



ENTRANCE TEST – 2020

MDCAT – CHEMISTRY TEST # 05 UHS TOPIC – 3 + 4 (Organic Chemistry) TOPIC: ALKYL HALIDES, ALCOHOLS AND PHENOLS **Which of the following statements is incorrect about haloalkanes? 0.51 A) The general formula of haloalkanes is C_nH_{2n+1} X B) Their derivatives can be easily prepared C) They have high reactivity D) Their boiling points decrease with the increasing of molecular mass **Which one of the following pairs of reaction, types of mechanism is included in the reaction sequence below? $CH_{3}CH = CHCH_{3} + HI \xrightarrow{CH_{3}COOH} CH_{3}CH_{2}CH_{2}CHICH_{3}$ $CH_3CH_2CHICH_3 + NaOH_{(aq)} \longrightarrow CH_3CH_2CH(OH)CH_3$ A) Electrophilic addition and electrophilic substitution B) Electrophilic addition and nucleophilic substitution C) Free radical addition and nucleophilic substitution. D) Free radical addition and electrophilic substitution **Answer Explanation: (B)** One of the pair of reactions involves mechanism electrophilic addition $CH_3 - CH = CH - CH_3 + HI \xrightarrow{CH_3COOH} CH_3 - CH_2 - CH - CH_3$ 2-Butane 2-Iodobutene Other of the pair of reactions involves mechanism nucleophilic substitution $CH_3 - CH_2 - CH - CH_3 + NaOH_{(aq)} \longrightarrow CH_3 - CH_2 - CH - CH_3$ Butan-2-ol 2-Iodobutane OH **Which enzyme is not involved in the fermentation of starch? A) Diastase C) Urease D) Invertase B) Zymase **Which of the following statement is not matched correctly w.r.t. reaction of methanol with the given reagents? A) $2CH_3 - OH + 2Na \longrightarrow 2CH_3O^-Na^+ + H_2$ B) $CH_3 - OH + PCl_5 \longrightarrow CH_3 - Cl + PCl_3$ C) CH₃ – OH + [O] $\xrightarrow{K_2Cr_2O_7/\text{dil.H}_2SO_4} H$ – COOH $\xrightarrow{\text{Pyridine}} \text{CH}_3 - \text{Cl} + \text{SO}_2 + \text{HCl}$ D) $CH_3 - OH + SOCl_2 -$ **Answer Explanation: (B)** It is incorrect statement. The correct statement is as follow: $CH_3 - OH + PCl_5 \longrightarrow CH_3 - Cl + POCl_3 + HCl$ Q.55 **Consider the following statements: I. CH₃–I will react faster than CH₃–Br in S_N2 II. CH₃-F will react faster than CH₃-I in S_N2 III. CH₃–Br will react faster than CH₃–Cl in S_N2 IV. CH₃-Cl will react faster than (CH₃)₃CCl in S_N2 Which of the above statements is incorrect? A) I only C) II and III B) II only D) I, II, III and IV **Answer Explanation: (B)** It is incorrect statement. The correct statement is as follow: CH₃-I will react faster than CH₃-F in S_N2 The order of reactivity of alkyl halides for a particular alkyl group is **Iodide > Bromide > Chloride > Fluoride**



