

FUNDAMENTALS OF CHEMISTRY 1B - CHEM1002**SECOND SEMESTER EXAMINATION****CONFIDENTIAL****PART B****NOVEMBER 2000****TOTAL TIME ALLOWED (FOR PARTS A & B): THREE HOURS**

GIVE THE FOLLOWING INFORMATION IN BLOCK LETTERS

SURNAME			OTHER NAMES		
SID NUMBER		FACULTY		TABLE NUMBER	

INSTRUCTIONS TO CANDIDATES

- All questions are to be attempted. There are 15 pages of examinable material in two parts.
- Complete the written section of the examination paper in **INK**.
- Read each question carefully. Report the appropriate answer and show all relevant working in the space provided.
- The total score for Part A is 40% and for Part B is 60%. The possible score per question is shown.
- Each new question begins with a ●.
- Electronic calculators, including programmable calculators, may be used. Students are warned, however, that credit may not be given, even for a correct answer, where there is insufficient evidence of the working required to obtain the solution.
- Pages 5 and 12 are for rough working only.
- Part A of this examination is in a separate booklet.

OFFICIAL USE ONLY**Multiple choice section**

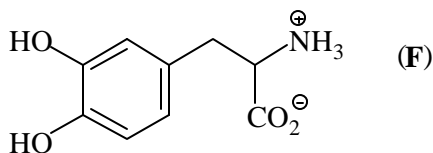
		Marks	
Pages	Max	Gained	
2-8	39		

Short answer section

Page	Marks		Marker
	Max	Gained	
9	10		
10	4		
11	7		
Total	21		
Check Total			

- DOPA (3,4-dihydroxyphenylalanine) (**F**) is the biological precursor to the neurotransmitter dopamine.

Marks
5



- On the above diagram, clearly circle the stereogenic centre in (**F**).
- List the substituents attached to the stereogenic centre in descending order of priority according to the appropriate rules.

highest priority

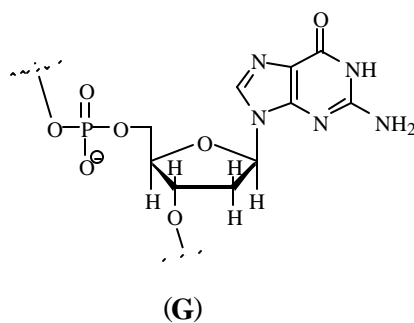
lowest priority

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(iii) Only the (*S*)-enantiomer of (**F**) is converted to dopamine in the brain. Draw the (*S*)-enantiomer of DOPA by completing the diagram on the right.

- Compound (**G**) represents a monomeric unit of an important biological polymer.

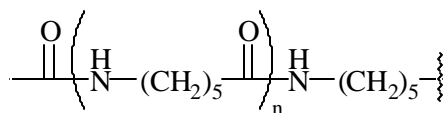
5



- What is the common name of the biopolymer?
- What is the name of the repeating unit of the biopolymer?
- On the diagram above, circle and label the phosphate, sugar and heterocyclic base sections of the biopolymer.

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- Nylon-6 (**H**) is a polymer with repeating units derived from 6-aminohexanoic acid.

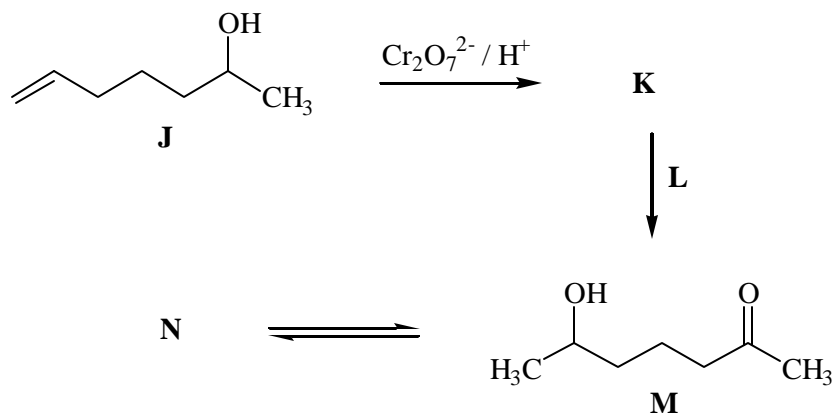
Marks**4**

- (i) What functional group is present in Nylon-6?

- (iii) What product is formed when Nylon-6 is hydrolysed with hot, concentrated HCl?

THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY.

- Consider the following synthetic sequence.

Marks**7**

- (i) Compound **J** is oxidised with acidified dichromate solution to give compound **K**. What is the structure of **K**?

- (ii) Hydration of the double bond in **K** with reagent **L** produces compound **M**. What is reagent **L**?

- (iii) In aqueous solution, compound **M** is in equilibrium with **N**, a cyclic compound. What is the structure of **N**?

- (iv) How many stereogenic centres are present in compound **N**?

- (v) How many stereoisomers of compound **N** are possible?

- (vi) What functional group is present in **N**?

INTRODUCTORY CHEMISTRY 1B - CHEM1002**SECOND SEMESTER EXAMINATION**

NOVEMBER 2000

TIME ALLOWED: THREE HOURS

Numerical Data*Acid dissociation constants, pK_a at 298 K*

benzoic acid, C_6H_5COOH	4.20
acetic acid, CH_3COOH	4.76
carbonic acid, H_2CO_3	6.35
hydrogen cyanide, HCN	9.22
ammonium ion, NH_4^+	9.24

Acid/base indicator pK_a values at 298 K

methyl yellow	3.1
methyl red	5.1
phenolphthalein	9.6
alizarin yellow	11.1

Periodic Table of the Elements

Group																	
1	2											13	14	15	16	17	18
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	3	4	5	6	7	8	9	10	11	12	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 Ha	106 Sg	107 Ns	108 Hs	109 Mt									

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
90	91	92	93	94	95	96	97	98	99	100	101	102	103

Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
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