HOMEWORK ASSIGNMENT #5 ORGANIC CHEMISTRY I (20 pts)

structure-property; free radical reactions of alkanes and ozone

(due Wed 5 October post mini-break)

Your name: Answers **your name 1 pt**

5.1 In the `zone' (2 pts)

The reactions of CFCs (chlorofluorocarbons) that occur in the upper stratosphere are below. Circle the two specific ones that are most directly responsible for interrupting the natural birth of ozone, O_3. (refer to exercise 7)

a) $Cl + Cl \longrightarrow Cl_2$

b) $CF_3 + CF_3 \xrightarrow{\text{any uv light } \leq 350\text{ nm}} C_2F_6$

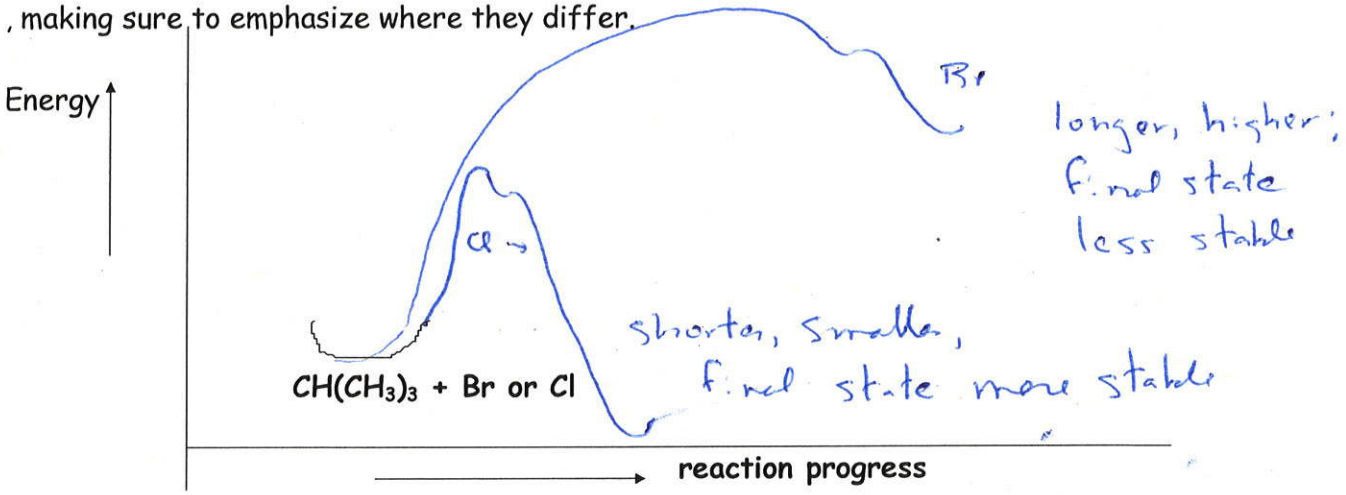
c) $ClO + O \longrightarrow Cl + O_2$

d) $F_3C\text{-}Cl \longrightarrow F_3C + Cl$

e) $Cl + O_3 \longrightarrow ClO + O_2$

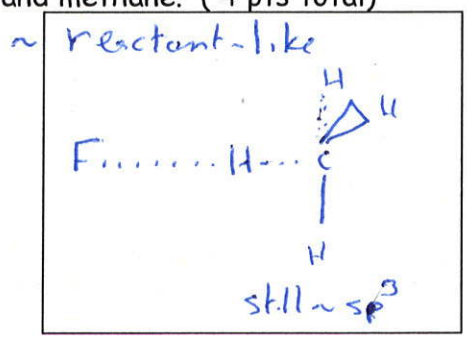
5.2 Drawn and quartered... 3 pts

sketch on the same plot below the reaction coordinate diagrams of Br and Cl with $CH(CH_3)_3$, making sure to emphasize where they differ.

