UNIVERSITY
OF SKÖVDE

School of Bioscience

WRITTEN EXAMINATION

Course Basic Chemistry

Examination Supervised written examination II

Course code Ke117G | Credits for written examination 5

Date 2025-02-21 | Examination time 14.15-18.30

Examination responsible Patric Nilsson/Magnus Fagerlind

Teachers concerned

Aid at the exam/appendices: Calculator (either a calculator provided by the University or the student´s own calculator

Other All answers must be given in the exam sheet. Answers given on extra sheets will not be considered.

Instructions

- ☐ Take a new sheet of paper for each teacher.
- ☐ Take a new sheet of paper when starting a new question.
- ☒ Write only on one side of the paper.
- ☒ Write your name and personal ID No. on all pages you hand in.
- ☒ Use page numbering.
- ☒ Don´t use a red pen.
- ☒ Mark answered questions with a cross on the cover sheet.

Grade points: To pass the exam, all learning objectives require the grade E or higher. The following grade scale will be applied.

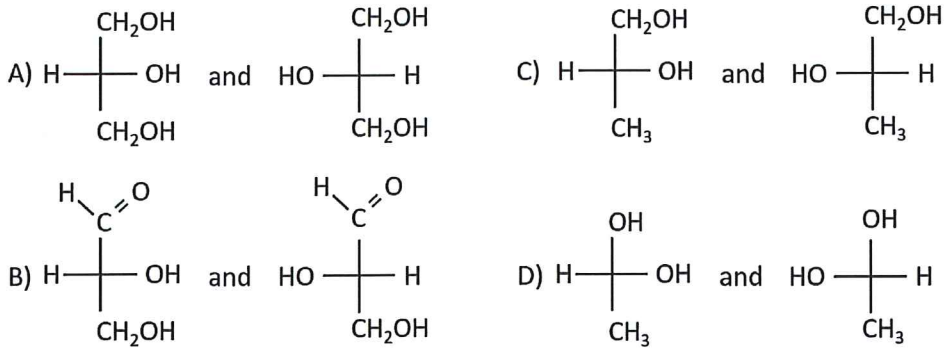
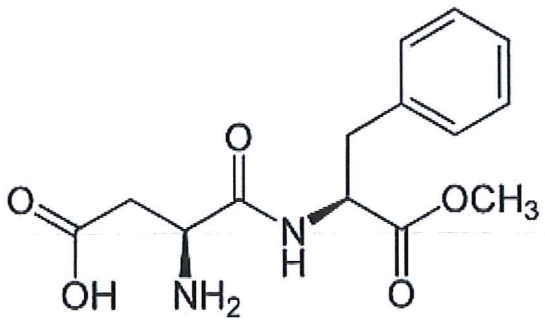
F < 35 <= E < 42 <= D < 49 <= C < 56 <= B < 63 <= A

Examination results should be made public within 18 working days

Good luck!

Total number of pages

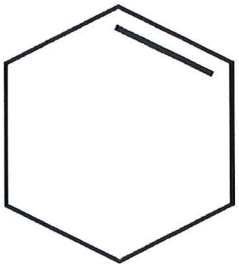
Learning objective: name organic chemical substances and draw their structural formula. To pass the learning objective, 50% correct answers are required (10 out of 20p is required)

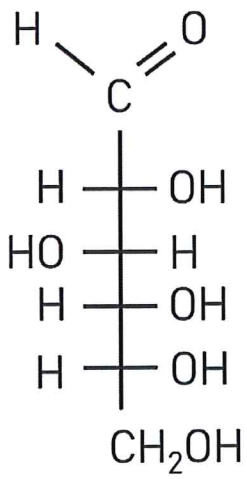
1	Indicate whether each pair of Fischer projection represents enantiomers or identical structures  A) B) C) D)	2
2.	The noncaloric sweetener Equal contains aspartame, which is made from two amino acids, aspartic acid and phenylalanine. Identify the functional groups in aspartame  	5
3	Draw the condensed structural formula or line-angle formula for a) 2-methyl-3-pentanol b) 2-methyl-1-pentanethiol	1 1

	c) 1-ethoxy-2-methylbutane	1
	d) N-methylpropanamide	1
	e) Pentyl ethanoate	1
	f) 3,4-dimethyl-2-hexanone	1
	g) 3-bromo-2-chloropentanoic acid	1
	h) 2-hydroxy-cyclopentanone	1
	i) 1-bromo-4-chloro-3-nitropentane	1

