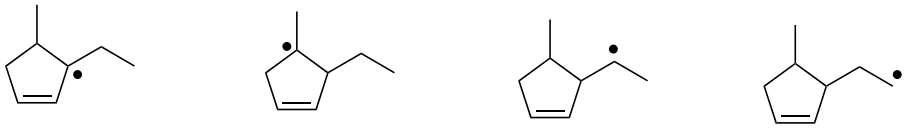
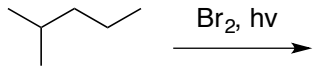
Radicals Quiz, Organic Chemistry I – Jasperse Name:

1. Write the mechanism (propagation steps only!) for the reaction of propane with bromine to give 2-bromopropane. Include detailed arrow-pushing. (Note: use skeleton structure so you can be precise about which C-H bond is getting replaced. Do not use generic "R-H" or "C_3H_7-H") (2 pts)

2. Rank the stability of the following radicals, from 1 (most stable) to 4 (least stable). (Hint: consideration of 1º, 2º, 3º and allylic versus non-allylic versus vinyl may be at play!)



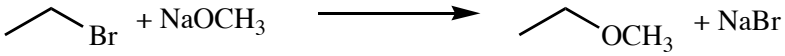
3. Draw the major product of the following reaction. (Note: 3-D drawing is not required).



4. Which of the following statements correctly explains why bromination reactions are more selective than chlorination reactions.

a. bromine radical is less stable than chlorine radical, so it is more reactive and less choosy
b. bromine radical is more stable than chlorine radical, so it is more reactive and less choosy
c. bromine radical is more stable than chlorine radical, so it is less reactive and more choosy
d. bromine radical is less stable than chlorine radical, so it is less reactive and more choosy
e. relative radical stability is 3˚ radicals > 2˚ radicals > 1˚ radicals when bromine radicals snatch hydrogens from alkanes, but when chlorine radicals snatch hydrogens the resulting alkyl radical stability is 3˚ radicals < 2˚ radicals < 1˚ radicals

5. The following ionic substitution reaction has a rate constant $r=k[CH_3CH_2Br]^1[NaOCH_3]^1$. (2 pts)



a. What will happen to the overall rate if the concentration of bromoethane doubles?
(In each case, don't just say "faster" or "slower", but say by **exactly how much** the rate will change.)

b. If the concentration of NaOCH3 doubles?

c. What will happen to the overall rate if you use the same amount of each reactant, but you double the amount of solvent that you use?