

KOLEJ UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF APPLIED SCIENCES

ACADEMIC YEAR 2019/2020

SEPTEMBER EXAMINATION

CHEMISTRY BACH1623
ORGANIC CHEMISTRY

TUESDAY, 17 SEPTEMBER 2019

TIME: 9.00 AM – 11.00 AM (2 HOURS)

BACHELOR OF SCIENCE (HONOURS) IN BIOSCIENCE WITH CHEMISTRY

Instructions to Candidates:

Answer **ALL** questions. All questions carry equal marks.

BACH1623 ORGANIC CHEMISTRY**Question 1**

a) Draw structural formulas for the following compounds: (10 marks)

(i) 4-isopropyl-2,2,3,6-tetramethyloctane

(ii) 5-cyclobutyl-1-pentyne

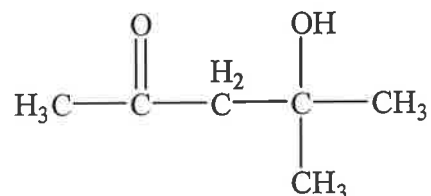
(iii) 2-ethoxy-3-methylbutane

(iv) 2-methylprop-2-enal

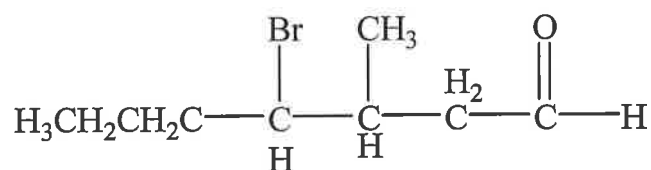
(v) 4-hydroxybenzaldehyde

b) Give IUPAC name for the following compounds: (6 marks)

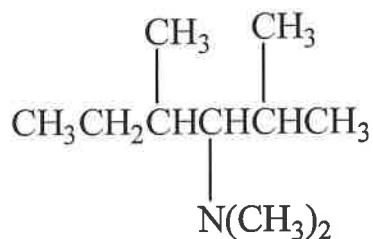
(i)



(ii)



(iii)



BACH1623 ORGANIC CHEMISTRY**Question 1 (Continued)**

c) Draw Lewis structure for the following compounds: (6 marks)

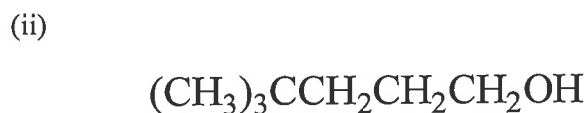
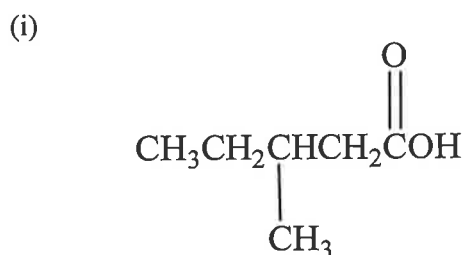


d) Which conformation of ethane is more stable; staggered or eclipsed conformation? Explain the answer. (3 marks)

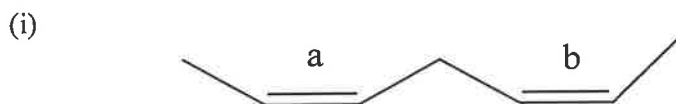
[Total: 25 marks]

Question 2

a) Draw the skeletal structures for the following compounds: (6 marks)



b) Assign *cis* or *trans* (a, b, c, d) configuration to the following compounds. (4 marks)



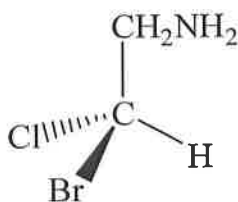
BACH1623 ORGANIC CHEMISTRY**Question 2 b) (Continued)**

(ii)

