

UNIVERSITY OF SWAZILAND

MAIN EXAMINATION

2019, MAY

TITLE OF PAPER	:	Functional Group Chemistry and Stereochemistry
COURSE NUMBER	:	CHE232
TIME	:	Three Hours
INSTRUCTIONS	:	Answer ALL QUESTIONS IN SECTION A and ANY OTHER 2 QUESTIONS from Section B. Each question carries 25 marks

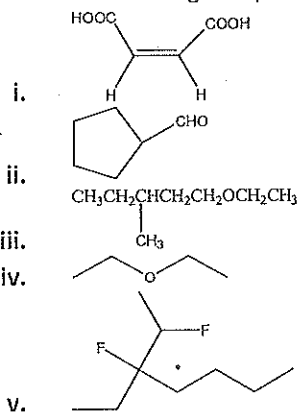
This Examination Paper Contains **FIVE** Printed Pages Including This Page
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the Chief Invigilator.*

Section A (Compulsory)

Question 1

a. Name the following compounds:

(10)



b. Draw the structures of the following compounds:

(15)

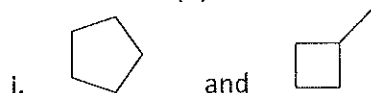
- 5-chloro-6-hydroxy-3-hexanone
- Cyclopentane-1,3-dione
- 5-methoxy-2-pentanol
- 4,4-dimethyl-2-cyclohexen-1-ol
- 2-chloro-2-methylbutane

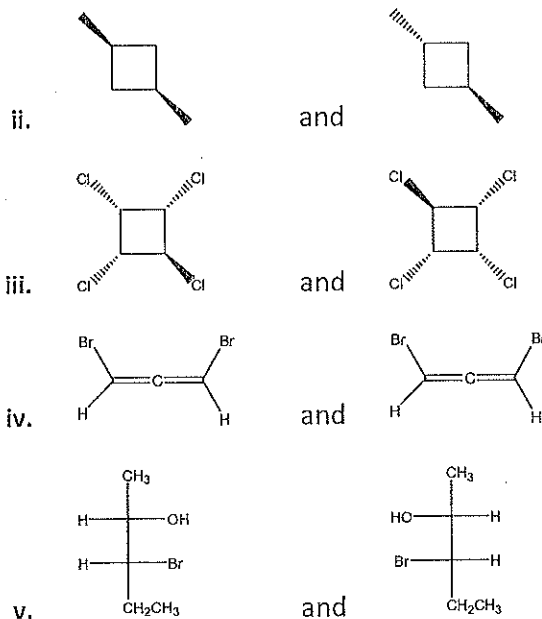
Question 2

a) Draw the following molecules whose names are shown below.

- R-2-butanol (2)
- S-3-chloro-3-methyl-1-pentene (2)
- (2R, 3R)-2,3-dibromopentane (3)
- S-3-chloro-4-ethylhexane (3)
- (3R)-3-methyl-5-hexen-3-ol (2)
- (1R)-1-bromo-1,3,3-trimethylhexane (2)
- (1R,3R)-1,3-dibromo-1,3-dimethylhexane (3)
- (1S,3R)-1-ethyl-1,3-dimethylpentane (3)

b) Indicate whether each pair of compounds is enantiomer (E), diastereomeric (D), constitutional isomers (C) or the same (S). (5)

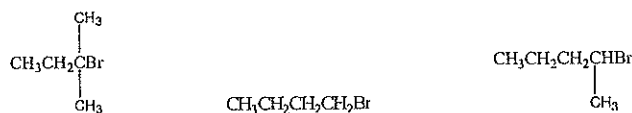




Section B (Choose any 2 Questions)

Question 3

- a. Consider the following alkyl halides and their reaction with sodium methoxide, $\text{CH}_3\text{CH}_2\text{ONa}^+$?



