INTI
International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session	:	**APRIL 2018**
Programme	:	FOUNDATION IN SCIENCE (CFSI)
Course		**CHM1204: CHEMISTRY 2**
Date of Examination	:	30th July 2018 (Monday)
Time	:	08:00am – 10:00am
Duration	:	2 Hours Reading Time : Nil
Special Instructions	:	

This paper consists of **FIVE (5)** questions. Answer **FOUR (4)** questions in the answer booklet provided.

All questions carry equal marks.

IMPORTANT NOTE : **THIS PAPER SHOULD NOT BE TAKEN OUT OF THE EXAMINATION HALL**

Materials Permitted : Non-programmable calculator

Materials Provided : Periodic Table

Examiner(s) : Ms. Lim Sze Theng

Moderator : Dr. Lim Gin Keat

This paper consists of 12 printed pages, including the cover page.

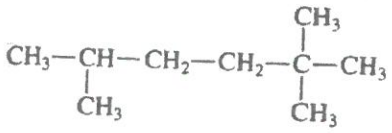
INTI INTERNATIONAL COLLEGE PENANG
FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 1
FINAL EXAMINATION: APR 2018 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

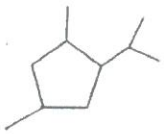
(a) Give the IUPAC name for each of the following compounds :

(i)



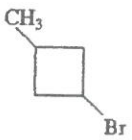
(1 mark)

(ii)



(1 mark)

(iii)



(1 mark)

(b) Consider the unsaturated hydrocarbon 1,3-butadiene.

(i) Draw the condensed structural formula.

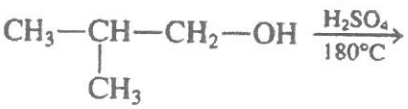
(2 marks)

(ii) Write the balanced equation for the complete combustion of 1,3-butadiene.

(2 marks)

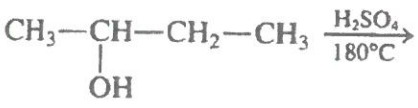
(c) Draw the structure of the predominant organic product formed in each of the following reactions involving alcohols molecules as the reactants.

(i)



(2 marks)

(ii)



(2 marks)

(d) Which member in each of the following pairs of molecules has the higher boiling point? Explain

(i) Butanal or 1-butanol

(2 marks)

(ii) Butanal or pentane

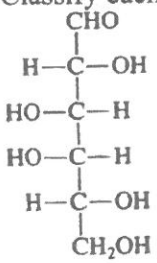
(2 marks)

(iii) 2-pentanone or 2-pentanol

(2 marks)

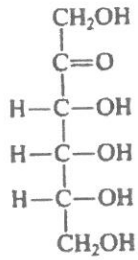
(e) Classify each of the following monosaccharides as an aldose or a ketose.

(i)



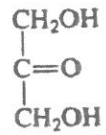
(1 mark)

(ii)



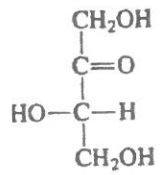
(1 mark)

(iii)



(1 mark)

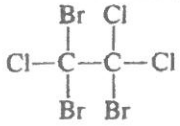
(iv)



(1 mark)

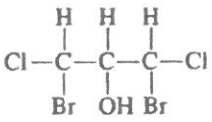
(f) Use asterisks to show the chiral center(s), if any, in the following structures.

(i)



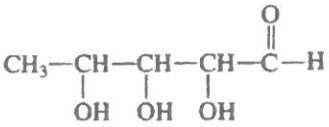
(1 mark)

(ii)



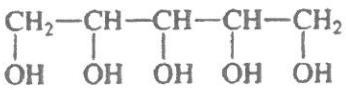
(1 mark)

(iii)



(1 mark)

(iv)



(1 mark)

(TOTAL: 25 MARKS)

Question 2

(a) Which member in each of the following pairs of compounds has the higher boiling point? Explain.

(i) Cyclohexane and hexane

(2 marks)

(ii) Pentane and 2,2-dimethylpropane

(2 marks)

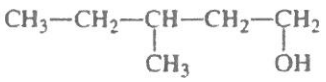
(iii) $CH_3—CH_2—Br$ or $CH_3—CH_2—Cl$

(2 marks)

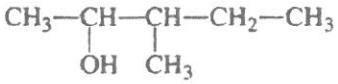
(iv) $CH_3—Cl$ or $CH_3—CH_2—Br$

(2 marks)

(b) Indicate whether an aldehyde or ketone is produced when each of the following alcohols is oxidised.

