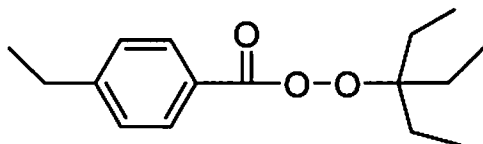
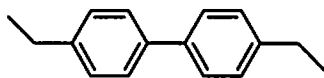


1) For the molecule below, what is the molecular formula?

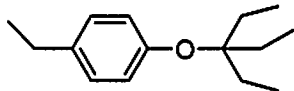


2-8) When the above compound is heated, the following seven stable products are observed in varying amounts. Draw plausible mechanisms to account for each product.

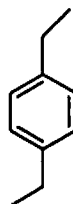
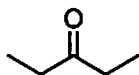
Carbon dioxide



Ethene



Ethane

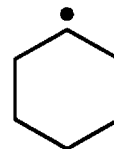
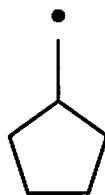
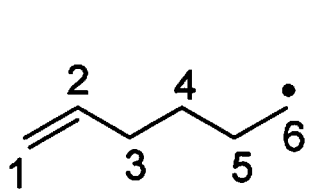


9-14) The following hexenyl radical can undergo intramolecular addition (cyclization) to generate two different cyclic radicals.

9) Number the corresponding carbons in the product radicals.

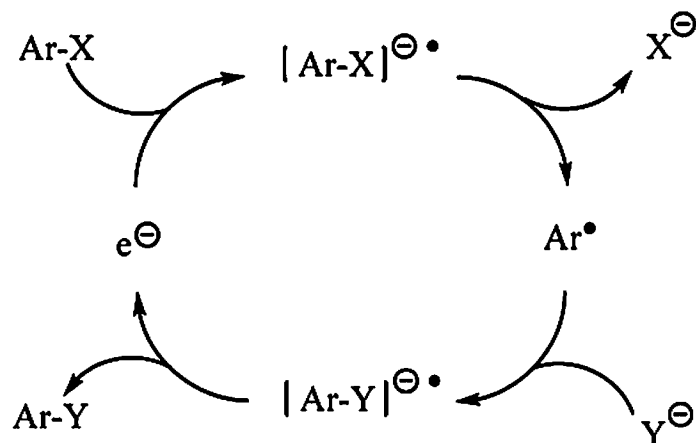
10) Identify the cyclizations as EXO or ENDO.

11-14) Write separate mechanisms for each cyclization.



15) What do the 4 terms in $S_{RN}1$ mean (or stand for)?

16-19) Below is a schematic of a general $S_{RN}1$ chain process:



16) What is the nucleophile?

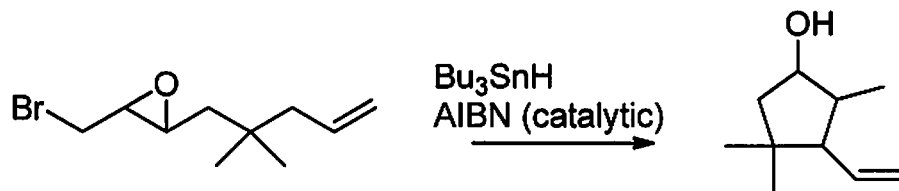
17) What is the leaving group?

18) How many (different) radical anions are there?

19) Draw *one* Lewis structure of any of the radical anions, showing where the electrons are located. (You can use any aromatic system as your "Ar" but C_6H_5 will be easiest to draw out).

20-25) Write a plausible mechanism for the following chain reaction which includes:

- i) initiation
- ii) abstraction of the Bromine
- iii) ring opening of the epoxide
- iv) abstraction of a (convenient and weakly bound) Hydrogen
- v) intramolecular addition (cyclization)
- vi) a radical that reacts with more Bu_3SnH to yield the product, and a Tin radical to continue this chain process.



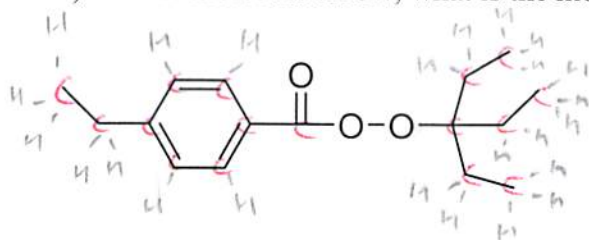
****Up to 2 bonus points****

In your previous mechanism to (Q20-25), explain the organic chemistry (molecular structural) features that account for my description of the abstracted Hydrogen atom as:

i) "convenient"

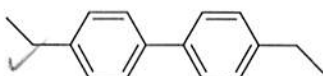
ii) "weakly bound"

1) For the molecule below, what is the molecular formula?