- Which alkyl halide would you expect to give the highest yield of substitution product by $\text{S}_{\text{N}}2$ mechanism? Explain your answer. (4)
 - Show the $\text{S}_{\text{N}}2$ mechanism for the reaction with the highest yield (6)
- b. Show how you can prepare the following compounds using alkyl halides of two or more carbons

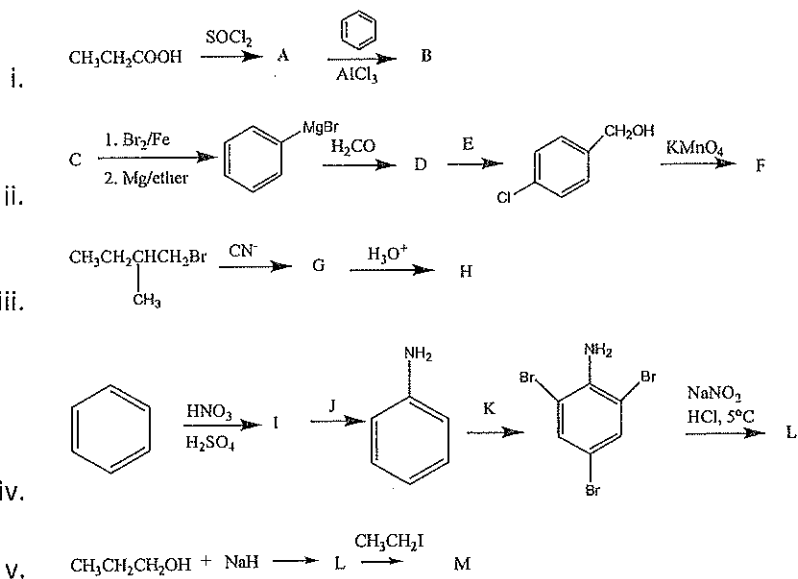


Question 4

- a. Show the mechanism and the structural formulas for the alkenes formed from the reaction of 3-bromo-2,3-dimethylpentane and alcoholic KOH. Show the major and minor products. (10)
- b. Show the products for the mixed aldol condensation reaction between ethanal and propanone. (10)
- c. Three compounds have the following boiling points -7°C , 82°C and 57°C . The compounds are 2-propanol, propanone and 2-methylpropene. Assign each compound with as suitable boiling point and justify your answer. Use diagrams to illustrate your answer. (5)

Question 5

- a) Fill in the missing reagents of products.



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Department of Chemistry

1	H	1.0079																	2	He	4.0026																																			
3	Li	6.941	4	Be	9.0122																	10	F	18.998	Ne	20.179																														
11	Na	22.990	12	Mg	24.305																	16	S	32.064	Ar	39.948																														
19	K	39.098	20	Ca	40.078																	32	Ge	72.61	Se	78.96	Kr	83.80																												
37	Rb	85.47	38	Sr	87.62																	50	Sn	118.71	Sb	121.75	Te	127.60	I	126.90	Xe	131.29																								
55	Cs	132.91	56	Ba	137.33																	80	Pt	195.08	Au	196.97	Hg	200.59																												
87	Fr	(223)	88	Ra	226.03																	89	Ac	227.03																																
																		21	Sc	44.956	22	Ti	47.88	23	V	50.942	24	Cr	51.996	25	Mn	54.938	26	Fe	55.847	27	Co	58.933	28	Ni	58.69	29	Cu	63.546	30	Zn	65.39									
																		39	Y	88.906	40	Zr	91.224	41	Nb	92.906	42	Mo	95.94	43	Tc	(98)	44	Ru	101.07	45	Rh	102.91	46	Pd	106.42	47	Ag	107.87	48	Cd	112.41									
																		57	La	138.91	72	Hf	178.49	73	Ta	180.95	74	W	183.85	75	Re	186.2	76	Os	190.2	77	Ir	192.22	78	Pt	195.08	79	Au	196.97	80	Hg	200.59									
																		69	Tm	168.93	70	Yb	173.04	71	Lu	174.97																														
																		81	Tl	204.38	82	Pb	207.2	83	Bi	208.98	84	Po	(209)	85	At	(210)	86	Rn	(222)																					
																		63	Eu	151.97	64	Gd	157.25	65	Tb	158.93	66	Dy	162.50	67	Ho	164.93	68	Er	167.26	69	Tm	168.93	70	Yb	173.04	71	Lu	174.97												
																		91	Th	232.04	92	Pa	231.04	93	Np	237.05	94	Pu	(244)	95	Am	(243)	96	Cm	(247)	97	Bk	247	98	Cf	(251)	99	Es	(252)	100	Fm	(257)	101	Md	(258)	102	No	(259)	103	Lr	(260)