(i) 

(1 mark)

(ii) 

(1 mark)

(c) Which of the three compounds hexanal, 2-butanone, and 2-propanol will react with each of the following oxidizing or reducing agents? There may be more than one correct answer in a given situation.

(i) $K_2Cr_2O_7$

(1 marks)

(ii) Tollens solution

(1 mark)

(iii) Benedict's solution

(1 mark)

(iv) H_2, Ni catalyst

(1 mark)

(d) Oleic acid is a nonessential fatty acid with structural notation of $18{:}1^{\Delta 9}$.

(i) Draw the structure of oleic fatty acid.

(2 marks)

(ii) Triacylglycerol can be produced from the reaction between one molecule of glycerol with three molecules of oleic acids.

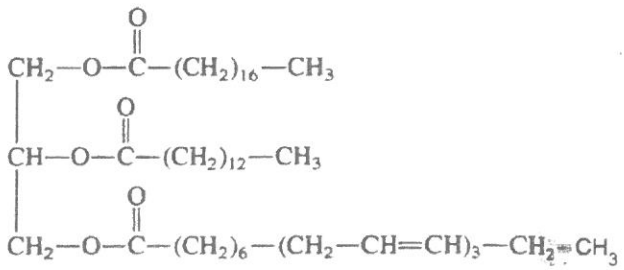
(1) Draw the structure of the triacylglycerol produced.

(2 marks)

(2) Write the chemical equations for the triacylglycerol that undergoes complete saponification with potassium hydroxide. You may draw structural formula in your equations.

(3 marks)

(e) Draw condensed structural formula for all products obtained from the complete hydrolysis of the following triacylglycerol under acidic condition



(4 marks)

(TOTAL: 25 MARKS)

Question 3

(a) Draw skeletal structural formulas for eight aldehydes and six ketones that have the molecular formula $C_6H_{12}O$.

(14 marks)

(b) What is the difference between the types of hydrogen bonding that occur in secondary and tertiary protein structure?

(2 marks)

(c) State the four types of attractive forces that give rise to tertiary protein structure.

(3 marks)

(d) Indicate whether each of the following statements applies to primary protein structure, secondary protein structure, or tertiary protein structure. More than one type of structure may apply in a given situation.

(i) Peptide linkages are present in the protein chain.

(1 mark)

(ii) Disulfide bonds between cysteine amino acids are present.

(1 mark)

(iii) Hydrogen bonds between C=O and N—H groups are present.

(1 mark)

(iv) The sequential order of amino acids in a protein chain is given

(1 mark)

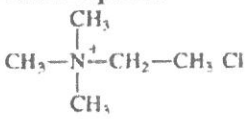
(e) Identify all possible products when the tripeptide Ala-Val-Ala undergoes complete hydrolysis.

(2 marks)

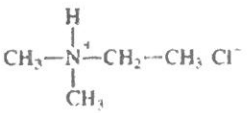
(TOTAL: 25 MARKS)

Question 4

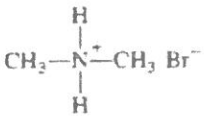
(a) Classify each of the following salts as an amine salt or a quaternary ammonium salt. Explain.

(i) 

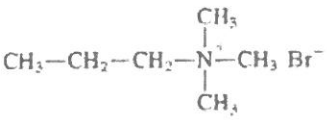
(2 marks)

(ii) 

(2 marks)

(iii) 

(2 marks)

(iv) 

(2 marks)

(b) Which compound in each of the following pairs of amines would you expect to be more soluble in water? Justify each answer.

(i) $CH_3—CH_2—CH_2—NH_2$ and $CH_3—CH_2—CH_2—CH_2—NH_2$

(2 marks)

(ii) $CH_3—CH_2—NH—CH_3$ and $CH_3—N(CH_3)—CH_3$

(2 marks)

(c) Would you expect N-ethylacetamide or N,N-diethylacetamide to have the higher boiling point? Explain.

(2 marks)

(d) Draw the structure of each of the following ethers.

(i) Isopropyl propyl ether

(1 mark)

(ii) Ethoxycyclobutane

(1 mark)

(iii) Butyl methyl ether

(1 mark)

(iv) Phenyl propyl ether

(1 mark)

(e) How does reversible inhibition differ from irreversible inhibition?

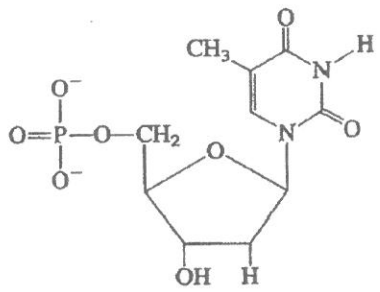
(2 marks)

(f) Predict the sequence of bases in the complimentary DNA strand to the single DNA strand below.