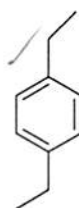
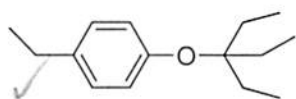


2-8) When the above molecule is heated, the following seven stable products are observed in varying amounts. Draw plausible mechanisms to account for each product.

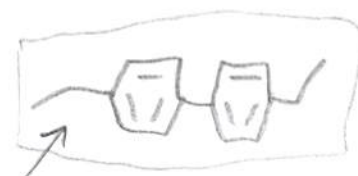
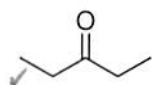
✓ Carbon dioxide



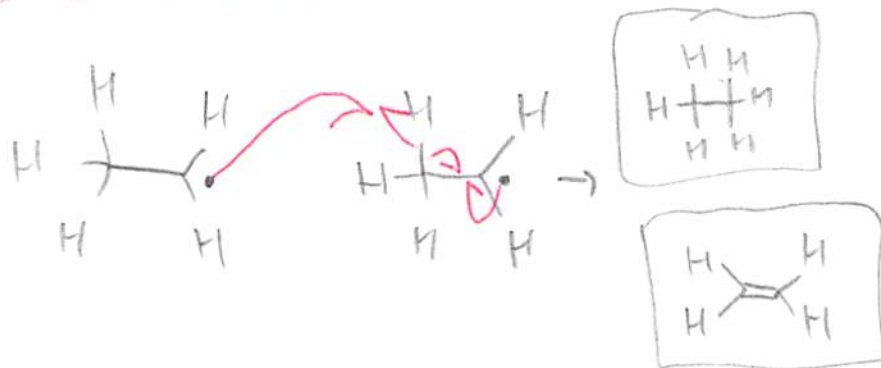
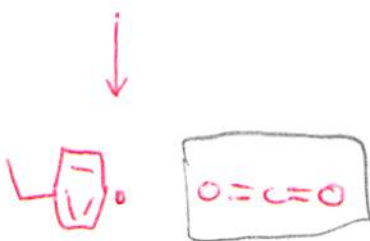
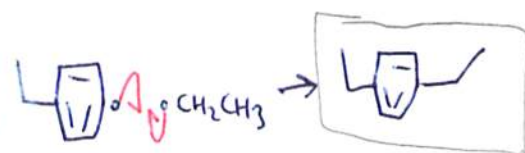
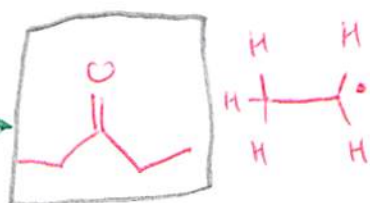
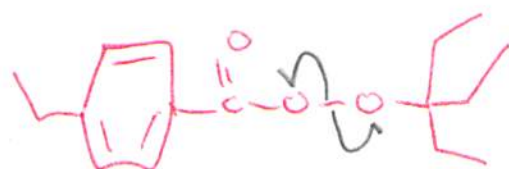
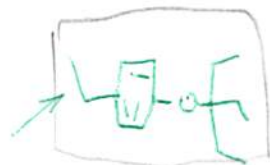
✓ Ethene



