

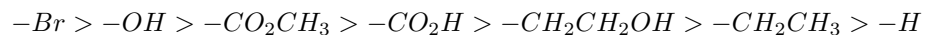
# Organic Chemistry

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## Section #2

### Question 4.1

### Question #6.1



### Question #6.2

## Section #3

### Question 5.1

1,3-butadiene has alternating single and double carbon bonds in its structure and therefore forms a conjugated system which is stabilized by resonance (see resonance forms below). In 1,4-pentadiene however there are no resonance structures, a conjugated system is not formed and as a result the compound is less stable.

### Question # 6.3

- a)
- b)
- c)
- d)
- e)
- f)
- g)

### Question # 7.3

### Question 8.1

resonance stabilization in  $CH_2CHCH_2^+$  delocalises charge in the molecule (see drawing below) increasing stability. in  $CH_3CH_2CH_2^+$  however there are no resonance structures present so no delocalisation occurs, and the positive charge remains concentrated on one carbon decreasing the stability of the molecule.

### Question 8.2

$CH_3CH^+CH_3$  The secondary carbonation is more stable than the primary carbonation due to the presence of additional electron releasing alkyl groups adjacent to the positively charged ion which help to ballance out the charge stabilizing the molecule.the rearrangement will occur as it results in a far more stable ion.

### Question 9.1

### Question 11.1

## Question 12.2

But-2-ene is more stable as there is an alternating system of single and double bonds, implying the presence of resonance structures and resonance stabilization. In but-1-ene there are no resonance forms.

## Section #4

### Question #3.1

### Question #3.3

### Question #3.5

a

limited amount/concentration of Chloride, with low temperature and limited time allowed for reaction

b

high /excess concentration of chlorine at higher temperature with reaction mix maintained for longer.

## Section #5

### Question #2.4

### Question # 2.5

Only the Markovnikov product is produced as Markovnikov addition proceeds through the tertiary carbocation, which is a far more stable intermediate, and so this reaction is highly favored.

### Question #2.6

The reaction again proceed to form the major product through the most stable intermediate, which is the tertiary carbon radical.

### Question 3.1

Despite the lack of permanent polarity within the dihalogen molecule, halogens contain a large easily polarisable electron cloud which allows for the formation of temporary dipoles (delta charges with the molecule). As the halogen molecules towards the alkene electrons in the molecule are repelled by the area of high electron density in the alkene bond, and so shift away from the closer halogen atom of the molecule towards the further away one, inducing temporary dipole in the process. The induced delta positive charge on the closer halogen atom allows it to act as a electrophilic attaching the C=C double bond to initiate the reaction.

### Question #3.5

Only cis addition can occur because the osmium tetroxide molecule is no large enough that it can react with different face of the ring simultaneously therefore it only reacts with one face of the ring leading to cis addition.

### Question 4.2

a)

b)

c)

**Question #6.2**

**Question 7.2**