

Elimination Reaction Chemistry Questions with Solutions

Q1. Assuming both the reactions as E1, where will the expected ratio between K_H/K_D lies between?



- a.) nearly 1
- b.) nearly 3
- c.) nearly 5
- d.) anything in between 2 and 8

Correct Answer– (a.) nearly 1

Q2. Predict the product for the following elimination reaction.



- a.)

b.)



c.)



d.)



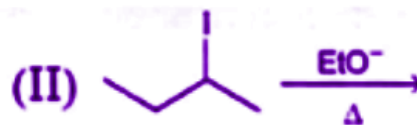
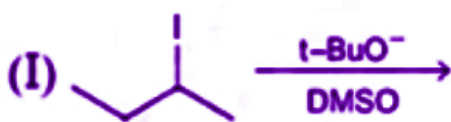
Answer– (b.)

Q3. Which of the following statement is correct?

- a.) E2 is a concerted reaction in which bonds break and new bonds form at the same time in a single step
- b.) Order of reactivity of alkyl halides towards E2 dehydrohalogenation is found to be $3^\circ > 2^\circ > 1^\circ$
- c.) In E2 elimination different stereoisomer (diastereomer) converts into different stereo product
- d.) All of the above

Correct Answer– (d.) All of the above

Q4. Find the following statement (s) is/are true about the following eliminations-



- (1) Hoffmann product is major product in I
- (2) Saytzeff product is major product in I
- (3) Hoffmann product is major product in II
- (4) Saytzeff product is major product in II

- a.) 1 and 2
- b.) 1 and 4
- c.) 2 and 3
- d.) 3 and 4

Correct Answer– (b.) 1 and 4

Q5. Choose the incorrect statement about alkyl bromide having molecular formula $C_5H_{11}Br$?

- a.) One isomeric alkyl bromide undergoes E1 elimination at the fastest rate.
- b.) Only one is incapable of reacting by the E2 mechanism.
- c.) Only one isomer gives a single alkene on E2 elimination.
- d.) 2-Bromopentane gives the most complex mixture of alkenes on E2 elimination.

Correct Answer– (c.) Only one isomer gives a single alkene on E2 elimination.

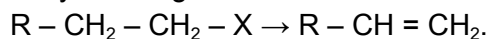
Q6. Specify the reagent used in the Elimination reaction (β - elimination) in case of alkyl halides.

Answer. The reagent used in the Elimination reaction (β - elimination) in case of alkyl halides is alcoholic KOH.

Q7. Fill in the blank.

By elimination reaction alkyl halide is best converted to ____.

Answer. By elimination reaction alkyl halide is best converted to alkene in the form of dehydrohalogenation.



Q8. Define β – elimination reaction.

Answer. When hydrogen atom is eliminated from the β -carbon atom (carbon atom next to the carbon to which halogen is attached).

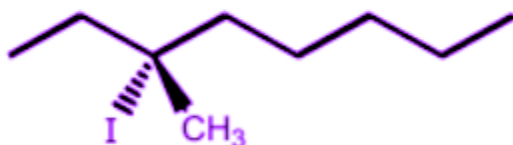
Q9. What is nucleophilic elimination reaction?

Answer. Nucleophilic substitution is a fundamental class of reactions in which an electron-rich nucleophile selectively binds or attacks the positive or partially positive charge of an atom or group of atoms as a substitute for a so-called leaving group.

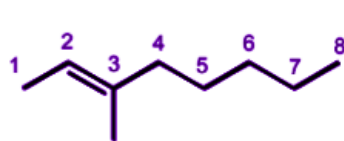
Q10. Why alcohol is used in elimination reaction?

Answer. Since most alcohols are weaker acids than water, the left side is preferred. The elimination of water from an alcohol is termed dehydration. Given that water is a far better leaving group than the hydroxide ion, acid-catalysis.

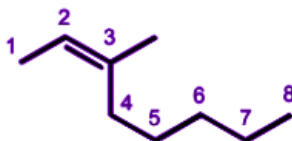
Q11. How many distinct alkenes can result from E2 elimination of the compound below? Give their structures and IUPAC names.