✓ Ethane



Then

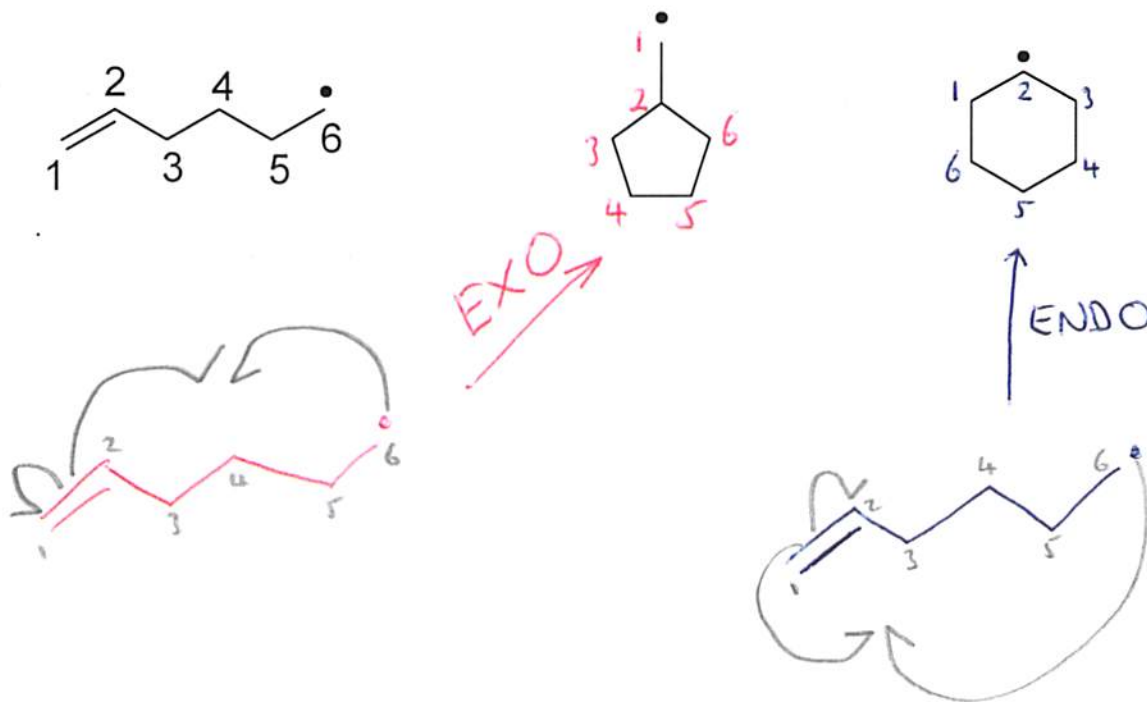


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9) Number the corresponding carbons in the product radicals.

10) Identify the cyclizations as EXO or ENDO.

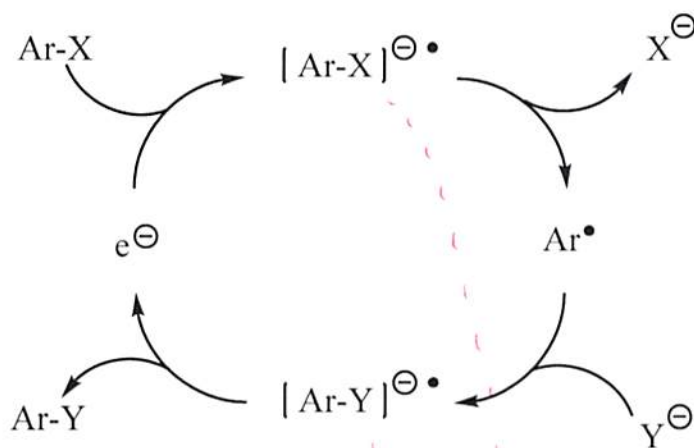
11-14) Write separate mechanisms for each cyclization.



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SUBSTITUTION RADICAL NUCLEOPHILIC UNIMOLECULAR

16-19) Below is a schematic of a general $S_{RN}1$ chain process:

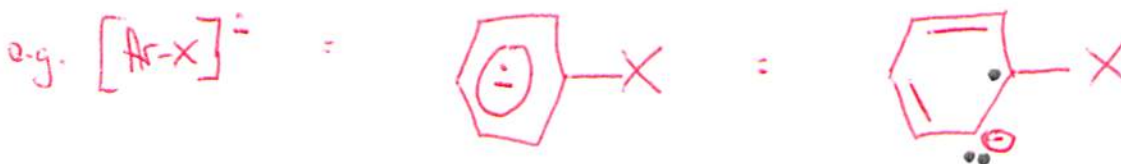


16) What is the nucleophile? Y^-

17) What is the leaving group? X^-

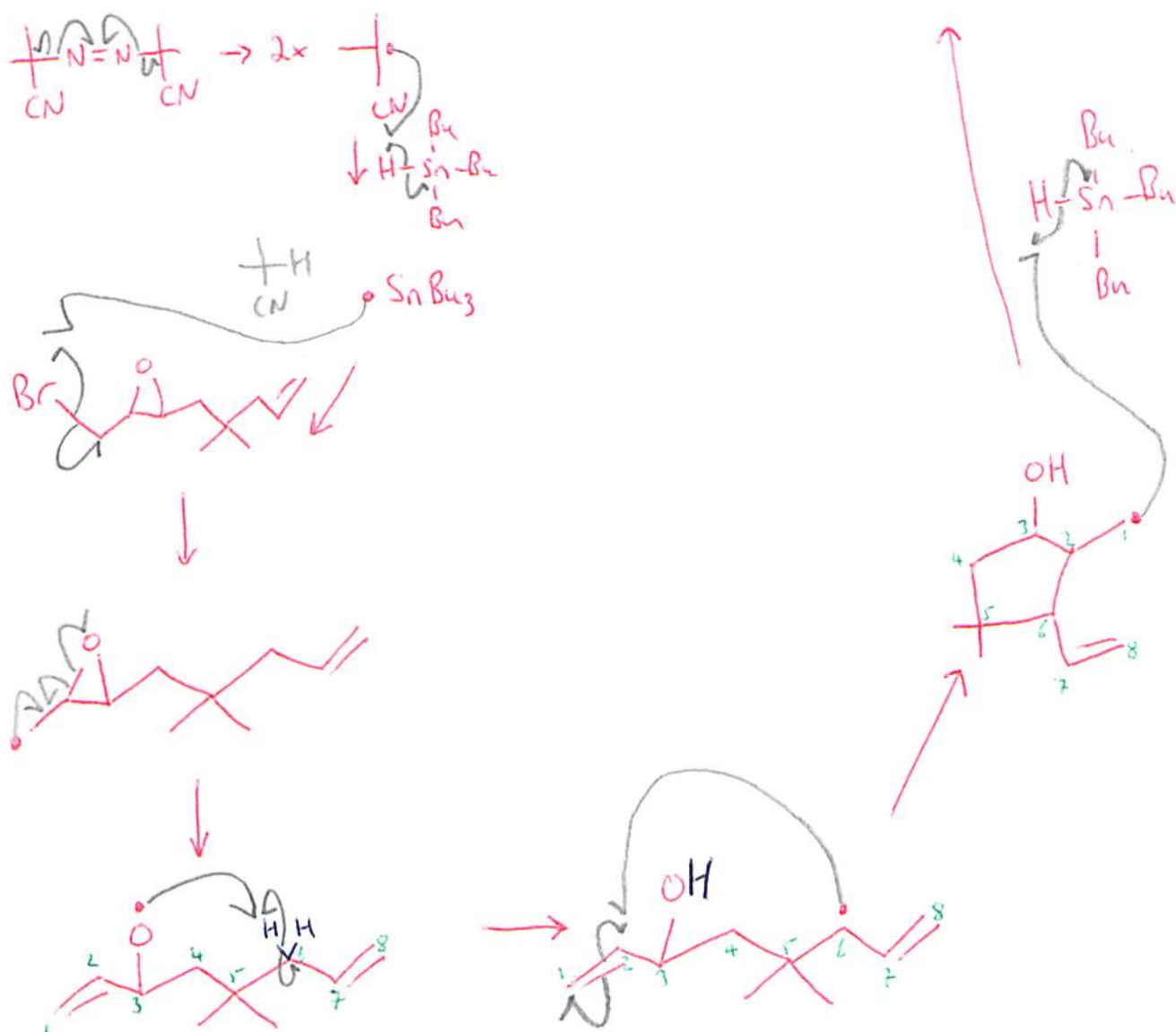
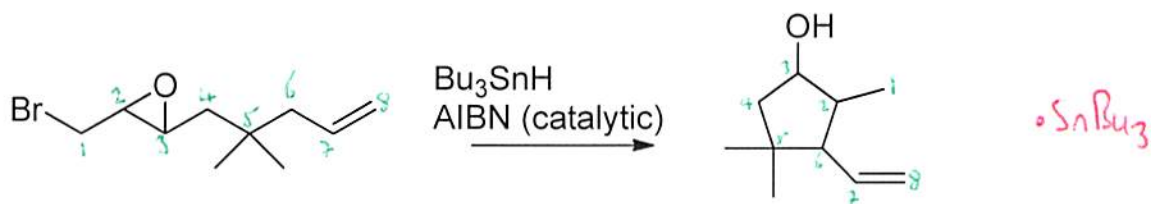
18) How many (different) radical anions are there? TWO

19) Draw *one* Lewis structure of any of the radical anions, showing where the electrons are located. (You can use any aromatic system as your "Ar" but C_6H_5 will be easiest to draw out).



Any resonance structure will do

- 20-25) Write a plausible mechanism for the following chain reaction which includes
- initiation
 - abstraction of the Bromine
 - ring opening of the epoxide
 - abstraction of a (convenient and weakly bound) Hydrogen
 - intramolecular addition (cyclization)
 - a radical that reacts with more Bu_3SnH to yield the product, and a Tin radical to continue this chain process.



****Up to 2 bonus points****

In your previous mechanism to (Q20-25), explain the organic chemistry (molecular structural) features that account for my description of the abstracted Hydrogen atom as:

i) "convenient"

It is convenient for the oxygen radical to abstract the Hydrogen since it can do so from a 6 membered transition state. This means it is easy to do so, without much steric repulsion or angle strain.

ii) "weakly bound"

That H is weakly bound since it has a low BDE because homolytic cleavage leads to a resonance stabilized radical.

