**University of Djillali Bounaama Khemis Miliana**
**Faculty of Matter Sciences and Computer Science**
**Department of Chemistry**

**2nd year Chemistry**
**Organic Chemistry 2**

## <u>Séries N°2</u>

**<u>Exercise 1:</u>**

Indicate the type and mechanism of the reactions below:

1. $CH_3-Br + OH^{\ominus} \longrightarrow CH_3-OH + Br^{\ominus}$
2. $CH_3-CH_2-CH_2OH \longrightarrow CH_3-CH=CH_2 + H_2O$
3. $CH_2=CH_2 + Cl_2 \longrightarrow ClH_2C-CH_2Cl$
4. $CH_3-C(CH_3)_2-Cl + OH^{\ominus} \longrightarrow (CH_3)_2C=CH_2 + H_2O + Cl^{\ominus}$
5. $CH_3-CH=CH_2 + HBr \longrightarrow CH_3-CH(Br)-CH_3$

**<u>Exercise 2:</u>**

Consider molecule A: bromo-2 -phenyl-2-butane.

The following competitive reactions are carried out, considering the stereoisomer of A with the chiral center 2S.

**(a)** A + $CH_3CH_2O^-$ $\longrightarrow$ $Br^-$ + Y

**(b)** A + $CH_3CH_2O$- $\longrightarrow$ $Br^-$ + X + X' + $CH_3CH_2OH$

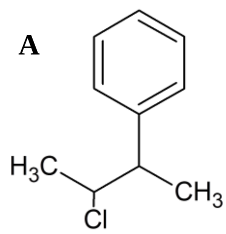
Experimental study shows that the rate expression for these two reactions is v=k [A]

**1)** Detail the mechanism of reaction (a).
**2)** The product Y obtained is an equimolar mixture of 2S and 2R, why?
**3)** Detail the mechanism of reaction (b) and represent the expanded formulas X and Y, specifying their configuration if applicable.

**<u>Exercise 3:</u>**

**I)** Consider compound A:

**A**




**1)** How many asymmetric carbons does this compound contain and how many stereoisomers are expected?
**2)** Represent the 2S-3S diastereoisomer using the same convention.

**II)** Treat compound B with the 2S-3S configuration with sodium hydroxide diluted in a polar aprotic solvent.

1) What type of reaction is this?
2) What is the major product C obtained? Give the reaction mechanism and deduce the steric consequences.

**III)** When compound B is treated with concentrated sodium hydroxide in a slightly polar medium, a compound D is obtained in addition to compound C. This product D results from an elimination reaction.

1) Specify the mechanism for the formation of D and give the geometry of this compound.
2) What rule governs this elimination?

**<u>Exercise 4:</u>**

Consider the compound A (bromo-1-methyl-2-cyclohexane):

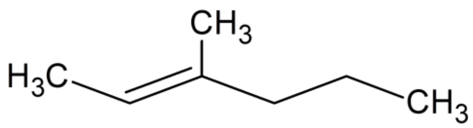
- Determine the absolute configuration of the asymmetric carbon atoms in A.

A is treated with hot sodium ethoxide at 55°C. The experiment shows that the reaction rate is proportional to the concentration of ethoxide ion.

1) What type of reaction is this? Explain.
2) Recall the Saytzeff rule. What major product B should be obtained by applying this rule in the previous reaction?
3) What would be the minor product C obtained? Name B and C.

**<u>Exercise 5:</u>**

Consider the following molecule, denoted as A:




1) Name this molecule specifying which diastereoisomer it is.
2) Provide the structural formula and name the products that can be obtained by the action of HBr on molecule A.
3) How many stereoisomers do each of the possible formed compounds have? Justify.
4) Which compound is formed predominantly? Justify.
5) Give the mechanism of the acidic hydration of A, represent and name the predominantly formed compound B.