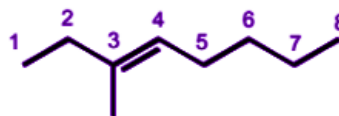
Answer.



(E)-3-methyloct-2-ene



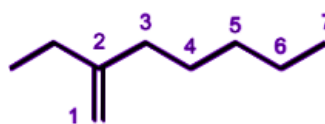
(Z)-3-methyloct-2-ene



(E)-3-methyloct-3-ene



(Z)-3-methyloct-3-ene



2-Ethylheptene

Q12. What is Saytzeff's rule?

Answer. There are haloalkanes that can undergo elimination in two different ways resulting in two different products. Alkenes with less number of hydrogens on the double-bonded carbon atoms are the preferred product. This process is known as Saytzeff's rule.

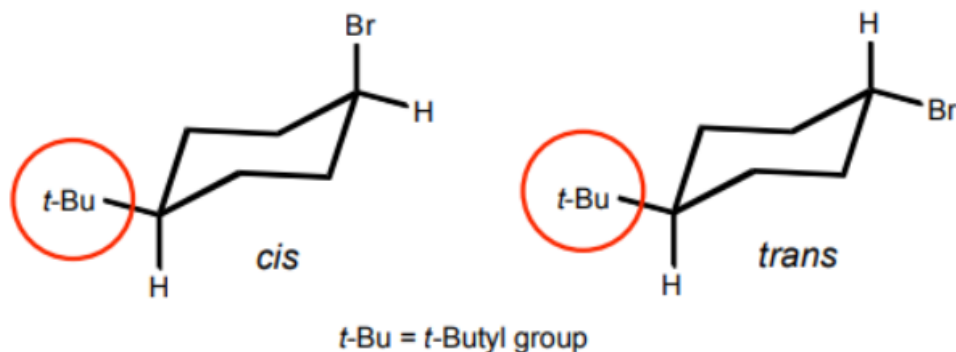
According to Saytzeff rule in dehydrohalogenation reactions, the preferred product is that alkene which has the greater number of alkyl groups attached to the doubly bonded carbon atoms.

Q13. What is the difference between substitution and elimination reactions?

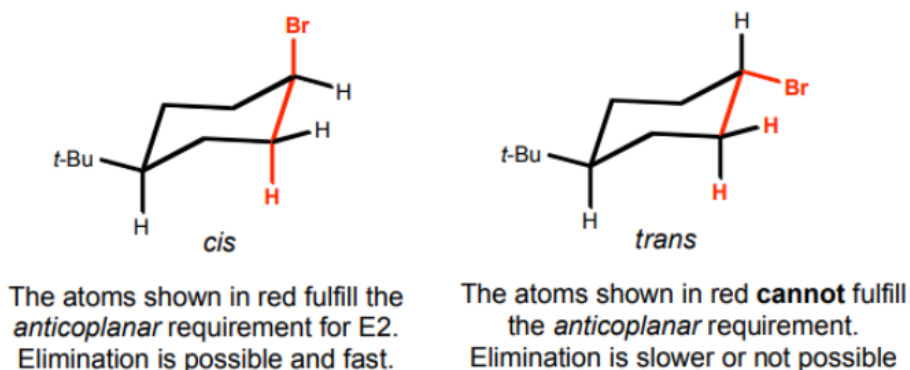
The distinction between replacement and elimination reactions is that replacement responses substitute one replacement with another while elimination reactions merely remove the replacement.

Q14. Which diastereomer of 1-bromo-4-t-butylcyclohexane, the cis or the trans, undergoes elimination more rapidly when treated with sodium ethoxide? Explain your answer.

Answer. The presence of the bulky t-butyl group effectively locks the ring into the most stable conformation, with the bulky group being equatorial.



The *cis* isomer is the only one of the two that fulfills the anticoplanar arrangement for E2, where the leaving group and adjacent proton must be in the same plane and anti to each other.