Q.56 **Ethanol is prepared on industrial scale world over, by the process of fermentation. Fermentation is a biological process which occurs in the presence of certain enzymes secreted by microorganisms such as yeast. Which of the following statement is incorrect for essential conditions for fermentation? A) Optimum temperature (25 to 30°C) C) Proper aeration D) Dilution of solution B) In the presence of a preservative Answer Explanation: (B) It is incorrect statement The correct statement is as follow: Fermentation is carried out in the absence of any preservative. Q.57 ******Which of the following statements about alcohol is/are correct? C) Both A and B A) It can act as an acid only B) It can act as a base only D) Neither A nor B Answer Explanation: (C) Solution: If an alcohol donates a proton to some other species B, it is acting as an acid such: $H_{2}C - OH + B \longrightarrow H_{2}C - O^{-} + BH^{+}$ If an alcohol accepts a proton, then it is acting as a base. $\begin{array}{c} R - C - \overset{\bullet}{O} H + HX \longrightarrow R - CH_2 - \overset{\bullet}{O^+} - H + X \\ \downarrow \\ P \end{array}$ **MORE DETAIL:** Alcohol shows amphoteric behavior: When it acts as an acid, the alcohol cleaves at the O – H bond. As an acid: $ROH \rightarrow RO^- + H^+$ When it acts as a base, it can subsequently cleave at the R – O bond. $ROH + H^+ \rightarrow RO H_2^+$ As an base: **Overall:** $ROH + ROH \rightarrow RO^{-} + ROH_{2^{+}}$ acid base **NOTE:** In fact, K_a of ethanol is 10^{-18} mol dm⁻³ whereas the value for water is 10^{-16} mol dm⁻³. It shows that alcohol is a weak acid. **Primary alcohols can be oxidized to aldehydes using either acidified potassium dichromate (VI) or acidified potassium manganate (VII). Both these oxidizing agents change colour as they are reduced. What is the colour of each oxidizing agent before and after it has reacted? Acidified Potassium Dichromate (VI) Acidified Potassium Manganate (VII) Opt. Colourless A) Green Orange Purple B) Colourless Purple Orange Green C) Colourless Orange Green Purple D) Purple Colourless Orange Green **Answer Explanation: (C)** Primary alcohols can be oxidized to aldehydes using either acidified potassium dichromate (VI) or acidified potassium manganate (VII). Both these oxidizing agents change colour as they are reduced. The colour of each oxidizing agent before and after it has reacted is as fallow $\xrightarrow{K_2Cr_2O_7} (dil.)H_2SO_4 \rightarrow$ (i) $\mathbf{RCH}_2\mathbf{OH} + [\mathbf{O}]$ $RCHO + H_2O$ Alcohol (Acidified potassium Aldehyde dichromate (VI)) Colour of acidified potassium dichromate (VI) changes from orange to green KMnO₄ (dil.)H₂SO₄ (ii) $\mathbf{RCH}_2\mathbf{OH} + [\mathbf{O}]$ $RCHO + H_2O$ → Alcohol (Acidified potassium Aldehyde manganate (VII)) Colour of acidified potassium manganat (VII) changes from purple to colourless



Q.59	I. A pr	**Consider the following statements for the classification of alcohols: I. A primary alcohol has the – OH group at the end of carbon chain				
		•	roup in the body of carbon chain			
			oup at the branch in the carbon chain			
		IV. A neo-alcohol has the – OH group at the 2 nd last carbon of the chain Which of the above statement is incorrect.				
	A) I on		C) IV only			
	B) II ai	•	D) I, II, III and IV			
1		Answ	er Explanation: (C)			
	-	orimary alcohol has the – OH gro	-			
1	-	is a type of monohydric alcohol i				
	is a	ttached to the primary carbon a	tom)			
1						
1		H-C-H				
)		Ŕ				
1		primary (1°) alcohol				
ļ 1	• A secondary alcohol has the – OH group in the body of carbon chain					
, 1	(It is a type of monohydric alcohol in which hydroxal group					
	is a	ttached to the secondary carbon	atom)			
))		OH				
)		R—C—H				
		R'				
2		secondary (2°) alcohol				
)						
, 1		(It is a type of monohydric alcohol in which hydroxal group				
)	is a	ttached to the tertiary carbon at	com)			
1		OH				
1		$R - \frac{1}{2} - R''$				
		R'				
)		tertiary (3°) al cohol				
\ \	• A		at the 2 nd last carbon of the chain			
!	(It is a type of alcohol in which OH group is attached with primary					
)	car	carbon and neo carbon is attached with four carbon)				
		R				
)		$R - C - CH_2 - OH$				
Q.60	Which	one of the following statements	is incorrect for Sy1 and Sy2			
Q.00		nism reaction w.r.t alkyl halide?				
	Opt.	Sn1	S _N 2			
	A)	A two step mechanism	A one step mechanism			
	B)	Unimolecular reaction	Bimolecular reaction			
	C)	Rate of reaction depends on the	Rate of reaction depends on the conc. of			
		conc. of alkyl halide only	alkyl halide and nucleophile			
	D)	Reaction occurs with strong	Reaction occurs with weak nucleophile			
	nucleophile					
	Answer Explanation: (D)					
	It is incorrect statement. The correct statement is as follow:					