5' G-A-A-T-C-C-T-A-C 3'

(2 marks)

(g) Draw the structures of the three products produced when the nucleotide below undergoes hydrolysis.



(3 marks)

(TOTAL: 25 MARKS)

Question 5

(a) Draw the "start (the first three repeating units) of the structural formula of the addition polymers made from the following monomers

(i) Propylene

(2 marks)

(ii) 1,1,2,2-tetrafluoroethene

(2 marks)

(iii) 2-methyl-1-propene

(2 marks)

(iv) 1,2-dichloroethylene

(2 marks)

(b) Classify each of the following chemical processes as anabolic or catabolic.

(i) Synthesis of a protein from amino acids

(1 mark)

(ii) Formation of a triacylglycerol from glycerol and fatty acids

(1 mark)

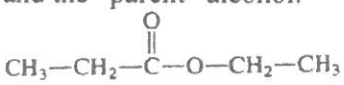
(iii) Formation of a nucleic acid from nucleotides

(1 mark)

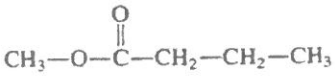
(iv) Hydrolysis of a polysaccharide to monosaccharides

(1 mark)

(c) For each of the following esters, draw the structural formula of the "parent" acid and the "parent" alcohol.

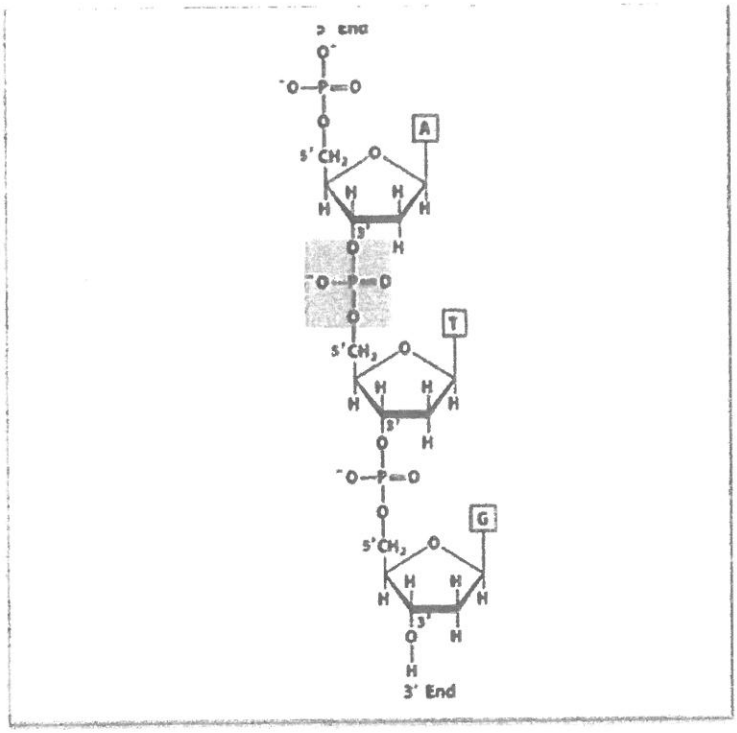
(i) 

(2 marks)

(ii) 

(2 marks)

(d) The polynucleotide chain is made up of nucleotides linked together with ester linkage.



(i) Give the name of the ester linkage (as seen in box) in the diagram above.
(2 marks)

(ii) Name the process of polynucleotides formation.
(1 mark)

(iii) Classify the polynucleotide strand above as DNA or RNA strand.
(1 mark)

(iv) State the full name of all the bases A, T and G in the strand above.
(3 marks)

(e) Give TWO differences between RNA molecules and DNA molecules.
(2 marks)

(TOTAL: 25 MARKS)