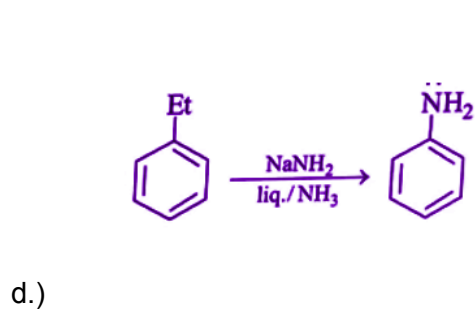
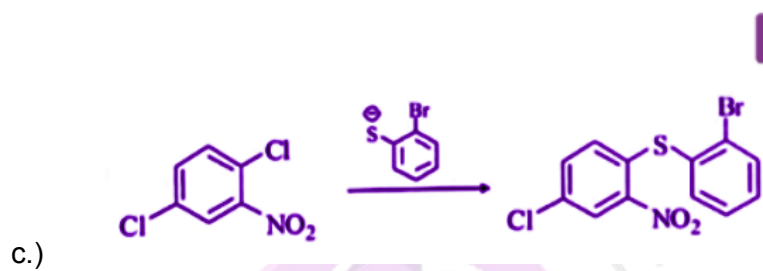
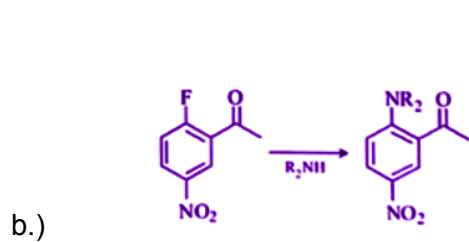
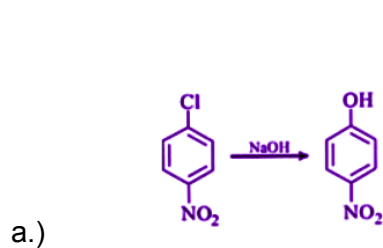
Q15. Arrange the alkyl halides ($R - Cl$, $R - Br$, $R - F$, $R - I$) according to their reactivity in the elimination reaction.

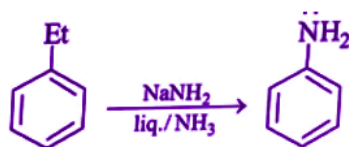
Answer. The arrangement of alkyl halides according to their reactivity in elimination reaction is as follows-

$R - F > R - Cl, R - Br, R - I$.

Practise Questions on Elimination Reaction

Q1. Which of the following reactions does not show an addition elimination mechanism?





Correct Answer– (d.)

Q2. Which of the following reacts by the E1 mechanism in ethanol most readily?

- a.) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$
- b.) $(\text{CH}_3)_2\text{CHCH}_2\text{Br}$
- c.) $(\text{CH}_3)_3\text{CBr}$
- d.) $\text{CH}_3\text{CH}_2\text{CHBrCH}_3$

Correct Answer– (c.) $(\text{CH}_3)_3\text{CBr}$

Q3. Fill in the blank.

Elimination reaction generally occurs with the formation of ____.

