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THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. Degree Programme and Stand Alone Courses in Science - 2015/2016

CMU2221/CME4221 - Organic Chemistry 1

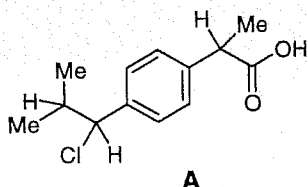
CONTINUOUS ASSESSMENT TEST II – PART A - Multiple Choice Questions

Saturday 01st October 2016

14.30 – 15.30 hrs

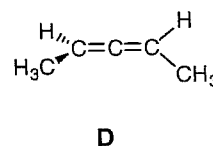
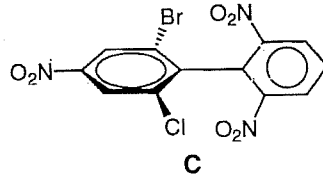
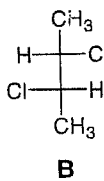
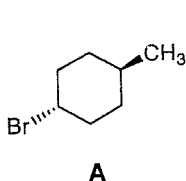
Instructions: Each correct answer carries **04 marks** while **01 mark** will be deducted for each wrong answer

1. How many stereoisomers are possible for the following compound?



- (1) 2 (2) 3 (3) 4 (4) 8 (5) 16

2. Which of the following compounds show optical activity?



- (1) A and B (2) B and C (3) B and D (4) A, B and C (5) A, B and D

3. Polarimeter is used to:

- (1) Separate a mixture of enantiomers
(2) Separate a mixture of diastereoisomers
(3) Measure the polarity of a solvent
(4) Measure the dipole moment of a compound
(5) Measure the specific rotation of a compound

4. Consider the following statements.

- (a) Carbocations are more stabilized in acetone than in water
(b) S_N2 reactions are favoured in dimethylformamide than in ethanol.
(c) S_N1 reactions **always** occur with rearrangement.

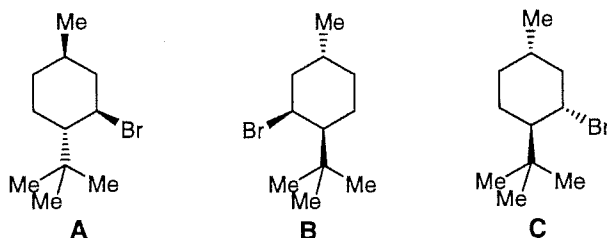
Correct statement/s is/are,

- (1) (a) only (2) (b) only (3) (c) only (4) (a) and (c) only (5) (b) and (c) only

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Questions 5, 6 and 7 are based on the following structures.

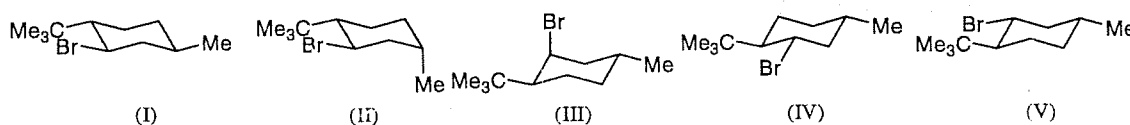


5. Consider the following statements.
- Structures **A** and **B** represent a pair of enantiomers.
 - Structures **A** and **C** represent a pair of enantiomers.
 - Structures **B** and **C** represent a pair of diastereomers.

Correct statement/s is/are:

- (1) (a) only (2) (b) only (3) (a) and (b) only (4) (b) and (c) only (5) (a) and (c) only

6. Consider the following conformations (I) – (V)



- Most stable conformations of **A** and **B** respectively are (I) and (II)
 - Most stable conformations of **B** and **C** respectively are (III) and (IV)
 - Most stable conformations of **A** and **C** respectively are (II) and (IV)
 - Most stable conformations of **A** and **B** respectively are (I) and (V)
 - Most stable conformations of **B** and **C** respectively are (III) and (V)
7. Select the **correct** statement.
- A** undergoes E2 elimination readily with alc. KOH to give two products.
 - B** undergoes E2 elimination readily with alc. KOH to give two products.
 - C** undergoes E2 elimination readily with alc. KOH to give one product
 - B** undergoes E2 elimination readily with alc. KOH to give one product.
 - A** and **B** both undergo E2 elimination readily with alc. KOH.