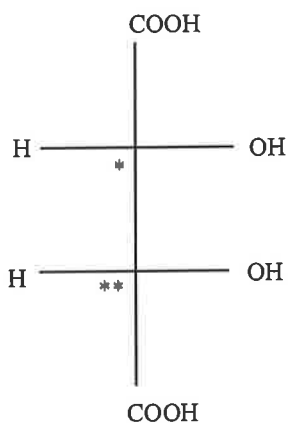


c) Assign R or S configuration to the following compounds: (6 marks)

(i)



(ii)



d) (i) Identify a test to distinguish between alkane and alkene. (2 marks)

e) State the reagent(s) for the following reaction:

(i) Ozonolysis reaction of alkene (3 marks)

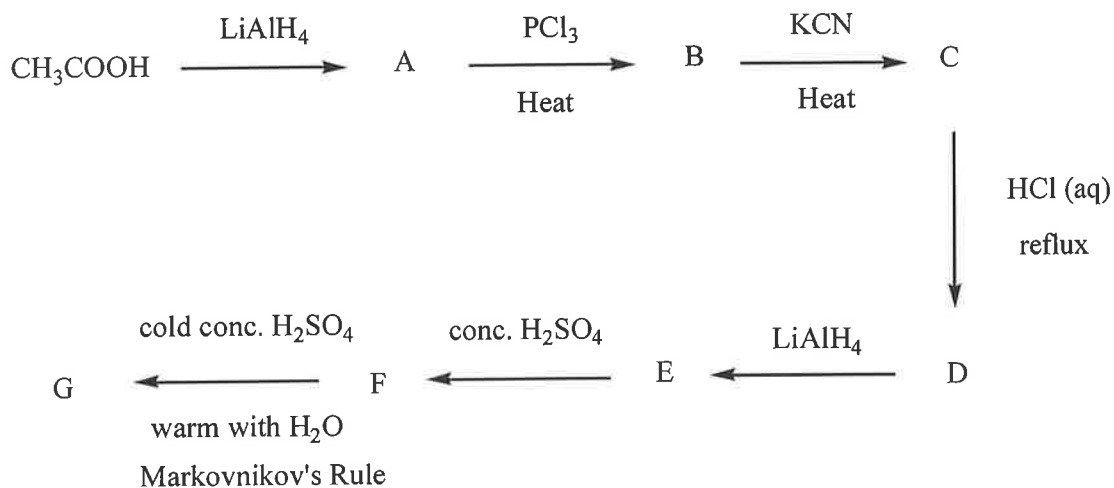
(ii) Anti-Markovnikov addition of alkene (2 marks)

(iii) Hydroxylation of alkene (2 marks)

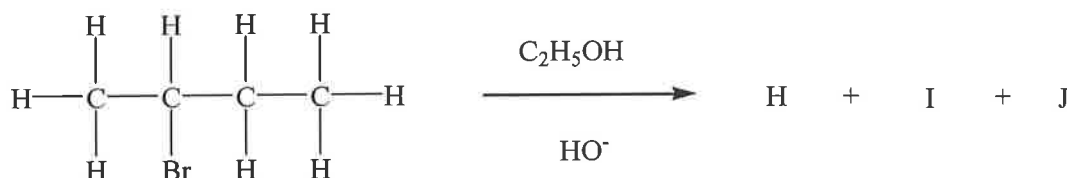
[Total: 25 marks]

BACH1623 ORGANIC CHEMISTRY**Question 3**

- a) Determine A, B, C, D, E, F and G in the following synthesis route: (14 marks)



- b) A mixture of three isomers will be formed in the following elimination reaction. Draw the structure of these three isomers (H, I and J). (6 marks)



- c) Draw graph to show how primary, secondary and tertiary alkyl halide will affect the SN2 reaction. Explain the answer. (3, 2 marks)
[Total: 25 marks]