4	Draw the condensed structural formulas and write the IUPAC names for all the aldehydes and ketones that have the molecular formula C_4H_8O	4
Learning objective: present different classes of organic substances, their properties, structures, reactivity and biological functions. To pass the learning objective, 50% correct answers are required. (15 out of 30p is required)		
5	Methyl benzoate, which smells like pineapple guava, is used to train detection dogs. a) Draw the condensed structural formula for methyl benzoate	1
	b) Write the IUPAC name of the carboxylic acid and the alcohol used to prepare methyl benzoate	2

	c) Use condensed structural or line angel formulas to write the balanced chemical equation for the acid hydrolysis of methyl benzoate.	2
	d) Use condensed structural or line angel formulas to write the balanced chemical equation for the base hydrolysis of methyl benzoate with NaOH.	2
6	The IUPAC name of ethyl vanillin, a synthetic compound used as a flavouring, is 3-ethoxy-4-hydroxybenzaldehyde. a) Draw the condensed or line-angle formula for anisaldehyde and identify all functional groups	4
	b) Draw the condensed or line-angle formula and name the product formed when anisaldehyde is oxidized	3

	c) Draw the condensed or line-angle formula and name the product formed when anisaldehyde is reduced. Also classified the product as 1°, 2° or 3°	3
7	Draw the condensed structural or line angle formula for the alcohols needed to give each of the following oxidation products. Also, classify the alcohols needed as 1°, 2° or 3°.	4
8	Sometimes several steps are needed to prepare a compound. Identify all steps required to prepare  from a ketone	

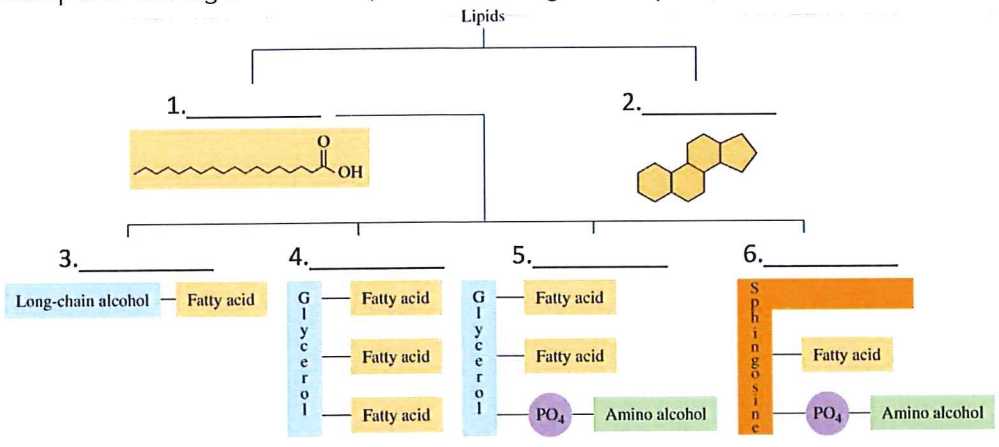
	a) Give the IUPAC name for the compound above	2
	b) IUPAC names for all products needed to synthesize the compound above	2
	c) the condensed or line-angle formulas for all molecules needed.	2
	d) The type of reactions required to synthesize the compound	3
Learning objective: describe the four classes of biological macromolecules, with focus on their structures and biochemical reactions and function. To pass the learning, 50% correct answers are required. (10 out of 20p is required)		
10	Carbohydrates. a) Name the molecule  	1

b) Draw the Haworth structure of the β-isomer of the molecule in a) — 2

11 — Cellulose, amylose, amylopectin, and glycogen are all important polysaccharides in organisms. Complete the table below — 4

	Cellulose	Amylose	Amylopectin	Glycogen
Organisms (Plants or animal)				
Monosaccharide (specify the monosaccharide and also if it is β or α)				
Types of bonds				
Branches (yes or no)				

12 — Complete the figure below (how we categorize lipids) — 3



13	Identify each of the following as <u>saturated, monounsaturated, polyunsaturated, omega-3, or omega -6 fatty acid</u> a) $CH_3-(CH_2)_7-CH=CH-(CH_2)_7-COOH$	1
	b) $CH_3-(CH_2)_4-HC=CH-CH_2-HC=CH-(CH_2)_7-COOH$	1
	c) $CH_3-CH_2-(HC=CH-CH_2)_5-CH_2-CH_2-COOH$	1
	d) $CH_3-(CH_2)_{14}-COOH$	1
14	Amino acids are the molecular building block of proteins a) Amina acids have a central carbon, called the α-carbon, bonded to two functional groups, which ones?	2
	b) The central carbon also binds two other "things" what "two other things" are also bonded to the α-carbon?	2
15	True or False a) Purine bases have a single ring	0.25
	b) Cytosine is a purine	0.25
	c) Thymine is a pyrimidine	0.25
	d) In RNA, cytosine is replaced by uracil	0.25
	e) The pentose sugar in RNA is deoxyribose	0.25

	f) Phosphodiester bonds link two sugars in DNA	0.25
	g) 2 hydrogen bonds are formed between guanine and cytosine	0.25
	h) Uracil is a component of RNA only	0.25

Equations and tables

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Priority rules

High Priority

Low priority

Group	Prefix	Suffix
Carboxylic acid	carboxy-	-oic acid
Ester	oxycarbonyl-	-oate
Amide	carbamoyl-	-amide
Aldehyde	formyl-	-al
Ketone	oxo-	-one
Alcohol	hydroxy-	-ol
Thiol	mercapto-	-thiol
Amine	amino-	-amine
Alkene	alkenyl-	-ene
Alkyne	alkynyl-	-yne
Alkane*	**alkyl-**	**-ane**
Ether	alkoxy-	-ane
Halo	halo-	-ane
Nitro	nitro-	-ane

Periodic Table of the Elements