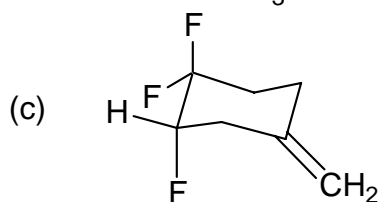
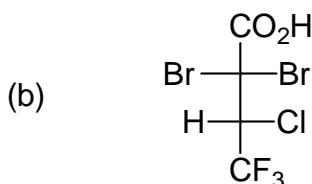
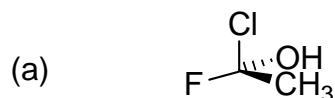


Name \_\_\_\_\_

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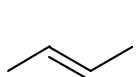
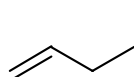
Answer all the questions.

1) (6pts) Assign (R) or (S) to **all** the chiral centers in the following molecules.

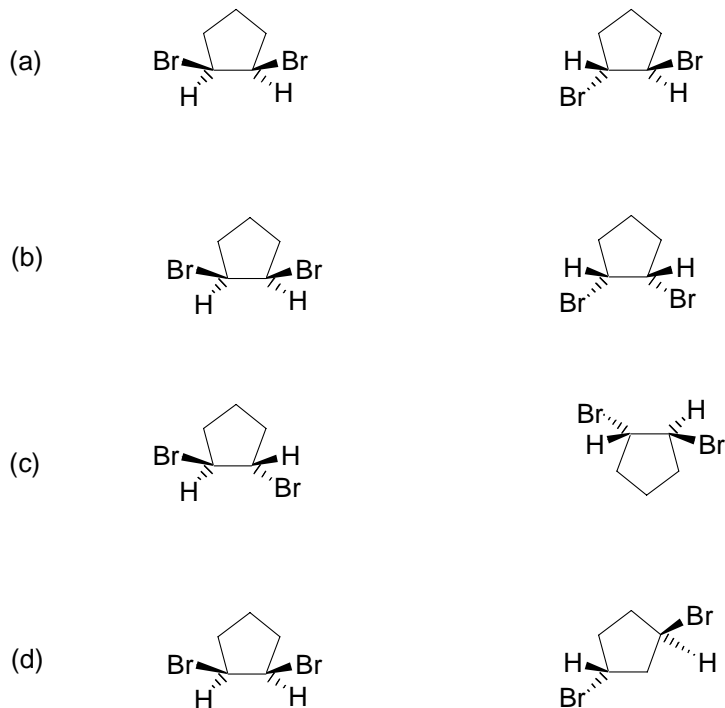


2) (4pts) List all four things that can happen once a carbocation is formed.

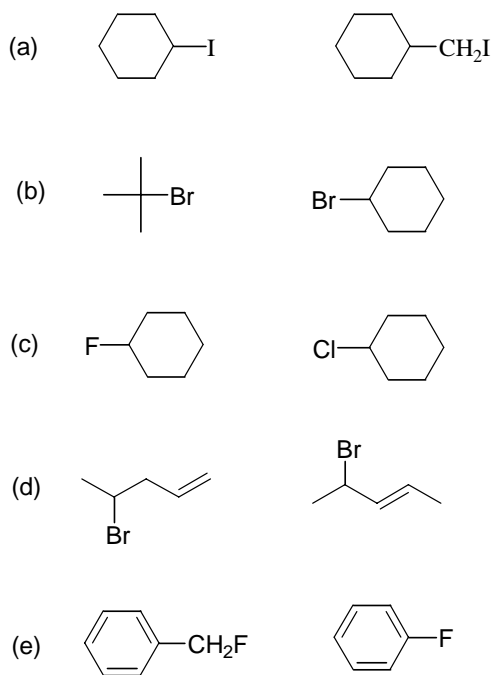
3) (12pts) Name these  $C_4H_8$  isomers in IUPAC form. (Bear in mind their names should all be different!)



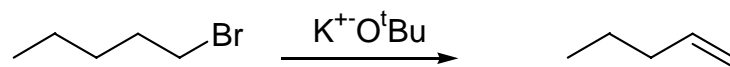
4) (12pts) Identify these pairs of compounds as *same*, *stereoisomers* or *structural isomers*.



5) (10pts) For each pair of molecules, **(i)** circle the one which will undergo  $S_N1$  type reactions the quickest, and **(ii)** write a sentence to explain your answer/guess.

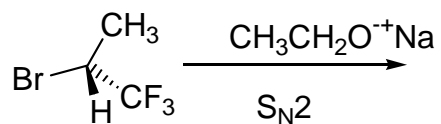


6) (8pts) Write a mechanism (i.e. curly arrows) for this **E2** elimination.



