HOMEWORK ASSIGNMENT #5 ORGANIC CHEMISTRY I (21 pts)

**Ring Language; structure-property; free radical reactions of methane & higher alkanes**

**(due Monday 30 September)**

**Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**5.1a. which is more stable ? (circle your choice. 4 points)**

equatorial methyls or axial methyls

methyl cyclohexane or t-butylcyclohexane

cis (1,2) ax, eq cyclohexane or trans (1,2) eq,eq cyclohexane

cis (1,2) cyclohexane or cis (1,4) cyclohexane

**5.1b. What is the correct, complete name for the compound below ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Br

**1** Br

**5.1c If a third Br must be placed axially at locant position 2, will it be cis or trans to the Br**

**at locant position 3 ? (circle choice)**

**Cis Trans**

**5.2. Mechanism shuffle (4 pts)**

Re-order the elementary reactions below to reflect the correct order of methane’s radical initiated chlorination and name the various stages of this reaction

**Br + Br🡪 Br2**

**CH3 + Br2 🡪 CH3Br + Br**

**CH3 + CH3 🡪 C2H6**

**Br + CH4 🡪 HBr + CH3**

**Br2 + uv light 🡪 2 Br**

**5.3 Drawn and quartered… 3 pts**

Sketch on the same plot below the reaction coordinate diagrams of Br and Cl with CH4 , making sure to emphasize where they differ.

Energy

**CH4 + Br or Cl**

**reaction progress**

*Homework #5 organic chemistry I Alfred State (continued)*

**5.4. 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\* + CH4 activated complex I \* + CH4 activated complex

**5.5. Circle the carbon at which the most rapid chlorination is expected**

**in each of the two structures below ( 2 pts)**



**5.6) Productive thinking (4 pts)**

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