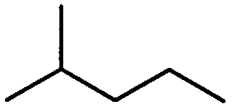
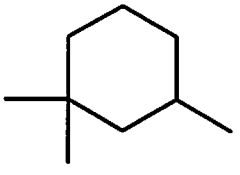
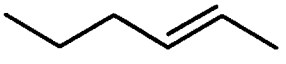
RADICALS Spring 2020 TWQ2 (25points) **Name**_____

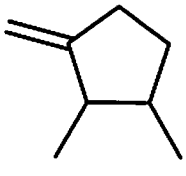
1-5) List the five types of reactions that radicals will typically perform (e.g. *abstraction*).

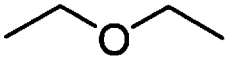
6-10) Using appropriate arrows, show the mechanisms for the Hydrogen abstraction by X• from the *weakest* C-H bond for each of the following molecules (which also appeared in your TWQ1).



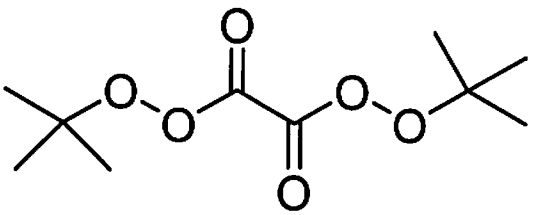








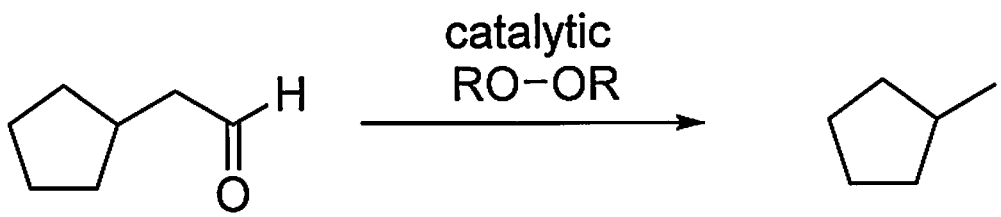
11-16) DTBPO is a free radical initiator shown below.



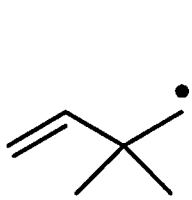
11-13) What do the initials D T B P O stand for? Also explain how each term relates to the above structure.

14-16) When heated, DTBPO generates the following species; carbon dioxide, ^{t}butoxy radical, propanone, and methyl radical.
Draw curly arrows to account for the production of these species.

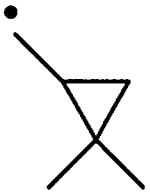
17- 20) Write the mechanism for this free radical chain process, and indicate whether each step is "initiation" or "propagation".



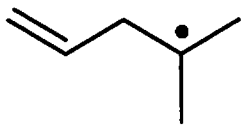
21-25) Consider the isomeric radicals A, B and C shown below:



A



B



C

21) Do you think A or C is more stable?

22) Draw the mechanism for A → B.

23) Is A → B an EXO or ENDO cyclization?

24) If A → B is described as *ring closure*, how would you describe B → C?

25) Draw the mechanism for B → C.

