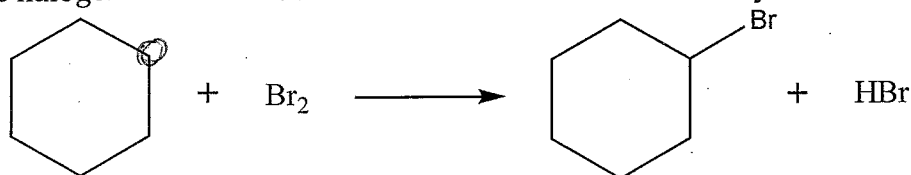
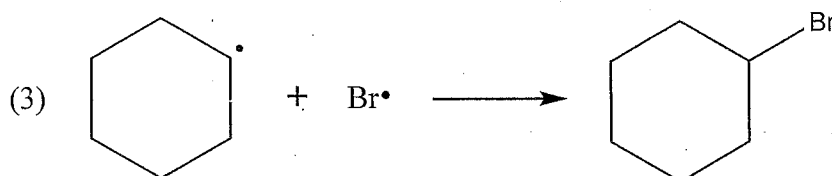
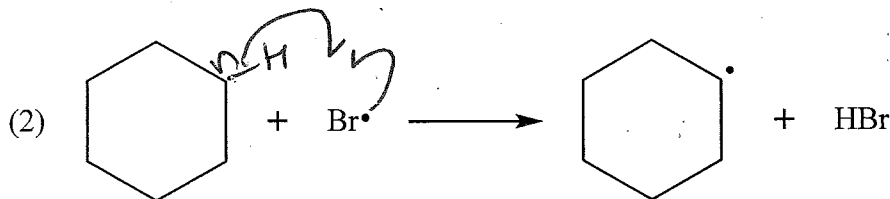


1. The halogenation of alkanes is a reaction used to create alkyl halides.



The process proceeds through the steps shown below:

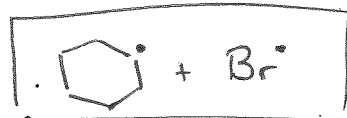


(a) What type(s) of intermediates are present?

0.5

Radical

or



will not be correct in the future

(b) Using the table provided on the last page, calculate ΔH (in kcal/mol) for the overall reaction.

1.5

- pdt energy + Sm energy = answer

0.5

0.5

0.5

if you used the wrong values from the table, I still gave points.

HBr	88	Br ₂	46	= -15
CBR	68	CH	95	
	156		141	

(c) On the image above, draw curved arrows showing the movement of electrons for Step 2 only. (Hint: You might need to draw in an atom that is part of a structure but not shown!)

1 I was very forgiving on this one, but you needed single-headed arrows

(d) **Omitting Step 1**, how many transition states would be present on a reaction coordinate diagram for the bromination of cyclohexane shown above?

0.5

2

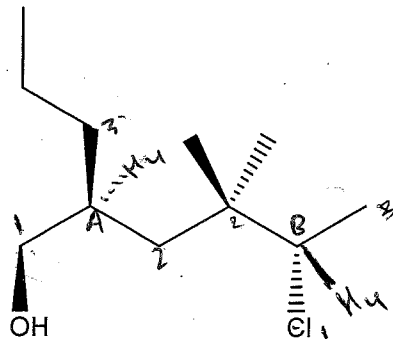
(e) If Step 1 is the rate determining step, write a rate law for the complete halogenation reaction.

0.5

rate = $k[\text{Br}_2]$

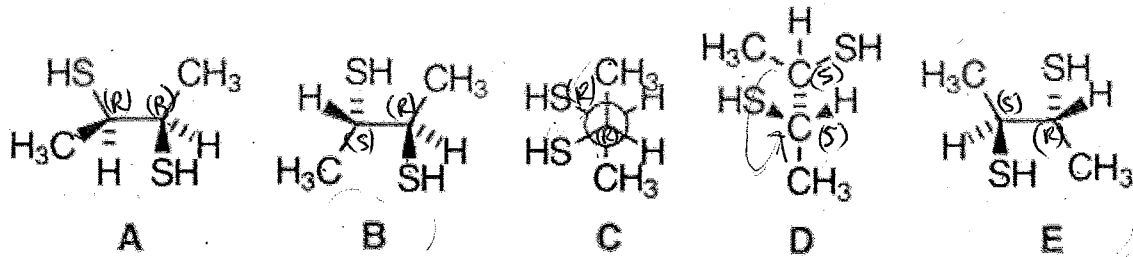
2. Label all of the stereocenters (A, B, C, etc.) on the molecule shown below and assign them as R or S in the box to the right.

2



1	A	S
1	B	S
	C	
	D	

3. Use the following compounds to answer the questions below. If no compounds fit the description, write NA. (There could be more than one correct answer for each question...you do not need to provide them all.)



4

a) A pair of diastereomers: A or C or D + B or E

b) A pair of enantiomers: ~~A+D, C+E~~

c) A meso compound: ~~A, C~~ B, E

d) A pair of identical structures: ~~A, C~~ A+C, B+E

1 pt each

everyone got a point for this

oops.