--THE END--

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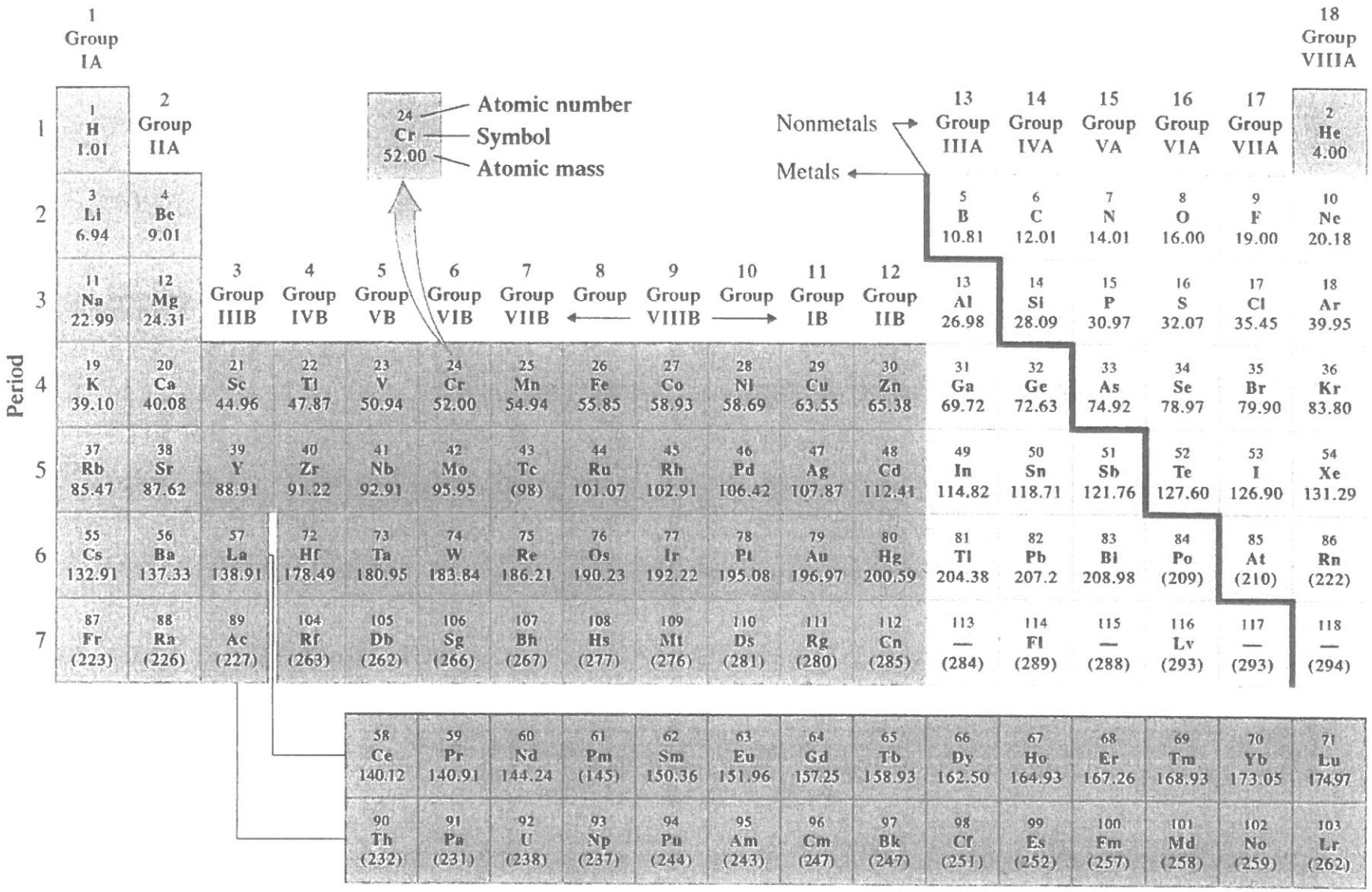
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2 Group IIA
3 Group IIIB
4 Group IVB
5 Group VB
6 Group VIB
7 Group VIIB
8 Group
9 Group VIIIB
10 Group
11 Group IB
12 Group IIB
13 Group IIIA
14 Group IVA
15 Group VA
16 Group VIA
17 Group VIIA
18 Group VIIIA
24 Cr 52.00
Atomic number
Symbol
Atomic mass
Nonmetals
Metals
1 H 1.01
2 He 4.00
3 Li 6.94
4 Be 9.01
5 B 10.81
6 C 12.01
7 N 14.01
8 O 16.00
9 F 19.00
10 Ne 20.18
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12 Mg 24.31
13 Al 26.98
14 Si 28.09
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28 Ni 58.69
29 Cu 63.55
30 Zn 65.38
31 Ga 69.72
32 Ge 72.63
33 As 74.92
34 Se 78.97
35 Br 79.90
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37 Rb 85.47
38 Sr 87.62
39 Y 88.91
40 Zr 91.22
41 Nb 92.91
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53 I 126.90
54 Xe 131.29
55 Cs 132.91
56 Ba 137.33
57 La 138.91
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73 Ta 180.95
74 W 183.84
75 Re 186.21
76 Os 190.23
77 Ir 192.22
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88 Ra (226)
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106 Sg (266)
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109 Mt (276)
110 Ds (281)
111 Rg (280)
112 Cn (285)
113 — (284)
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115 — (288)
116 Lv (293)
117 — (293)
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63 Eu 151.96
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 173.05
71 Lu 174.97
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92 U (238)
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