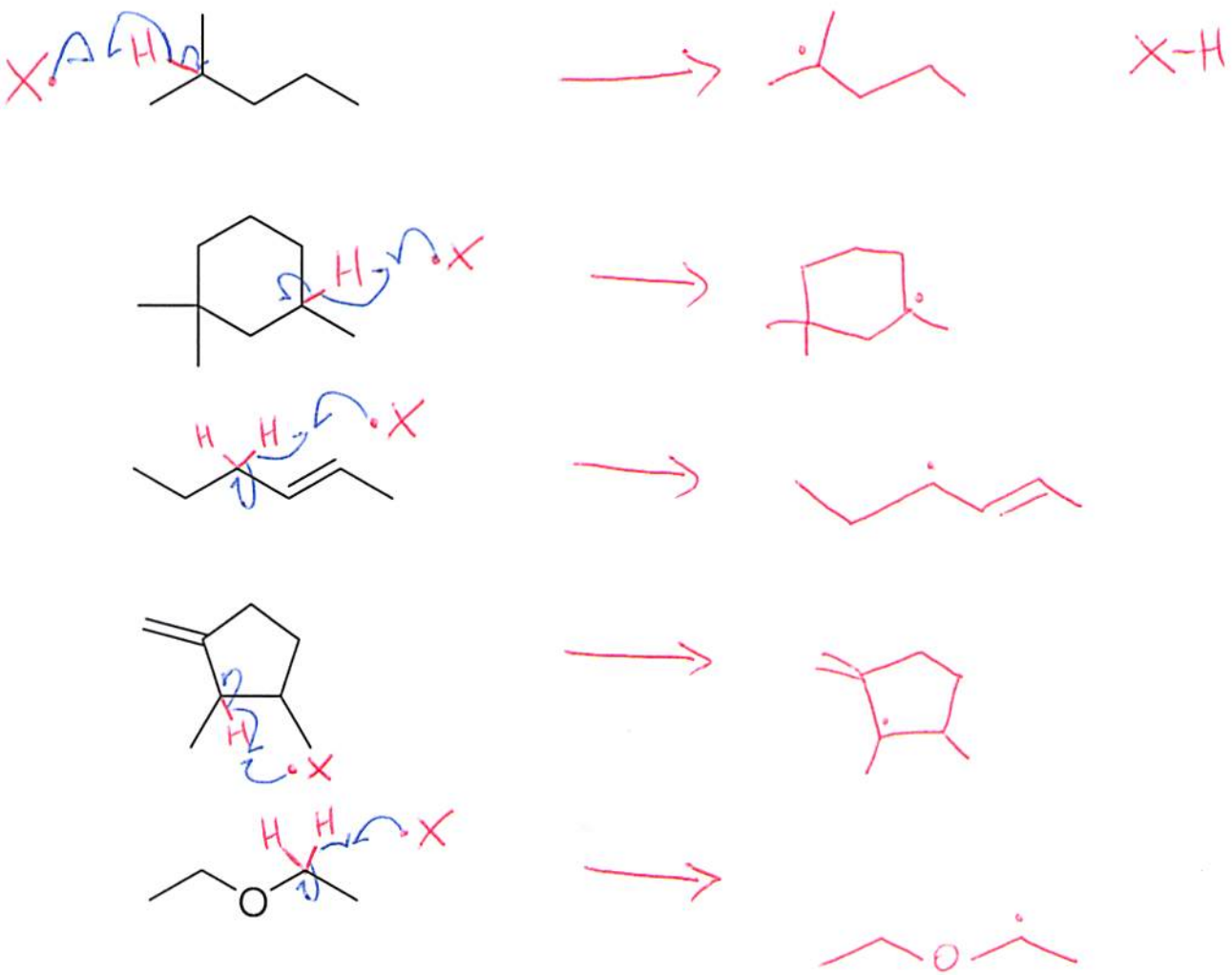
BONUS POINT: The above is actually part of a famous kinetic study that illustrated an observation in organic chemistry where large substituents favor ring closure. This effect is named after two chemists – what are their <u>first</u> names?

RADICALS Spring 2020 TWQ2 (25points) **Name** TWQ2

1-5) List the five types of reactions that radicals will typically perform (e.g. *abstraction*).

Addition
Abstraction
Dimerization
Disproportionation
Fragmentation.

6-10) Using appropriate arrows, show the mechanisms for the Hydrogen abstraction by X• from the *weakest* C-H bond for each of the following molecules (which also appeared in your TWQ1).



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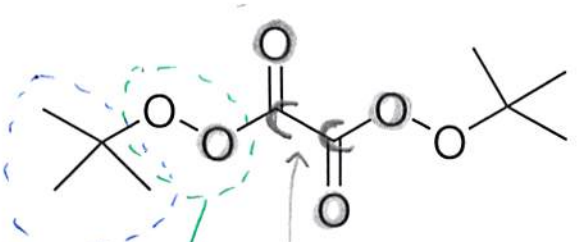

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Di Tertiary Butyl Peroxy Otalate

Two

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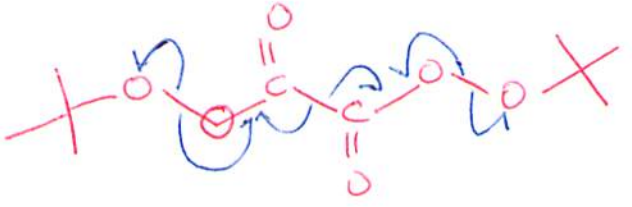

