

CHEMISTRY: ART, SCIENCE, FUN



**PRACTICAL
EXAMINATION
ANSWER SHEETS**

**JULY 18, 2007
MOSCOW, RUSSIA**

Official English version

Problem 1	Name: _____	Quest.	1a	1b	1c	2-3	4	Tot	Points
	Student code: _____	Marks	9	0	3	72	2	86	20

Number of the given mixture of amino acids _____ (A number between 301 and 600)

1.1a Draw the profile of coloration intensity on the plate sketch.

1.1b Indicate changes of eluents by drawing lines between the corresponding wells.

	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												

1.1c Labels of wells corresponding to the chosen fractions.

Peak number	Labels of wells
1	
2	
3	

1.2-1.3 Content (in mg) of each amino acid in the amino acid mixture you were given.

Your work

Problem 1	Name: _____	Quest.	1a	1b	1c	2-3	4	Tot	Points
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Complete the table.

Peak number	Volume of combined fractions, <i>mL</i>	Amino acid (3-letter code)	Wavelength λ , <i>nm</i>	Absorbance A_λ	Amino acid mass in the given mixture, <i>mg</i>
1					
2					
3					

ATTENTION. The print-offs with the spectra of your samples should be put into the envelope and delivered at the end of examination alongside with the Answer Sheets.

1.4 Resonance structures of the substance responsible for the mixture coloration.

Problem 2	Name: _____	Quest.	1a	1b	2	3	4	5	6a	6b	Tot	Points
	Student code: _____	Marks	25	5	25	25	5	5	1	9	100	20

2.1a Standardization of NaOH solution

Titration No	Initial burette reading, mL	Final burette reading, mL	Volume of NaOH solution consumed (V_1), mL
1			
2			
3			
Final volume of NaOH solution ($V_{1,f}$), mL			

2.1b Calculation of NaOH concentration

Your work

$c(\text{NaOH}) = \underline{\hspace{2cm}}$ mol/L

2.2 The first titration of the sample (BCG)

Titration No	Initial burette reading, mL	Final burette reading, mL	Volume of NaOH solution consumed (V_2), mL
1			
2			
3			
Final volume of NaOH solution ($V_{2,f}$), mL			

2.3 The second titration of the sample (TP)

Titration No	Initial burette reading, mL	Final burette reading, mL	Volume of NaOH solution consumed (V_3), mL
1			
2			
3			
Final volume of NaOH solution ($V_{3,f}$), mL			

2.4 Calculation of the mass of CO_3^{2-}

Your work

$m(\text{CO}_3^{2-}) = \underline{\hspace{2cm}}$ g

Problem 2	Name: _____	Quest.	1a	1b	2	3	4	5	6a	6b	Tot	Points
	Student code: _____	Marks	25	5	25	25	5	5	1	9	100	20

2.5 Calculation of the mass of HPO_4^{2-}

Your work

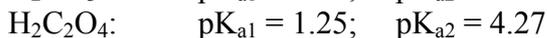
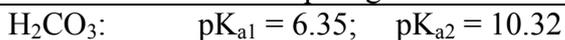
$$m(\text{HPO}_4^{2-}) = \underline{\hspace{2cm}} \text{ g}$$

Additional questions

2.6a Indicate one reaction (write down the equation) for a process interfering in the sample analysis you have carried out in the presence of Ca^{2+} .

2.6b A list of mistakes possible at different steps is given in the table. Indicate which of the mistakes can lead to errors in CO_3^{2-} and/or HPO_4^{2-} content determination. Use the following symbols: "0" if no error is expected, "+" or "-" if the result is higher (positive error) or lower (negative error) than the true one.

Mistake	Step	Error	
		CO_3^{2-} content	HPO_4^{2-} content
Incomplete removal of CO_2	1		
Too large excess of $\text{K}_2\text{C}_2\text{O}_4$ on calcium precipitation	2		
Too late indication of the endpoint (overtitration) on NaOH standardization	3		
Insufficient washing of the filter at CaC_2O_4 filtration	4		
Overtitration of the sample against BCG	5		
Overtitration of the sample against TP	6		



Extra samples given or column broken

Problem No	Sample No	Column broken and replaced	Student's signature	Lab assistant's signature