

School: School of Science Program/s: BSc Chemistry Year: 3rd Semester: 5th

Examination: End Semester Examination

Examination year: December - 2021

Course Code: CH311 Course Name: Organic Chemistry-III

Date: 01/12/2021

Total Marks: 40 Time: 11:30 am to 01:30 pm **Total Pages:** 3

Instructions:

→ Write each answer on a new page.

→ Use of a calculator is permitted/not permitted.

→ *COs=Course Outcome mapping. #BTL=Bloom's Taxonomy Level mapping

Q. No.	Details	Marks	COs*	BTL#
Q.1	Choose the correct answer (s) from the followings.	7	CO1	BT1
	1. Replacement of the diazonium group by -Cl using cuprous chloride is generally referred to		CO2	BT2 BT3
	as	8	CO4	BT4
D ₁	(a) Sandmeyer reaction		CO5	
	(b) Rosenmund reaction			
	(c) Grignard reaction	7.		_
	(d) Cannizzaro reaction		15	
	2. Predict and write the preferred product for following reaction with appropriate			
1.0	and this the preferred product for following reaction with appropriate			
	stereochemistry (in accordance with the Woodward-Hoffmann) from given option.			
	25 °C ????	,		
8		8		
	a) () () () () () () ()			
	H H		ė.	
	3. Choose the appropriate reagent and condition for following reaction			
	and appropriate reagent and contained for following reaction.			
	$\stackrel{\oplus}{N_2}$ $\stackrel{\bigcirc}{Cl}$ OH (a) hot dilute H_2SO_4 (b) H_3PO_2	*	- di 	
- 2 "	(b) 113FO2 (c) NaNO2, HCI			
5	(d) HBr + Cu			
* ₁₈	NO ₂ NO ₂			
	4. Which one of the following is HOMO for 1,3-butadiene in excited state?	T a	-	
-				
	$(a) \begin{pmatrix} c & c & c \\ c & c \end{pmatrix} \begin{pmatrix} c & c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} \begin{pmatrix} c \\ c \end{pmatrix} $		8	*
				8 4
			-	

	5. Predict and write the preferred product for following reaction.			
E 22	$\frac{O}{I}$ $h\nu$			
T _B	H ₃ C			
- 2				
100				28
	a) H ₃ C b) H ₃ C c) H ₃ C d) H ₃ C			
	a, 3- a, H ₃ C			
				*
	6. With respect to number of σ -bond formed or broken, which one of the following is true for	9		
	electrocyclic reaction?			. 8
	(a) one new σ-bond formed as another σ-bond breaks			,22
	-(b) two new σ-bonds are formed or broken	k		^
	(c) two new σ-bonds are formed and no σ-bond is broken			22
	(d) one new σ -bond formed and no σ -bond is broken			
	7. With respect to electrophilic aromatic substitution reaction, which one of the following is			
	ortho, para directing group?		и,	
	(a) -NO ₂ (-Nitro group)			
	(b) -COOH (-Carboxylic Acid group)		12.5	
	(c) -CHO (-Aldehyde group)			
-	(d) -NH ₂ (-Amino group)		= 1 = 1	
			- v	
Q.2	Each of the following reactions involves one or more concerted steps that take place in	5	CO1	BT1
	accordance with the Woodward-Hoffmann rules. Predict the product in each case with		C02 C03	BT2 BT3
	preferred stereochemistry, wherever it is applicable. (Any Five)		CO4	BT4
			CO5	- 1
	CH ₃ OAc			
	a) $\begin{pmatrix} H \\ + \end{pmatrix} \begin{pmatrix} 80 \text{ °C} \\ + \end{pmatrix}$			
	monocyclic N.COOEt			
-	CH ₃ compound			
	2,4,6,8-decatetraene			
	b) $h\nu$ e $+$ MeOOC ——COOMe ——E			
	e . Ph			
	√. Į			
a, a	c $h\nu$ c CH_3 $h\nu$			
ET.	-20 °C _{f)} CH ₃		- "	
Q.3	Complete the following reactions and predict the major product. (Any Four)	6	C01	BT1
	estingles the following reactions and predict the major product. (Any Four)	O	CO2	BT2
	D ₂			
1	Br i) Mg, ether		CO3	BT3 BT4
	a) CH ₂ CI NaCN H ₂ , Ni, 140 °C ii) Mg, ether ii) CO ₂ ?		CO3 CO4	BT3
	CH ₂ CI NaCN H ₂ , Ni, 140 °C ii) Mg, ether ii) CO ₂		CO3	BT3
	a) CH ₂ CI NaCN H ₂ , Ni, 140 °C ii) Mg, ether ii) CO ₂ ?		CO3 CO4	BT3
=	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Br i) Mg, ether ii) CO ₂ ? iii) H ⁺ Note: write the final product		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Br i) Mg, ether ii) CO ₂ ? Note: write the final product Note: write the final product		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Br i) Mg, ether ii) CO ₂ ? Note: write the final product Note: write the final product CI i) NaN ₃ ii) H ₂ O, heat		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Fr i) Mg, ether ii) CO ₂ ? Note: write the final product KOH H + HCHO Consistence ? + ? CI i) NaN ₃		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Br i) Mg, ether ii) CO ₂ ? Note: write the final product Note: write the final product CI i) NaN ₃ ii) H ₂ O, heat		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Br i) Mg, ether ii) CO ₂ ? Note: write the final product Note: write the final product CI i) NaN ₃ ii) H ₂ O, heat		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Fr i) Mg, ether ii) CO ₂ ? Note: write the final product KOH Cannizzaro reaction ? + ? NH ₂ NaNO ₂ , H ₂ SO ₄ H ₂ O, H ⁺ , Heat		CO3 CO4	BT3
	a) CH ₂ CI NaCN ? H ₂ , Ni, 140 °C ? d) Fr i) Mg, ether ii) CO ₂ ? Note: write the final product KOH Cannizzaro reaction ? + ? e) CI i) NaN ₃ ii) H ₂ O, heat ?		CO3 CO4	ВТ3