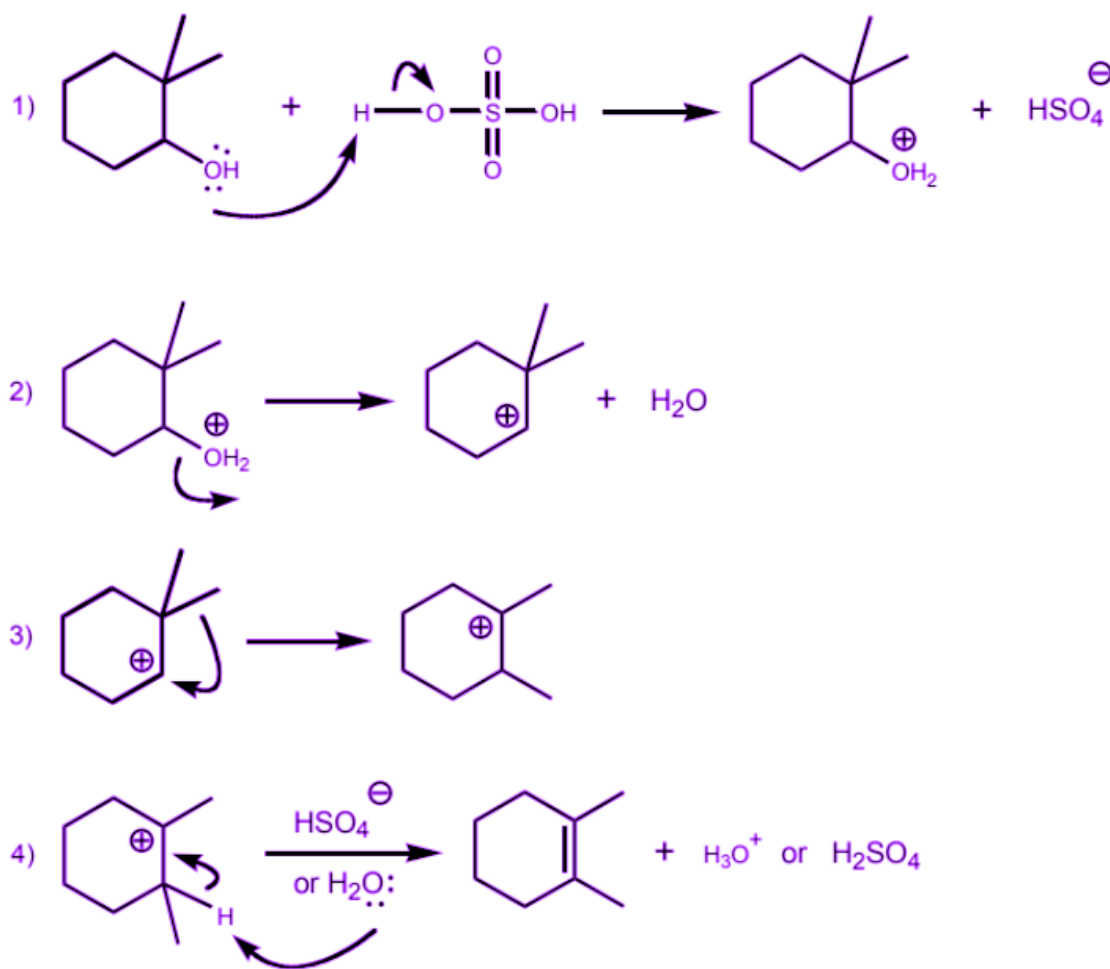
Answer. Elimination reaction generally occurs with the formation of One sigma and one pi bond. The sigma bond that holds the leaving group together is broken, and the remaining double bond is composed of one sigma bond and one pi bond.

Q4. Write the detailed, step-by-step mechanism for the reaction depicted below.

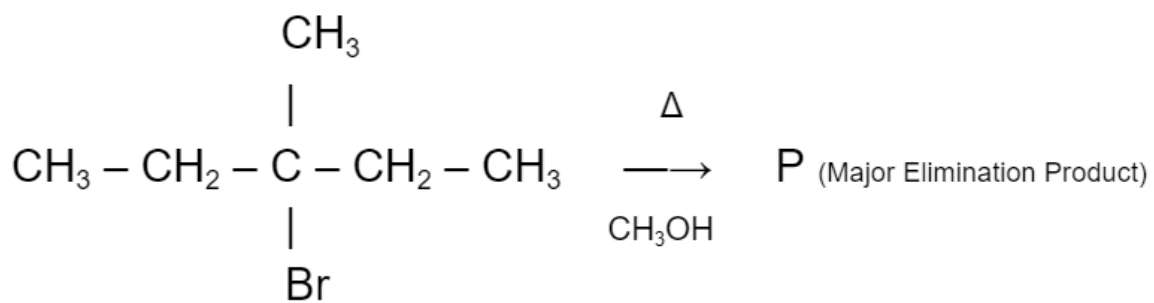


Answer. Step by step process is as follows-

- The strong acid protonates the alcohol first, forming a potential water molecule as a leaving group.
- The leaving group then departs, followed by the formation of a carbocation.
- Following that is a secondary to tertiary carbocation rearrangement.
- The final step is an elimination step in which water removes the acidic proton next to the positive charge to form the alkene.



Q5. The major elimination (E - 1) product P is:



Answer.

