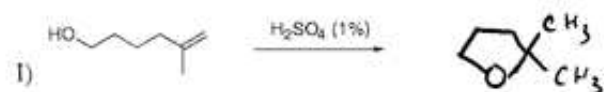
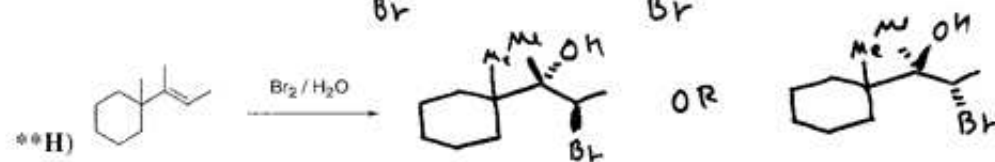
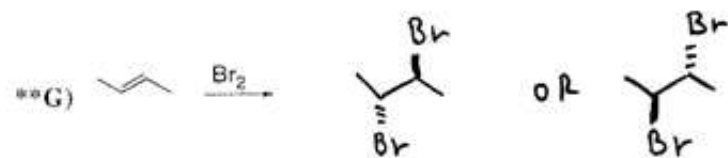
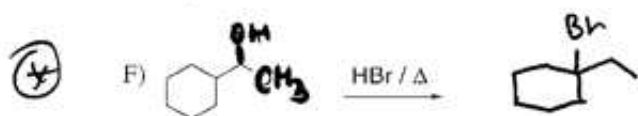
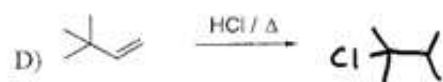
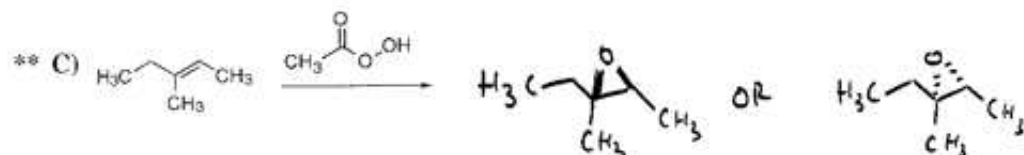
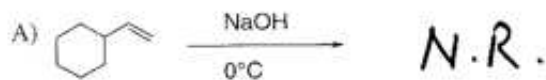
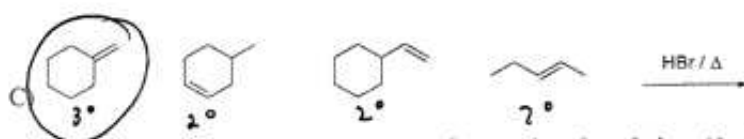
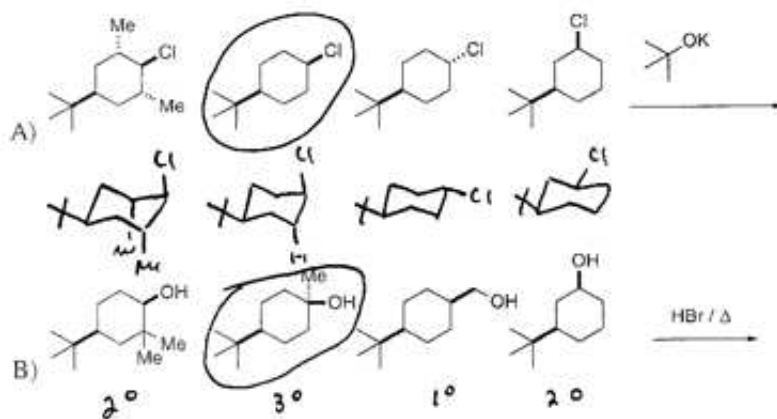