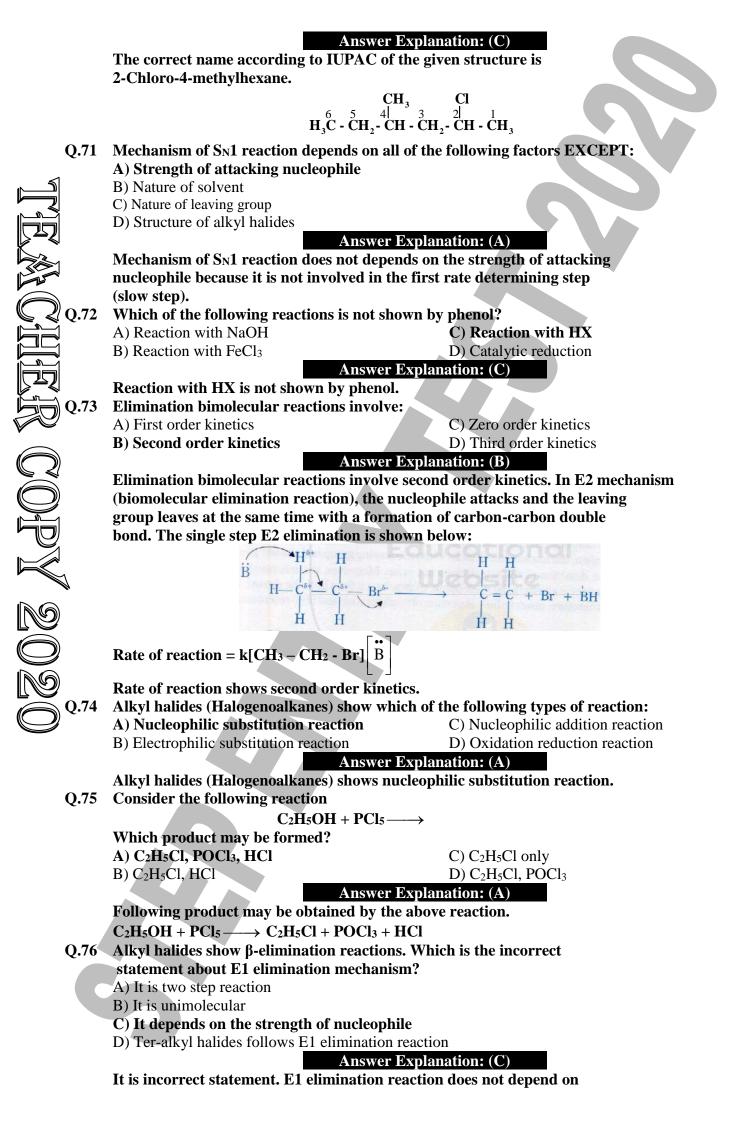


Q.61 When 1-bromopropane is treated in succession with two reagents, 'X' and 'Y', it produces propanoic acid. What are reagent 'X' and 'Y'?

-	it produce	es propanoic acid. V	Vhat a	re reagent '	X' and 'Y'?		
	Options	X		Y			
	A)	NaOH _(aq)	H ⁺ /	$Cr_2O_7^{-2}(aq)$			
	B)	NaOH _(aq)	CO_2				
	C)	KCN in ethanol	HCl ₍				
	D)	KCN in ethanol	NaO	H _(aq)			
					anation: (A)		
1		romopropane is tre					
)		es propanoic acid. T					
1		7 ⁻² (aq) respectively.]	_		produced by the s	aid	
	U	s shown in the read					
1		$H_3 - CH_2 - CH_2 - B_1$					
1		$\mathbf{H}_3 - \mathbf{C}\mathbf{H}_2 - \mathbf{C}\mathbf{H}_2 - \mathbf{O}$					
			-			OOH (Propanoic acid)	
Q.62		the following tests l	nelps u	is to disting	uish between		
1	1°, 2°, 3°						
1	A) Lucas $(\mathbf{D}) \mathbf{D}^{\prime} 1$	•			C) Both A and I		
j	B) Dichrol	mate test only	A -	nowor Evol	D) Neither A no	DF B	
<u>ا</u>	I ucos tost	and dichromate te			anation: (C)		
)		alcohols as shown b	-	us to uistii	iguisii between		
i	Tests	Primary alcohol		Seconda	ry alcohol (2º)	Tertiary alcohol (3º)	
9		1° alcohols form a			s form an oily	3° alcohols form an oily	
		layer only on heating	v		e to ten minutes.	layer immediately.	
) Q.63	L	anol is treated with	U			· · · ·	
, - 1	product o	btained is?					
IJ	A) Ethene	2			C) Ethanal		
1	B) Ethoxy	ethane			D) Ethane		
N					anation: (A)	_	
N		anol is treated with			D ₄ at 180°C the pr	oduct	
	obtained i	s ethene as shown i			(\$0.)		
•		$CH_3 - CH$	$l_2 - OF$		$\xrightarrow{(_2SO_4)} CH_2 = CH_2$	$+H_2O$	
) Q.64		m describes the act	tion of	NaOH(aq) ol			
9	,	ase reaction			C) Elimination		
2	B) Electro	philic substitution				c substitution reaction	
	TL • • • • • • • •				anation: (D)		
/		nucleophilic substit 10alkane as shown i			e action of NaOH	.(aq)	
o (-		$+$ NaOH _(aq) \longrightarrow C					
Q.65		the following is cor	rect or	der of stabi	lity of carbanion		
	of alkyl ha		CU·丶	(CH.).C.			
		A) $CH_3^- > CH_3CH_2^- > (CH_3)_2CH^- > (CH_3)_3C^-$ B) $CH_3^-CH_2 > CH_3^- > (CH_3)_2CH^- > (CH_3)_3C^-$					
	C) $CH_3 = (CH_3)_2 CH^2 > (CH_3)_2 CH^2 > (CH_3)_3 C^2$						
	D) $(CH_3)_2CH^- > (CH_3)_3^-C > CH_3^- > CH_3CH_2^-$						
	- / (5/2				anation: (D)		
	The corre	ct order of stability				ollow:	
	$CH_3 > CH_3$	$H_3CH_2^- > (CH_3)_2CH_2^-$	[⁻ > (C]	H3)C ⁻			
	• Smaller is the size of carbanion greater is the stability						
• Since, alkyl groups are electron donating they increase							
charge density of respective carbanion							
• As a result stability decreases. i.e. greater is the charge							
	density of carbanion less is the stability.						

