

الفرقة الثانية: كيمياء الربط والتماثل (ساعات
مكتسبة)
الشعبة : كيمياء خاص

إعداد/ أ.د/ أحمد الهداوى

Exercise: P. 33

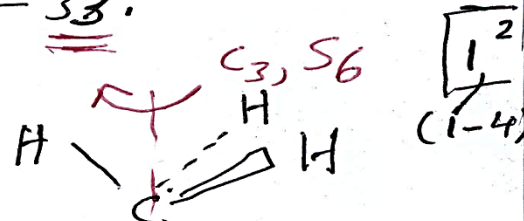
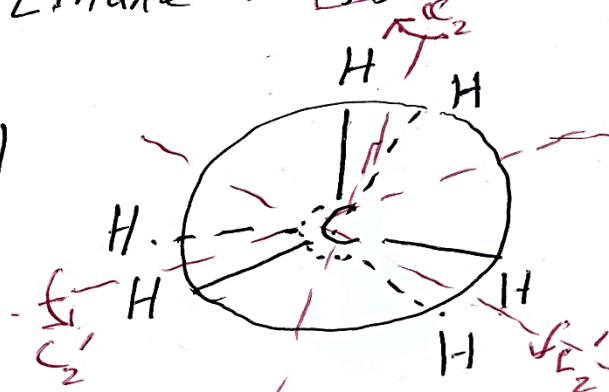
- Assign each of the following Molecules to the correct point Group.

- See Examples in P. 22 - 30, 30 - 33.

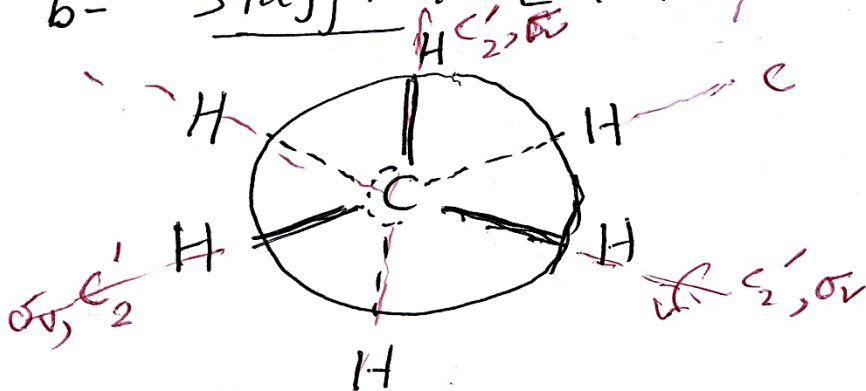
Also, (Different Conformations)