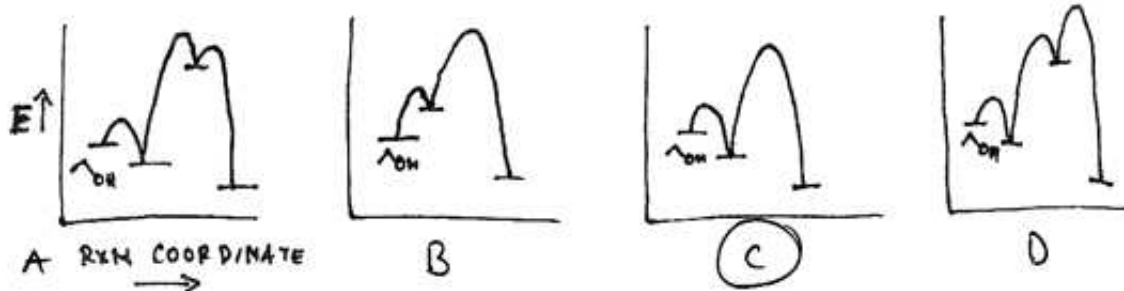
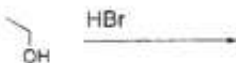
1) Provide the major product for each of the following reactions. If no reaction would occur, then write NR. For the questions labeled with a **, indicate the stereochemistry of the product by drawing bold or dashed lines as appropriate. (4 or 5 points each).



2) Circle the substrate which would react the fastest under the given set of conditions. (3 points each):



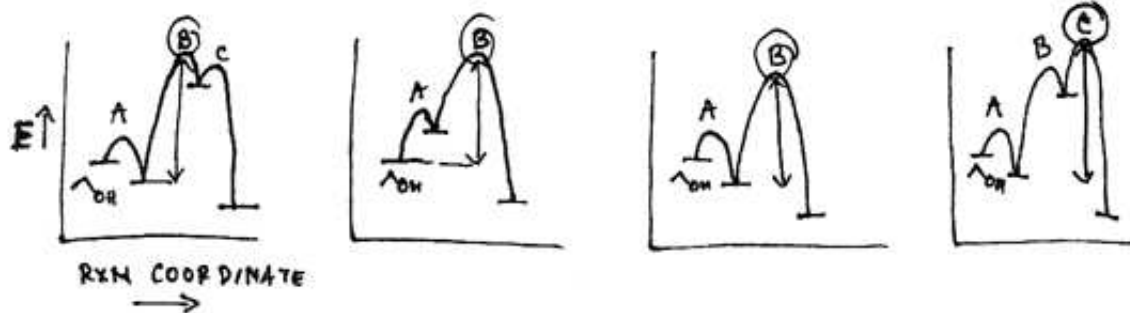
3) Which energy diagram best represents the reaction show below (4 points)?



A) RXN COORDINATE

4) The energy diagrams for four hypothetical reactions are shown below.

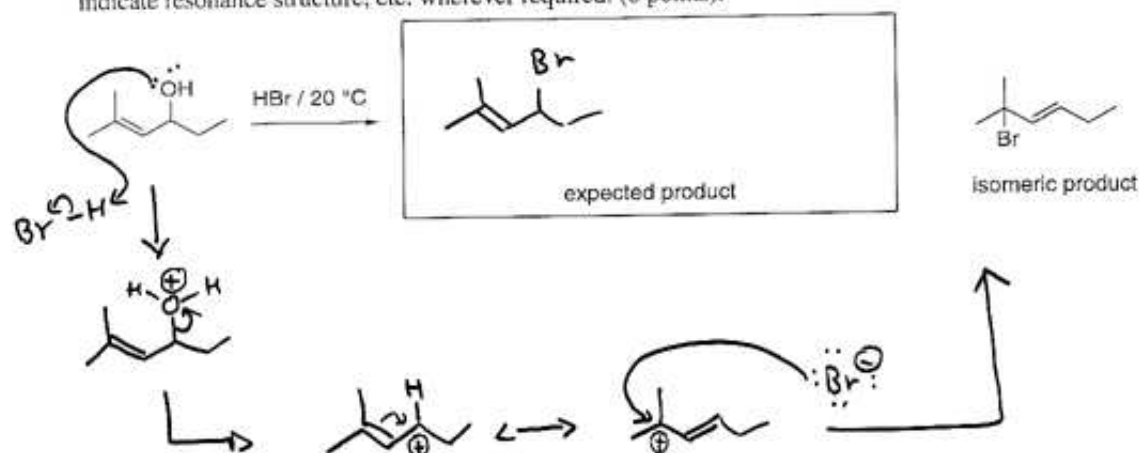
- a) Indicate the rate determining step for each one (circle A, B, or C on each diagram) and
 b) Indicate the activation energy by drawing an arrow on each diagram (8 points, -2 each wrong answer).