8. Select the **correct** statement regarding the following organic solvents.

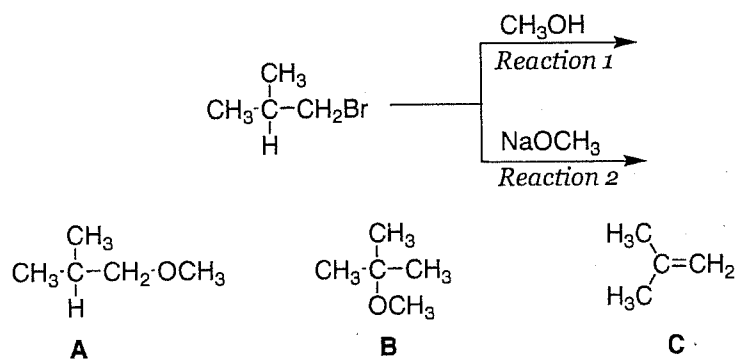
Acetic acid ($\text{CH}_3\text{CO}_2\text{H}$) Acetonitrile (MeCN) Dimethylformamide (HCONMe_2)
 Ethanol (EtOH) Acetone (CH_3COCH_3)

- Acetone is a nonpolar aprotic solvent
- Ethanol is a nonpolar protic solvents
- Acetic acid is a polar protic solvent
- Acetonitrile is a polar protic solvent
- Dimethylformamide is a polar aprotic solvent

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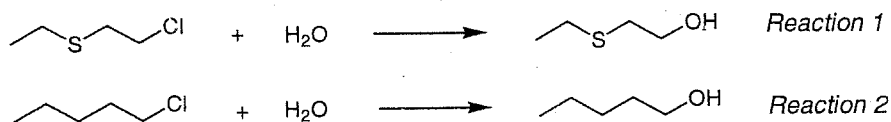
9. Consider the following two reactions and the compounds **A**, **B** and **C** given below.



Select the correct statement.

- (1) Major products of both reactions 1 and 2 are the same and it is **A**.
- (2) Major products of both reactions 1 and 2 are the same and it is **B**.
- (3) Major product of reaction 1 is **B** and product of reaction 2 is **A**.
- (4) Major product of reaction 1 is **B** and product of reaction 2 is **C**.
- (5) Major product of reaction 1 is **A** and product of reaction 2 is **C**.

10. Consider the following two reactions.



Select the incorrect statement.

- (1) Reaction 1 takes place very much faster than the reaction 2
- (2) Reaction 1 takes place via neighbouring group participation mechanism
- (3) Reaction 2 takes place via $\text{S}_\text{N}2$ mechanism.
- (4) Both reactions form carbocation intermediates
- (5) Rate of reaction 1 depends only on the concentration of the substrate.





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CMU2221/CME4221 - Organic Chemistry 1
CONTINUOUS ASSESSMENT TEST II

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Ques No.	Max.	Marks
MCQ	40	
1	20	
2	40	
Total	100	

Saturday 01st October 2016

14.30 – 15.30 hrs.

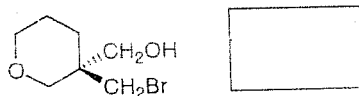
MCQ Answer sheet (PART A)

1.	1	2	3	4	5	2.	1	2	3	4	5	3.	1	2	3	4	5	4.	1	2	3	4	5
5.	1	2	3	4	5	6.	1	2	3	4	5	7.	1	2	3	4	5						
8.	1	2	3	4	5	9.	1	2	3	4	5	10.	1	2	3	4	5						

Structured Essay Questions (PART B)

1. (a) Determine the configuration of the stereocenter of the following compound indicating the priorities of the groups according to Cahn Ingold Prelog rules.

(Note: If the priorities of the groups are *not indicated* marks will *not be awarded*).



(10 Marks)

- (b) Fill in the blanks using appropriate terms. (number of words required for each sentence is given in parenthesis)

- (i) are stereoisomers which do not show object-mirror image relationship. (one word)
- (ii) Molecules having more than one chiral center can be achiral due to..... (two words)
- (iii) S_N2 reactions are favored in solvents. (two words)
- (iv) Strong bases and high temperatures favor reactions over reactions. (one word in each blank)
- (v) Rearrangements are possible during, and reactions. (three words)

(10 Marks)