① a- gauche-Ethane for CH_3-CH_3

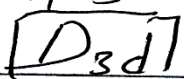
$$C_3 + 3 C_2'$$



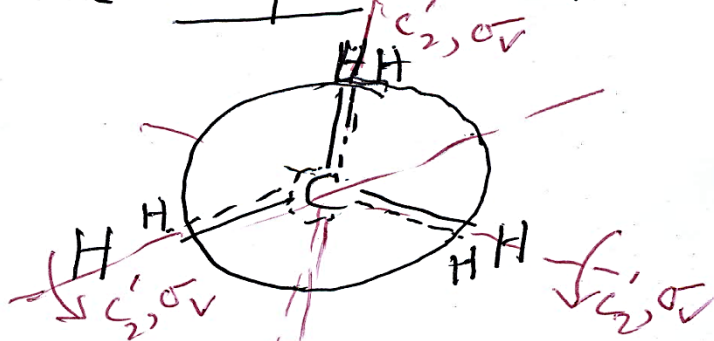
b- staggered-Ethane



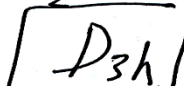
$$C_3 + 3 C_2' + 3 \sigma_v$$



c- Eclipsed-Ethane



$$C_3 + 3 C_2' + 3 \sigma_v + \sigma_h$$



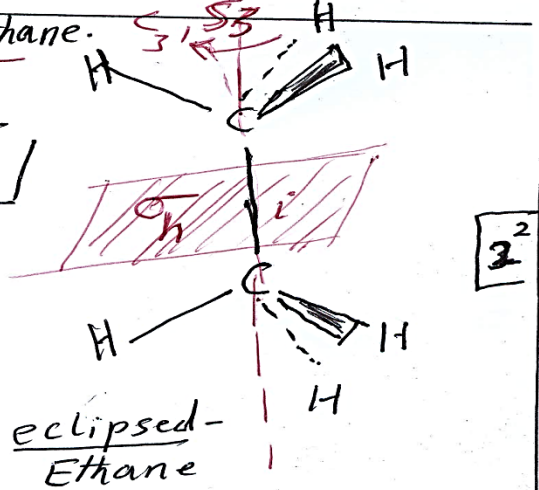
* Deduce Symmetry Operations for eclipsed-Ethane.

Symmetry elements:
 $C_3 + 3 C_2 + 3 \sigma_v + \sigma_h$ $[D_{3h}]$

there is also: $i + S_3$

C_3 : $C_3^1, C_3^2, C_3^3 \equiv E$

S_3 : $S_3^1, S_3^2, S_3^3 \equiv E$



eclipsed-Ethane

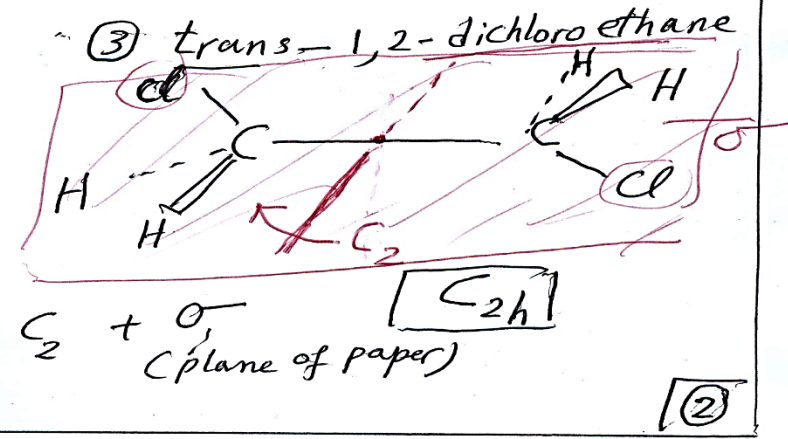
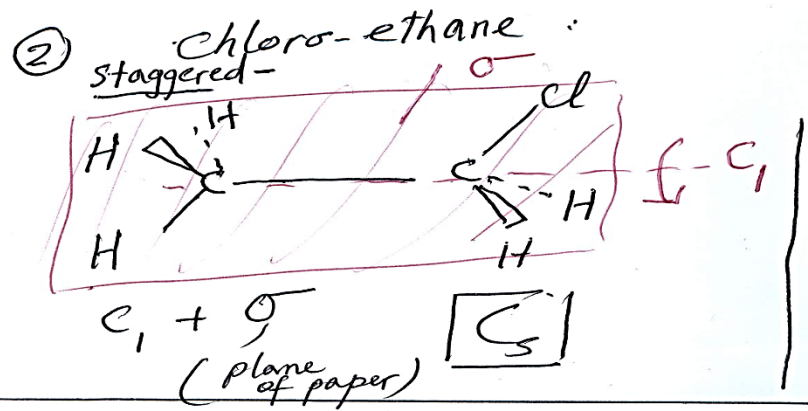
Character Table: $[2S_3]$