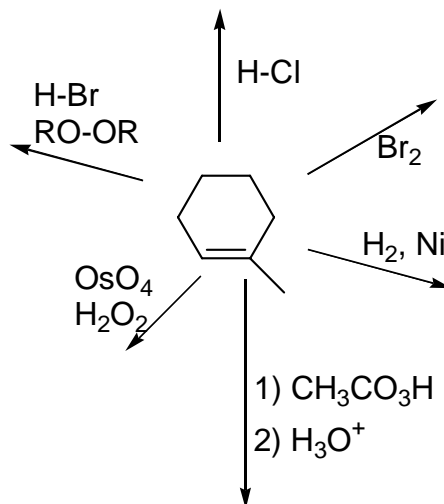
7) (9pts) Draw and label an Energy Level Diagram for a typical **S<sub>N</sub>1** process.

8) (7pts) The below enantiomer undergoes  $S_N2$  reaction with sodium ethoxide.



- (i) Draw the product or products.
  
  
  
  
  
  
  
  
  
  
- (ii) Will the product of this reaction be totally (R), totally (S) or a mixture of both?
  
  
  
  
  
  
  
  
  
  
- (iii) If four times as much nucleophile was added, what would happen to the rate of this reaction?

9) (22pts) Give the products formed in the following transformations of the below cyclic alkene, paying attention to stereo- and regio-chemistry where relevant.



(i) How many of these 6 transformations give *anti Markovnikov* products?

(ii) How many of these 6 transformations are pure *syn additions*?

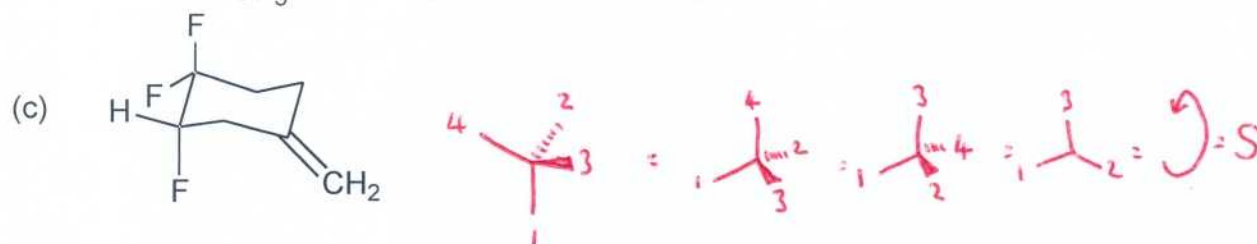
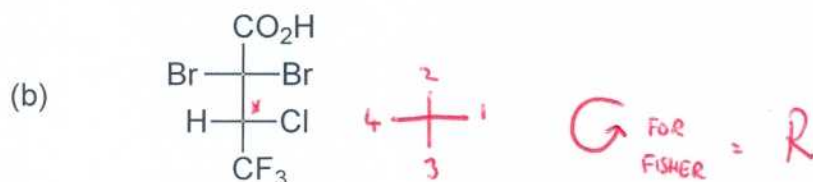
10) (10pts) Write the mechanism for either the H-Cl addition **OR** the HBr/Peroxides addition in (9), and briefly explain why the reaction is *regioselective*.

Name JEAN-ANN TONIQUE

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Answer all the questions.

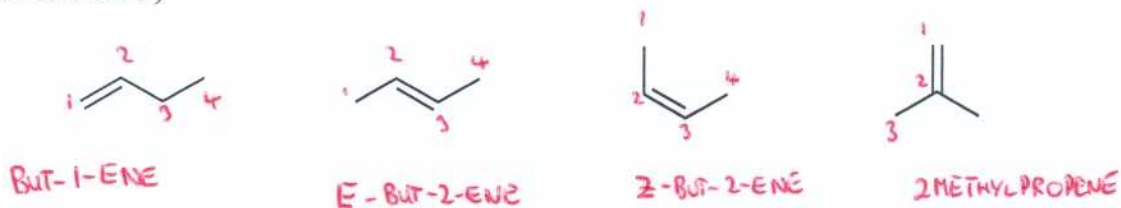
1) (6pts) Assign (R) or (S) to **all** the chiral centers in the following molecules.



2) (4pts) List all four things that can happen once a carbocation is formed.

- i) React with original leaving group → S<sub>N</sub>
- ii) React with a Nucleophile → substitution
- iii) lose a H<sup>+</sup> → Elimination
- iv) Rearrange.