	Q.66	In the presence of strong base and polar solvent secondary alkyl
		halide undergo through reaction?
		A) E2 B) E1 C) $S_N 1$ D) $S_N 2$
		Answer Explanation: (B)
		In the presence of strong base and polar solvent secondary alkyl halide
		undergo through E1 reaction.
	Q.67	Which one of the following type of reaction is shown by alcohols?
		A) Reaction in which C-O bond breaks only C) Both A and B
, 	4	B) Reaction in which O-H bond breaks only D) Neither A nor B
	₹	Answer Explanation: (C) The type of reactions shown by alcohols are:
		 Reaction in which C – O bond breaks
		e.g. $CH_3 - CH_2 - OH + HCl \xrightarrow{ZnCl_2} CH_3 - CH_2 - Cl + H_2O$
F		In this reaction $C - O$ bond is broken in ethanol
	VIUR Q.68 MOLD	 Reaction in which O – H bond breaks
		e.g. $2CH_3 - CH_2 - O - H + 2Na \longrightarrow 2C_2H_5O^-Na^+ + H_2$
		In this reaction O – H bond is broken in ethanol
		Teflon (- $CF_2 - CF_{2-})_n$ is a valuable plastic. Which of the following
		is not use of Teflon?
		A) It is used for making corrosion-proof parts of machinery
G		B) It is used for coating the electrical wiring
		C) It is used as a refrigerants
E		D) It is used as a non-stick coating for cooking pans
		Answer Explanation: (C) It is incorrect statement. The correct statement is that dichlorodifluoromethane
		(CF_2Cl_2) is used as a refrigerant.
	Q.69	When ethanol is warmed with ethanoic acid in the presence of conc.
		H2SO4, ethyl ethanoate (an ester) is formed. H2SO4 (conc.) acts as a
. .	Ĩ	catalyst in this reaction? 2012
	D)	$CH_{3}CH_{2}OH + CH_{3}CO_{2}H \xrightarrow{conc. H_{2}SO_{4}} CH_{3}CO_{2}CH_{2}CH_{3} + H_{2}O$
Ĩ		During this reaction: A) Alcohol is reduced
	I I	B) O–H bond in ethanoic acid is broken
	D	C) O–H bond in ethanol is broken
		D) Acid is oxidized
)	Answer Explanation: (C)
		During this reaction O – H bond in ethanol is broken as shown
		in the reaction.
		$\begin{array}{c} O \\ \blacksquare \\ CH_3 - C \rightarrow OH + H \rightarrow O - CH_2 - CH_3 \xrightarrow{\text{conc.H}_2SO_4} + CH_3 - C - O - CH_2 - CH_3 + H_2O \end{array}$
		$CH_{3} - C - OH + H - O - CH_{2} - CH_{3} \xrightarrow{\text{conc.H}_{2}SO_{4}} CH_{3} - C - O - CH_{2} - CH_{3} + H_{2}O$
		Ethyl ethanoate
		This reaction clearly shows that during this reaction O – H bond in ethanol is broken.
	Q.70	Consider the following structural formula:
	2.10	
		$\begin{array}{c} CH_3 & CI \\ \downarrow & \downarrow \\ H_3C - CH_2 - CH - CH_2 - CH - CH_3 \end{array}$
		$H_3C - CH_2 - CH - CH_2 - CH - CH_3$
		The correct name according to IUPAC is:
		A) 2-Chloro-3-methylhexane
		B) 3-Methyl-4-chlorohexane
		C) 2-Chloro-4-methylhexane D) 3-Chloro-2-methylhexane
		2) consto 2 montphotano