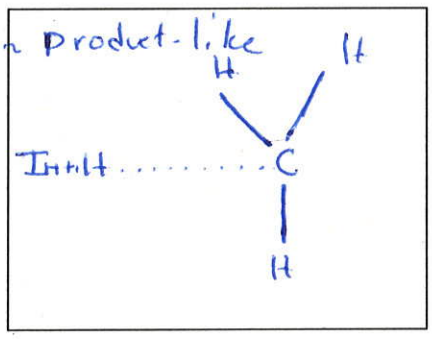


5.3. Activated Thinking (4 pts)

sketch the activated complex you expect to form between F* and methane vs that between I* and methane. (4 pts total)

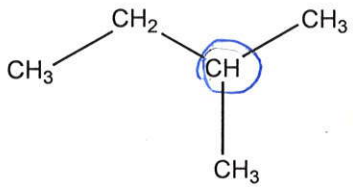


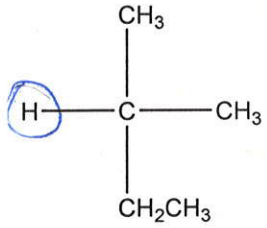
F* + CH_4 activated complex



I * + CH_4 activated complex

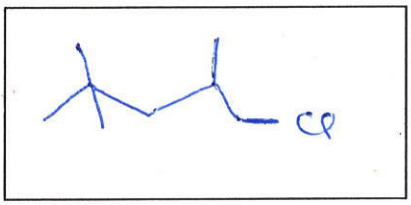
5.4. Circle the carbon at which the most rapid chlorination is expected in each of the two structures below (2 pts)

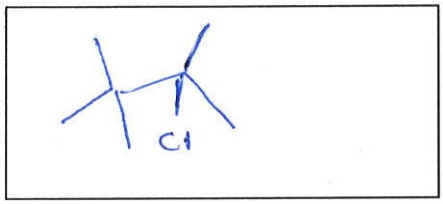


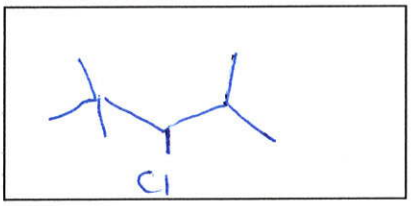


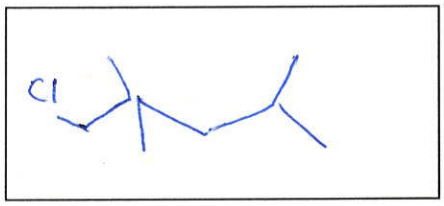
5.4) Productive thinking (4 pts)

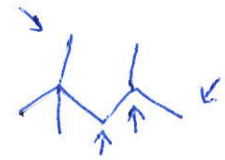
Photochemical chlorination of 2,2,4-trimethylpentane yields 4 different monochlorides. Draw them below











2,2,4-trimethylpentane

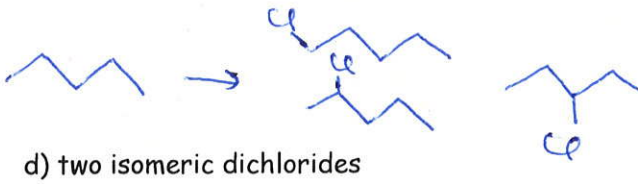
→ = unique sites

5.6 All in the family chemistry (4 pts)

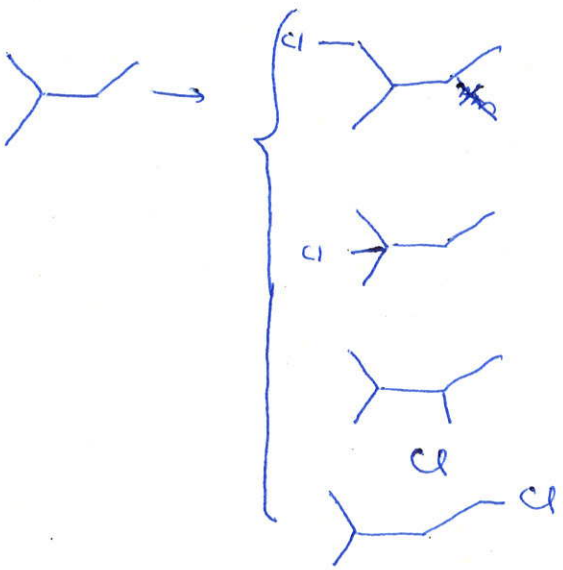
Among the isomeric alkanes with the empiric formula C_5H_{12}, sketch the skeletal structure of the particular alkane that on photochemical chlorination produces :

a) single monochloride

b) three isomeric monochlorides



c) four isomeric monochlorides



d) two isomeric dichlorides