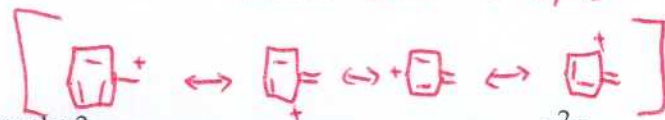
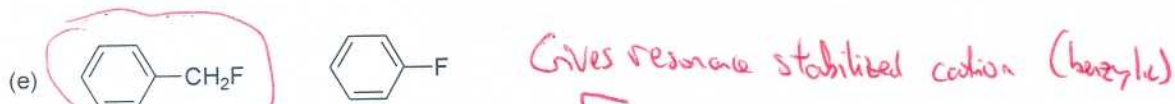
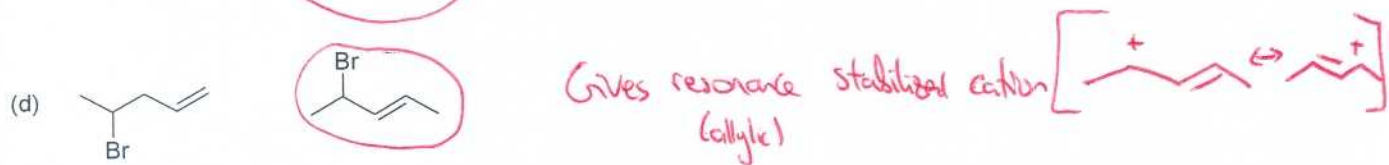
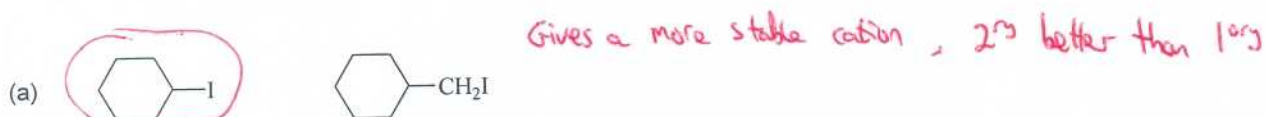
3) (12pts) Name these C<sub>4</sub>H<sub>8</sub> isomers in IUPAC form. (Bear in mind their names should all be different!)



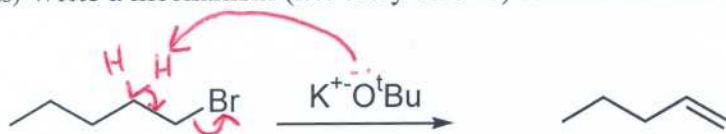
4) (12pts) Identify these pairs of compounds as *same*, *stereoisomers* or *structural isomers*.



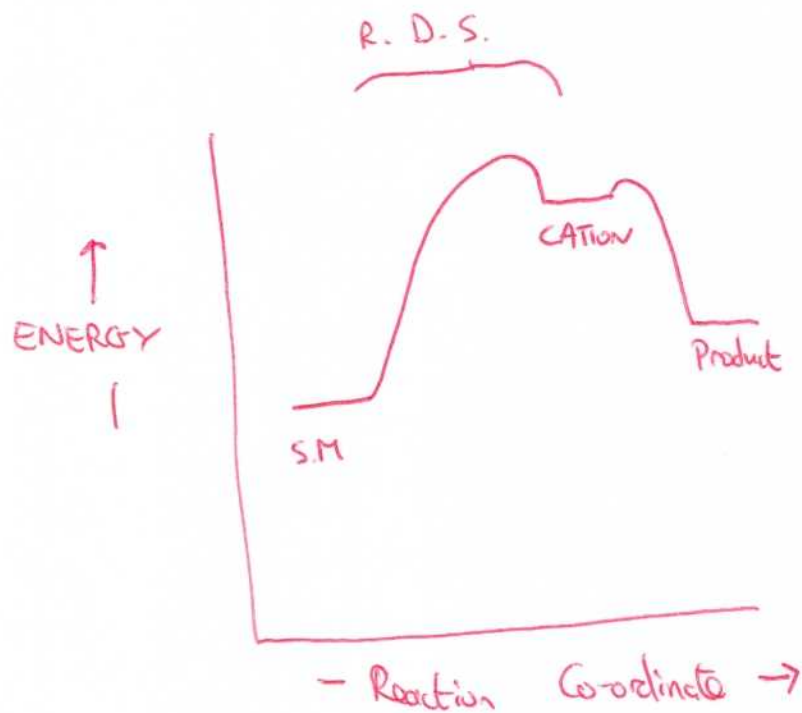
5) (10pts) For each pair of molecules, (i) circle the one which will undergo  $S_N1$  type reactions the quickest, and (ii) write a sentence to explain your answer/guess.