Q.4	Do as directed. (Any Four)	10	C01	BT1
	(i) Write the sequence of reactions (with reagent and any special conditions) necessary to		CO2 CO3	BT2 BT3
	convert toluene into p-toluic acid (Hint: via diazonium salt).		CO4	BT4
	(ii) Aryl diazonium salts are stable at lower temperature compared to alkyl diazonium salts.		CO5 -	
	Justify			
	(iii) With respect to pyrrole and pyridine, which one is more basic? Justify your answer.			
-	H N			
	pyrrole pyridine			
	(iv) The -OH of carboxylic acid tends to release a hydrogen ion so much more readily than		(2)	
	the -OH of an alcohol. Justify.			
	(v) (a) State Woodward-Hoffmann rule for electrocyclic reaction. (b) Draw HOMO for	14	10	
	1,3,5-hexatriene in ground state and for 1,3,5,7-octatetraene in excited state.		*	
	(vi) Write equations for the reaction of <i>p</i> -nitrobenzenediazonium sulfate with:		8 8	
	(a) Hot dilute H ₂ SO ₄ (c) H ₃ PO ₂			
. *	(b) HBF ₄ , then heat (d) KI			
OF	De se diverted (Any Servi)	40	CO1	BT1
Q.5	Do as directed. (Any Four)	12	CO2	BT2
	(i) 2-Methyl benzophenone is termed as photostabilizer. Explain with the reaction mechanism.		CO3	BT3 BT4
	CH ₃		CO4 CO5	BT5
1			5	
	2-methyl benzophenone	,		
	(ii) Write the sequence of reactions (with reagent and any special conditions) necessary to	6		
	convert Toluene into <i>m</i> -Bromotoluene (Hint: via diazonium salt).			
	(iii) Write the general mechanism of Baeyer-Villiger oxidation with suitable example.			
	(iv) Predict the product(s) of the following reactions. If more than one product is formed, tell			
	which is major.			
	CHal (excess)			
- ANV	$CH_3I \text{ (excess)} \qquad A \qquad Ag_2O, H_2O \qquad B \qquad Heat \qquad C$			
	A B C		,	
	(A) Constant prosting of the stimulation that will be said to the laboratory in the			
	(v) Suggest a practical situation that might arise in the laboratory in which you would need to			
	(a) separate an aldehyde from undesired non-carbonyl materials; (b) remove an aldehyde	a a		
	that is contaminating a non-carbonyl compound. Describe how you could carry out the		.	
	separations, telling exactly what you would do and see.			

************End of Question Paper*******