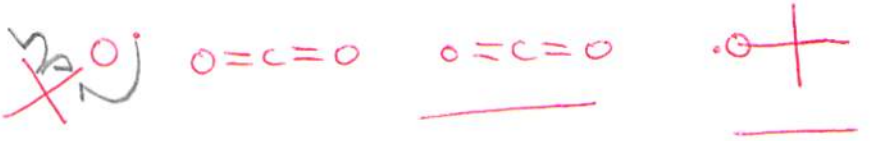

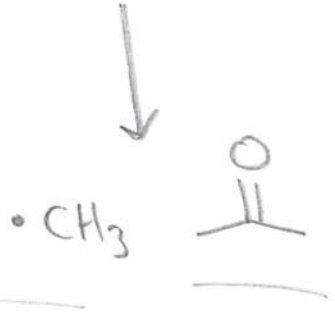

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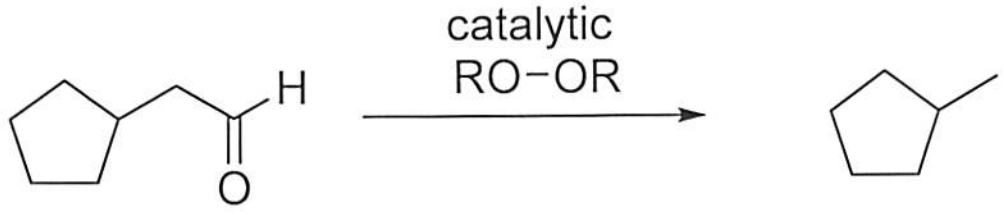
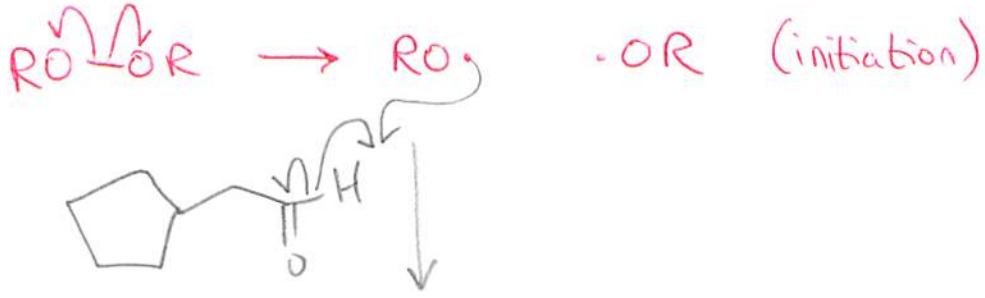
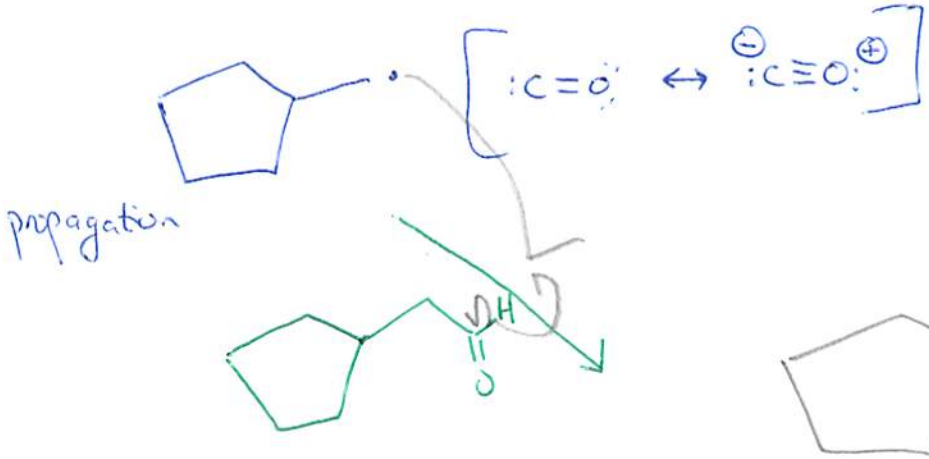
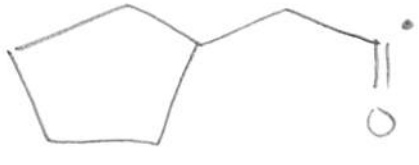


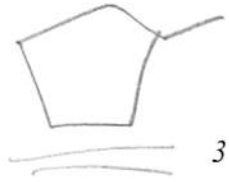






also propagation

&



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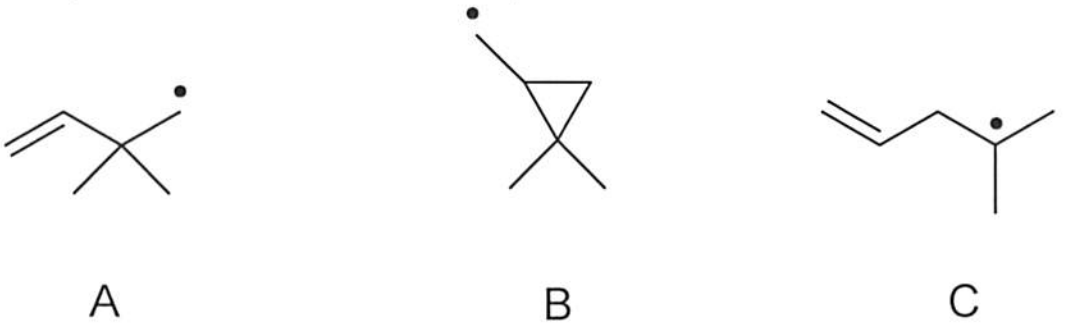

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ring opening

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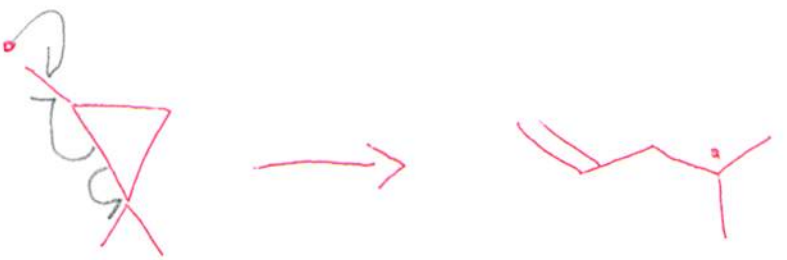

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Sir Christopher Kelk Ingold & Sir Jocelyn Field Thorpe of the "Thorpe-Ingold effect."