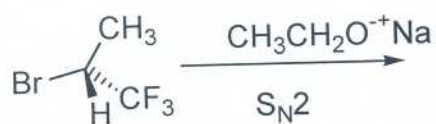
6) (8pts) Write a mechanism (i.e. curly arrows) for this **E2** elimination.



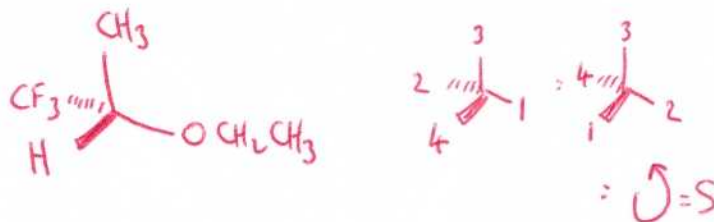
7) (9pts) Draw and label an Energy Level Diagram for a typical **S<sub>N</sub>1** process.



8) (7pts) The below enantiomer undergoes  $S_N2$  reaction with sodium ethoxide.



(i) Draw the product or products.



(ii) Will the product of this reaction be totally (R), totally (S) or a mixture of both?

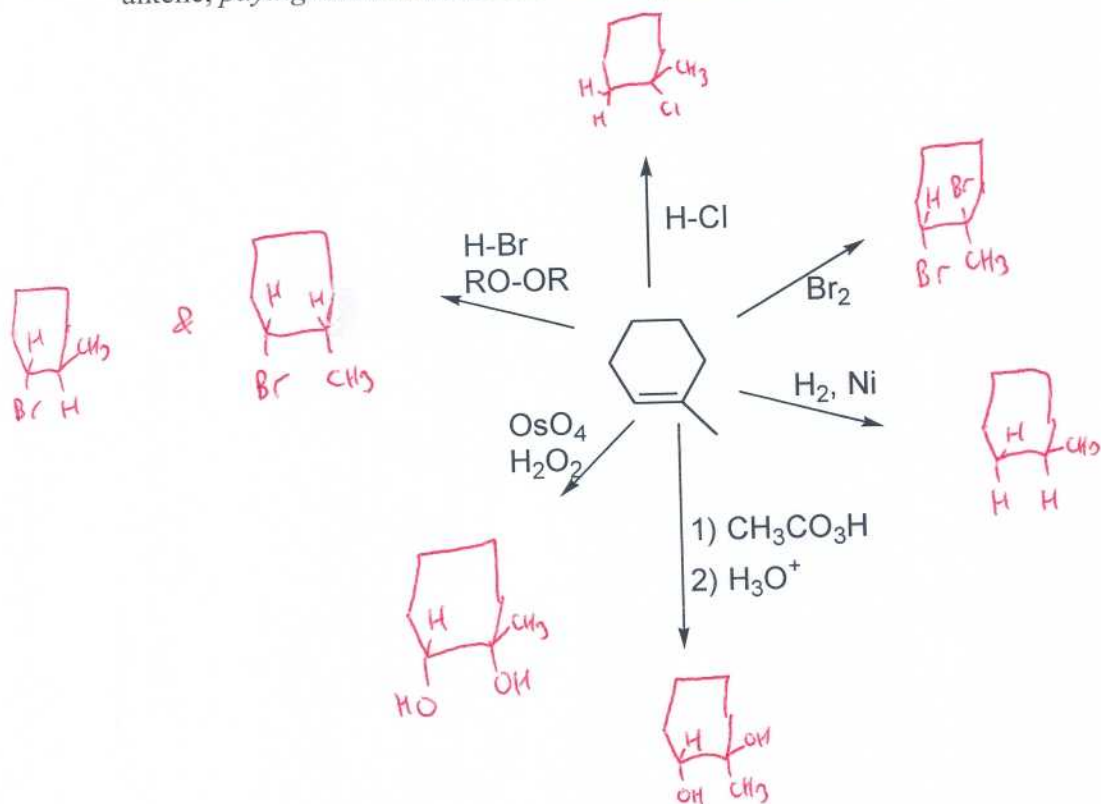
TOTALLY (S)

(iii) If four times as much nucleophile was added, what would happen to the rate of this reaction?

SPEED UP BY FOUR TIMES

$S_N2$  implies  $\text{Rate} = k [\text{SUBSTRATE}] [\text{NUCLEOPHILE}]$

9) (22pts) Give the products formed in the following transformations of the below cyclic alkene, paying attention to stereo- and regio-chemistry where relevant.



- (i) How many of these 6 transformations give *anti* Markovnikov products? **ONE**
- (ii) How many of these 6 transformations are *syn* additions? **TWO**

10) (10pts) Write the mechanism for either the H-Cl addition **OR** the HBr/Peroxides addition in (9), and briefly explain why the reaction is regioselective.