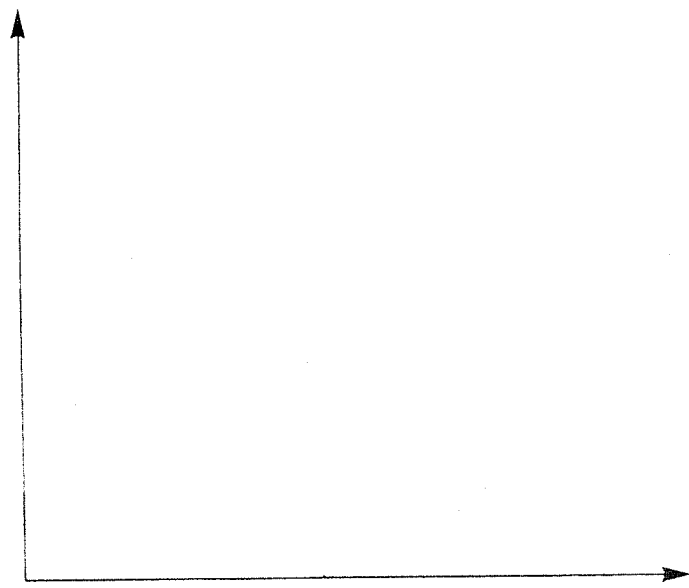
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2. Consider the hydrolysis of 2-bromo-2-methylpropane in water.

(a) Give the mechanism of this reaction.

(b) Draw the labeled energy diagram for the above reaction.



(c) State whether the rate of reaction would be increased or decreased if the above reaction is carried out in aqueous acetone without varying the concentration of the substrate.

.....

(d) Explain your answer to the above question.

(40 Marks)

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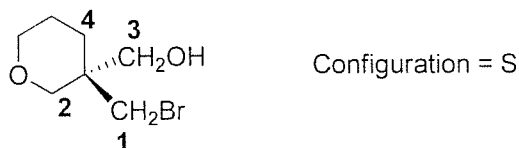
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Answers for MCQ.

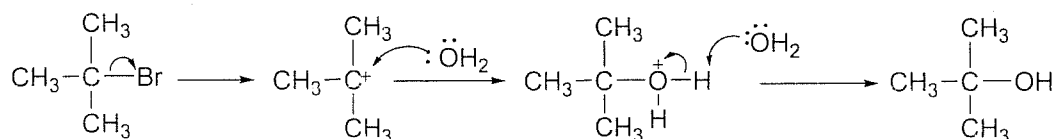
1. 3 2.3 3. 5 4. 2 5. 4 6. 2 7. 2 8. 5 9. 4 10. 4

1. (a)

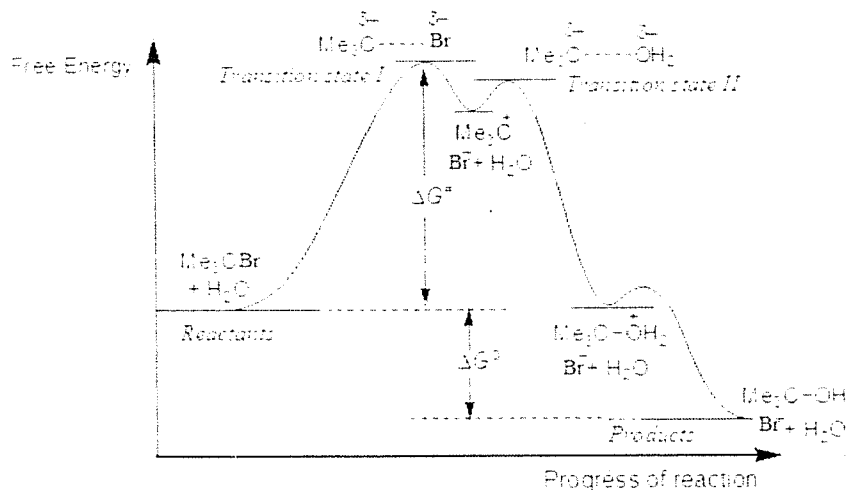


- (b) (i) **Diastereomers** are stereoisomers which do not show object-mirror image relationship
 (ii) Molecules having more than one chiral centre can be achiral due to **molecular symmetry**.
 (iii) S_N2 reactions are favored in **polar aprotic** solvents.
 (iv) Strong bases and high temperatures favor **elimination** reactions over **substitution** reactions.
 (v) Rearrangements are possible during S_N1 , $E1$ and **addition** reactions

2. (a)



(b) Unit II, page 20



(c) Decreased.

- (d) S_N1 reactions go through a carbocation intermediate. Water is a polar protic solvent which solvate the carbocation strongly. Solvation stabilizes the carbocation. Acetone is a polar aprotic solvent. It is a less polar solvent than water. Therefore the carbocation is less stabilized by solvation. The reaction rate is decreased.