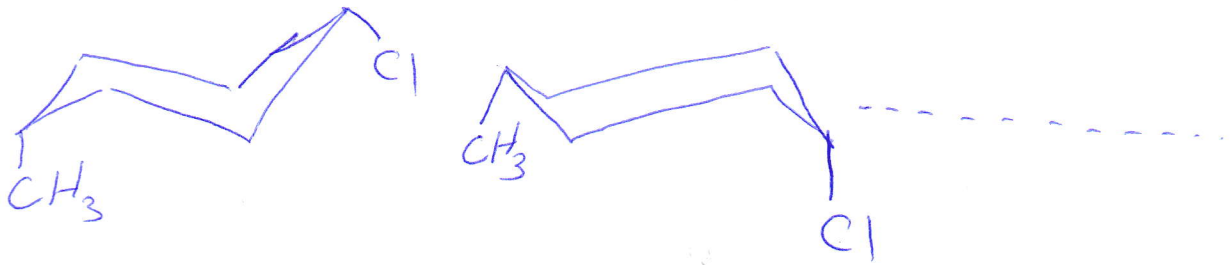

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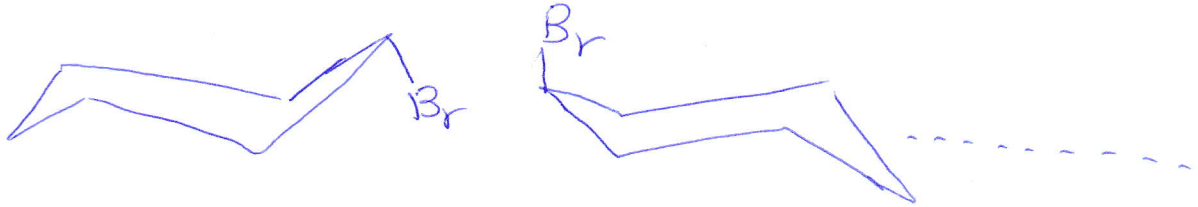

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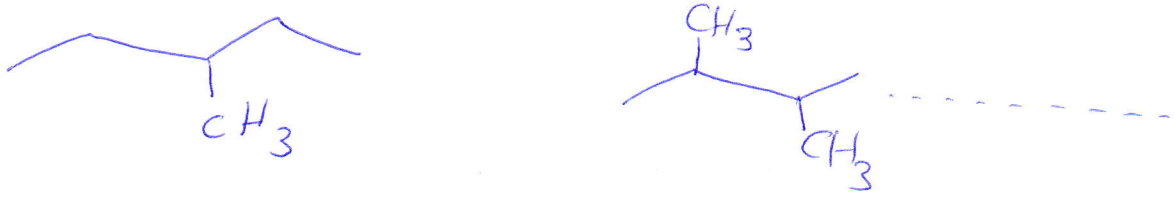

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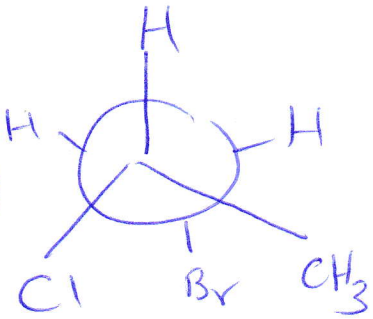

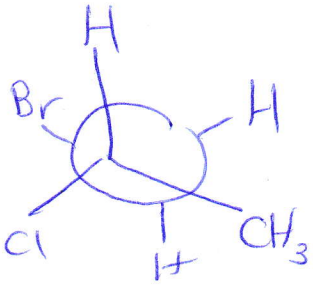

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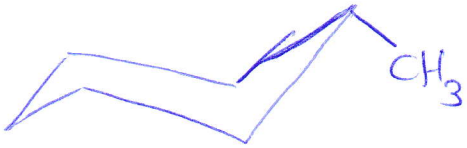

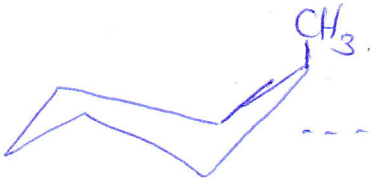

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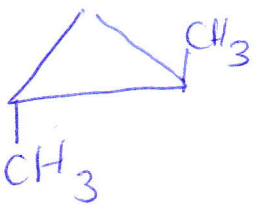

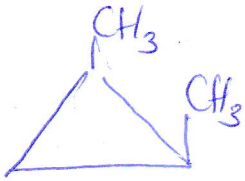

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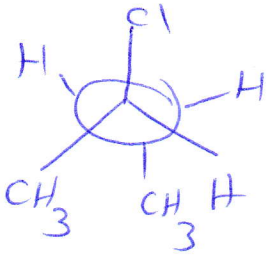

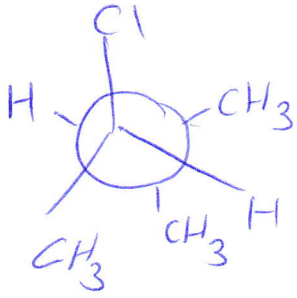

Ex: Draw C_5H_{10} that can show cis-trans isomerism.

Ex: Draw C_5H_{10} that contains only secondary carbons.

Reactions of Alkanes:

① Combustion of hydrocarbons

$$CH \xrightarrow[\text{Spark}]{O_2} CO_2 + H_2O + \text{heat}$$

"exothermic"

② Radical substitution reaction

Radical :- odd number of electrons; it is very reactive.

Examples: $:\dot{\underset{\cdot\cdot}{Cl}}\cdot$, $:\dot{\underset{\cdot\cdot}{Br}}\cdot$, $\dot{C}H_3$

$$CH_4 + Cl_2 \xrightarrow{\Delta \text{ or } h\nu} CH_3Cl + HCl$$

monochlorination

$$CH_3-CH_3 + Br_2 \xrightarrow{h\nu} CH_3CH_2Br + HBr$$

mono bromination