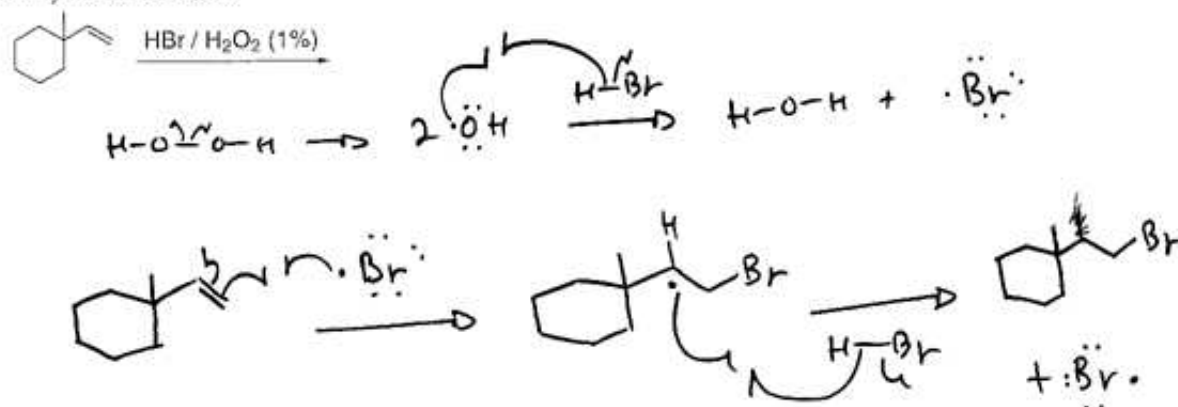
5) A chemist attempted the reaction shown below, and expected to get a particular product, but instead observed the isomeric product shown as the major product.

A) Provide the structure of the expected product (4 points)

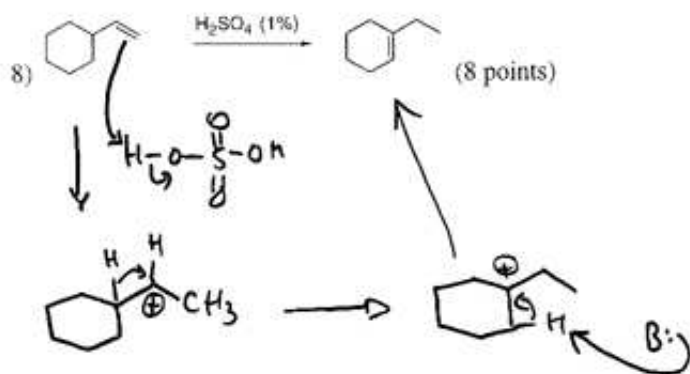
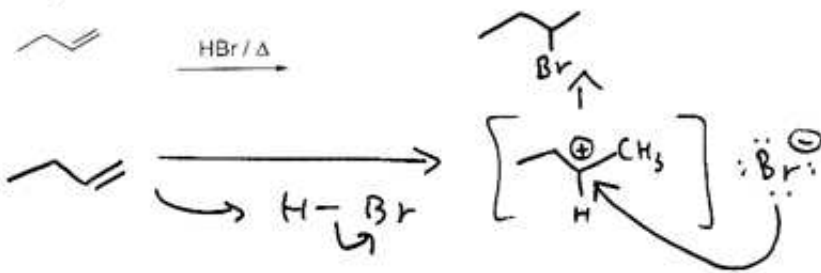
B) Provide the mechanism of formation of the isomeric product. Please show every intermediate and all the arrows required for each step, and pay careful attention to the include all charges and to properly indicate resonance structure, etc. wherever required. (8 points).



6) Provide the product (4 points) and mechanism (8 points) of the reaction shown below. Please show every intermediate, etc.



7) Provide the product (4 points) and mechanism (4 points) of the reaction shown below. Please show every intermediate, etc.



Extra credit: 5 points for up to 100 points maximum on the exam: There is a second mechanism one could draw for this reaction, draw it. This is all or nothing, and you must get the mechanism entirely right, so don't even think of asking for partial credit!