the strength of attacking nucleophile. **O.77** Which of the following compounds is used as an inert solvent? A) CCl₄ C) CH₂Cl₂ B) CHCl₃ D) CF₂Cl₂ Answer Explanation: (A) CCl₄ is used as an inert solvent. When ethanol is oxidized by acidified K₂Cr₂O₇, the colour of solution **Q.78** turns green due to? C) Oxidation of Cr⁺³ into dichromate (VI) A) Lose of oxygen from ethanol D) Oxidation of dichromate (VI) into Cr⁺³ B) Reduction of dichromate (VI) into Cr⁺³ **Answer Explanation: (B)** When ethanol is oxidized by acidified K₂Cr₂O₇, the colour of solution turns green due to reduction of dichromate (VI) into Cr⁺³. Q.79 Which is an intermediate compound formed in S_N1 mechanism reaction? A) Ethoxide ion C) Alkene **D)** Carbocation B) Alkyl halide **Answer Explanation: (D)** Carbocation (an intermediate) compound is formed in SN1 mechanism reaction as shown below: R R R - C- X Ŕ R Carbocation **Q.80** Consider the following structure. CH2 Br H₃C ĊH3 Which of the following is the correct name according to IUPAC: A) 2-Bromo-3,4-dimethylpentane C) 2,3-Dimethyl-5-bromopentane B) 5-Bromo-3,4-dimethylpentane D) 1-Bromo-2,3,4-dimethylbutane **Answer Explanation: (A)** The correct name according to IUPAC of the given structure is 2-Bromo-3,4-dimethylpentane. CH₃ 1CH₃ 'Rr CH3 **Q.81** How will you distinguish between methanol and ethanol? A) By Lucas test C) By oxidation B) By silver mirror test **D) By Iodoform test Answer Explanation: (D) Iodoform Test:** Ethanol gives iodoform with iodine in the presence of NaOH. Formation of yellow crystals indicate that the alcohol is ethanol as shown in the reaction: $C_2H_5OH + 4I_2 + 6NaOH \longrightarrow CHI_3 + HCOONa + 5NaI + 5H_2O$ Methanol does not give iodoform test. **Q.82** Alkyl halides are considered to be very reactive compounds towards nucleophiles because: A) They have an electrophilic carbon B) They have an electrophilic carbon and a good leaving group C) They have a nucleophilic carbon and a good leaving group D) They have an electrophilic carbon and bad leaving group



	Ally holides are considered to be very reactive compounds towards meloarbiles						
	Alkyl halides are considered to be very reactive compounds towards nucleophiles						
Q.83	because they have an electrophilic carbon and a good leaving group.						
Q.03	3 Which of the following is comparatively a better leaving group? A) OH ⁻ C) NH ₂ ⁻						
	B) OR ⁻	D) HSO4 ⁻					
	·						
	Answer Explanation: (D) HSO ₄ ⁻ is comparatively a better leaving group.						
	Good leaving group	Poor leaving group					
	They have Less electronegativity	They have more electronegativity					
j	And more polarizability	And less polarizability					
	Cl ⁻ , Br ⁻ , I ⁻ and HSO4 ⁻	OH ⁻ , O ⁻ R and NH ₂ ⁻					
1 Q.84	Phenol reacts with alkalies to form salts and this is called:						
8 -	A) Electrophilic substitution reaction	C) Elimination reaction					
	B) Acid base reaction	D) Oxidation reduction reaction					
1		Explanation: (B)					
1	Phenol reacts with alkalies to form salts and this is called acid base reaction						
J 1	as shown below:						
	OH	O Na					
, ,		+ NaOH + H ₂ O					
٧		Sodium phenoxide					
Q.85	Which one of the following is the least rea	active alcohols when bond is to					
	be broken between carbon and oxygen:						
1	A) CH ₃ -OH	C) R_2 CHOH					
	B) R-CH ₂ -OH	D) R ₃ COH					
¢ 1	Answer	Explanation: (A)					
IJ	Methanol (CH3-OH) is the least reactive alcohols when bond is to be						
1	broken between carbon and oxygen.						
`	The order of reactivity of alcohols when C – O bond breaks.						
	Tertiary alcohol > Secondary alcohol > Primary alcohol						
9	The order of reactivity of alcohols when O – H bond breaks.						
2	CH ₃ OH > Primary alcohol >	Secondary alcohol > Tertiary alcohol					
,							
\							
2							