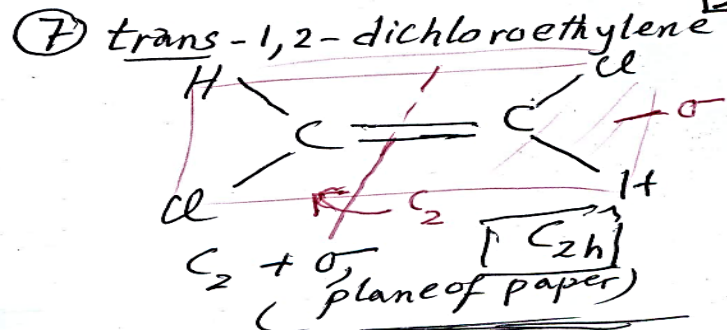
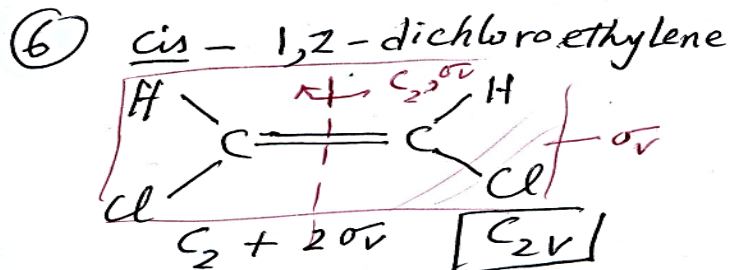
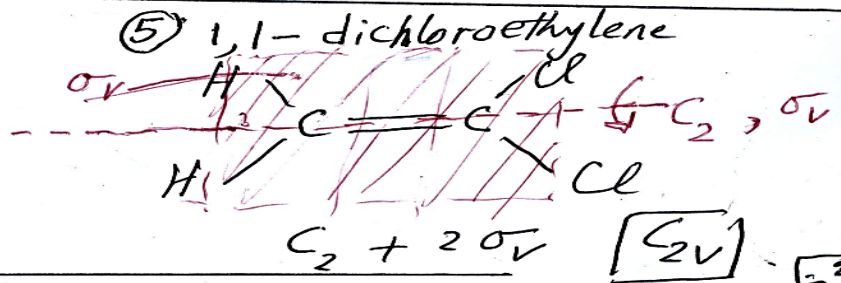
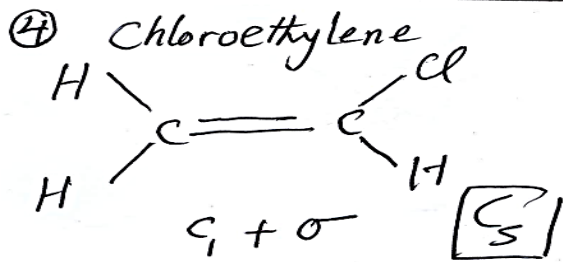
D_{3h}	E	$2 C_3$	$3 C_2'$	i	$2 S_3$	$3 \sigma_v$
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12 symmetry operations

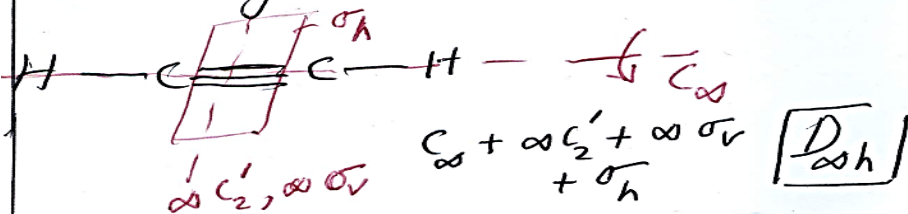
Exercise: Deduce symmetry operations in C_6H_6 (benzene) & PF_5 .

Other Examples:



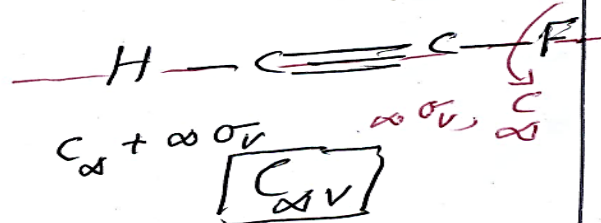


⑧ Acetylene

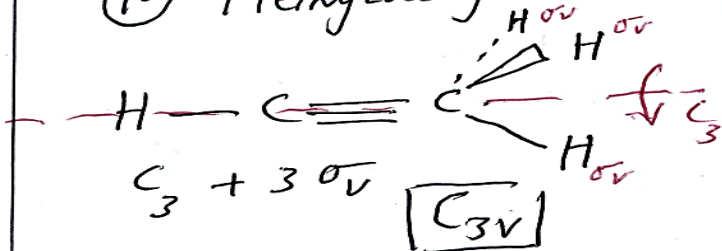


Infinite Groups

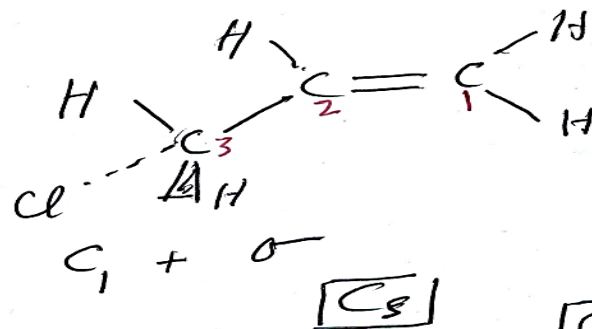
⑨ Fluoroacetylene



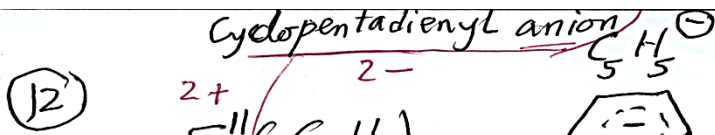
⑩ Methylacetylene



⑪ 3-Chloropropene

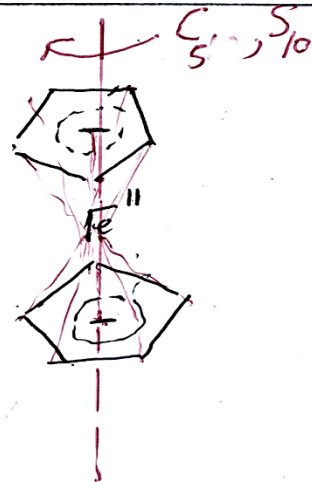
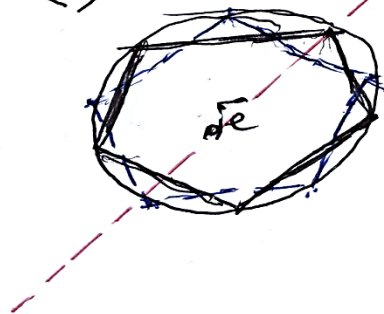
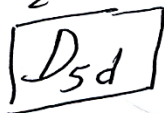
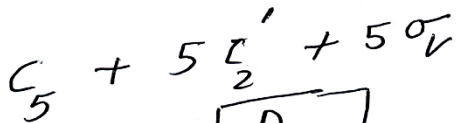


③

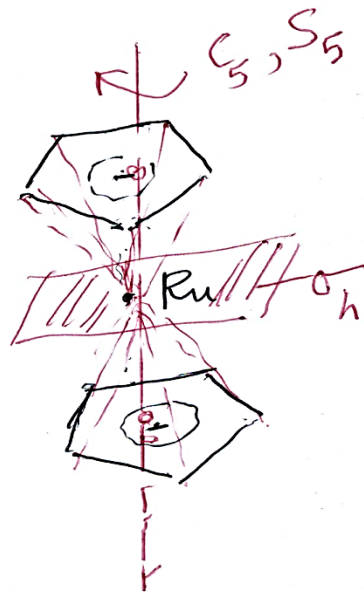
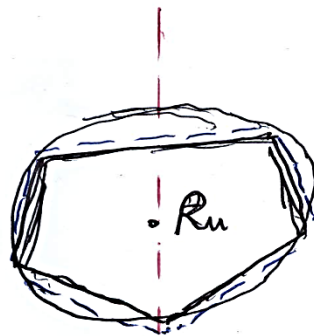
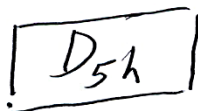
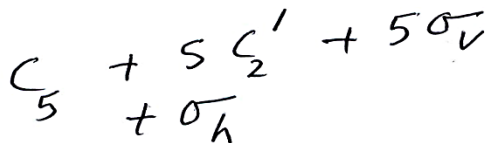
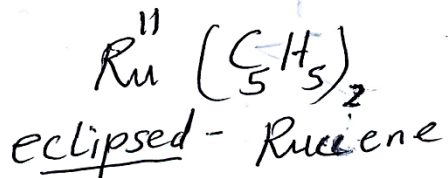


staggered-

Ferrocene



⑬



Please, Deduce symmetry operations in $Ru^{II}(C_5H_5)_2$.