Question 4

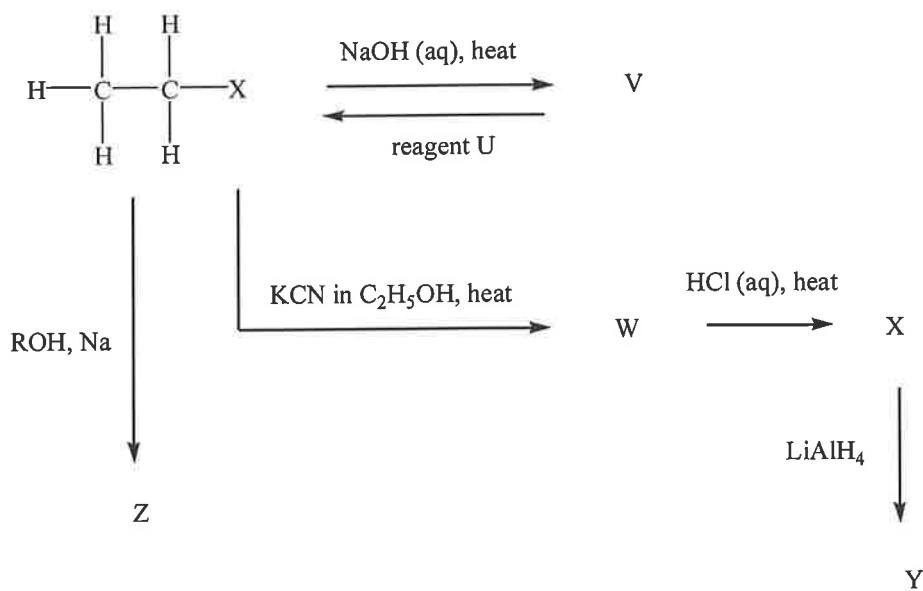
- a) 2-methyl-2-pentanol is classified as alcohol.
- Draw chemical structure of 2-methyl-2-pentanol. (2 marks)
 - What is Grignard reagent? (2 marks)
 - How could you use the reaction of a Grignard reagent with a carbonyl compound to synthesize 2-methyl-2-pentanol? (4 marks)

BACH1623 ORGANIC CHEMISTRY**Question 4 a) (Continued)**

(iv) How could you use Grignard reagent to synthesis 2-phenyl-2-propanol? (4 marks)

(v) If formaldehyde is used as one of the reactants to react with Grignard reagent, the resulted product is a primary, secondary or tertiary alcohol? (2 marks)

b) Complete the following chart (V, W, X, Y, Z and reagent U). (11 marks)



[Total: 25 marks]

BACH1623 ORGANIC CHEMISTRY

Appendix 1:

Periodic table of the elements

group	<input type="checkbox"/> alkali metals <input type="checkbox"/> halogens <input type="checkbox"/> alkaline earth metals <input type="checkbox"/> noble gases <input type="checkbox"/> transition metals <input type="checkbox"/> rare earth elements (21, 39, 57-71) <input type="checkbox"/> other metals <input type="checkbox"/> lanthanide elements (57-71 only) <input type="checkbox"/> other nonmetals <input type="checkbox"/> actinide elements																Also known as metalloids					18
1*	2											13	14	15	16	17	18					
Ia**	IIa											IIIa	IVa	Va	VIa	VIIa	0					
1 H	2 He											5 B	6 C	7 N	8 O	9 F	10 Ne					
3 Li	4 Be											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar					
11 Na	12 Mg	3 IIIb	4 IVb	5 Vb	6 VIb	7 VIIb	8 VIIIb	9	10	11 Ib	12 IIb	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar					
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr					
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe					
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn					
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 *** (Uub)	113 *** (Uut)	114 *** (Uuq)	115 *** (Uup)	116 *** (Uuh)							
lanthanide series		6	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu						
actinide series		7	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr						

* Numbering system adopted by the International Union of Pure and Applied Chemistry (IUPAC).

** Numbering system widely used, especially in the U.S., from the mid-20th century.

*** Discoveries of elements 112-116 are claimed but not confirmed. Element names and symbols in parentheses are temporarily assigned by IUPAC.

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