CHEMISTRY: ART, SCIENCE, FUN



PRACTICAL EXAMINATION ANSWER SHEETS

JULY 18, 2007 MOSCOW, RUSSIA

						_								
Problem	Na	me:			Quest.	1a	1b	1c	2-3	4	Tot	Poi	nts	
1	Stu	udent co	de:		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 th 1.1b Indicate										spone	ding	wells	5.	
1	2	3	4	5	6	7		8		9	1	.0	11	
$A \bigcirc $														
В ()			(
$C \bigcirc $)							(
D ((
E ((
F ((
G (\bigcirc													(
H (\bigcirc)							(
1.1c Labels of wells corresponding to the chosen fractions.														
Peak number	r I	Labels o	f wells											
1														

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

Tour work

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

Complete the table.

Peak	Volume of	Amino acid	Wavelength	Absorbance	Amino acid mass in
number	combined	(3-letter	λ , nm	A_{λ}	the given mixture,
	fractions, mL	code)			mg
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	Name:	_ Q	Quest.	1a	1b	2	3	4	5	6a	6b	Tot	Points
2	Student code:	N	Marks	25	5	25	25	5	5	1	9	100	20
									<u> </u>	<u> </u>			
	lization of NaOH solution	T										~	
Titration No	Initial burette reading, mL	Fina mL	al bure	ette	reac	ling	,					OH so , mL	lution
1	IIIL	IIIL						COL	isum	icu	(<i>V</i> 1)	, IIIL	
2													
3													
	Final volume of	f NaOl	H solı	ıtioı	1 (V	(1 f)	mI.						
	1 mm + 0 mm • 0	11,001	11 551		- (,	1,1/7		<u>I</u>					
	ion of NaOH concentration	n											
Your work													
							c(NaO	H) :	=			_ mol/
2 2 The final t	ituation of the gamente (DC)	C											
Titration No	itration of the sample (BCC) Initial burette reading,		al bure	ette	reac	lino		Vo	lum	e of	Na()H sc	lution
Titrution 100	mL	mL	ii ouiv		rouc	••••	,					, mL	ration
1													
2													
3													
	Final volume of	of NaOl	H solı	ıtioı	1 (V	(2 f),	mL						
2.3 The secon	d titration of the sample (T				- (.	2,17,		ļ					
Titration No	Initial burette reading,		al bure	ette	reac	ling	,						lution
	mL	mL						con	sun	ned	(V_3)	, mL	
1													
3													
3													
	Final volume of	f NaOl	H solu	ıtioı	1 (V	(3,f),	mL						
	on of the mass of CO_3^{2-}							•					
Your work													

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

2.5	Calculation	of the	mass	of HPO	2-
4.0	Caicmanon	oj inc	mass	0, 111 04	

2.3 Calculation of the mass of HPO ₄	
Your work	
	$m(HPO_4^{2-}) =g$
I	···(111 04) 8

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	E ₁	rror
Wiistake		CO ₃ ²⁻ content	HPO ₄ ²⁻ content
Incomplete removal of CO ₂	1		
Too large excess of K ₂ C ₂ O ₄ on calcium precipitation	2		
Too late indication of the endpoint (overtitration) on	3		
NaOH standardization			
Insufficient washing of the filter at CaC ₂ O ₄ filtration	4		
Overtitration of the sample against BCG	5		
Overtitration of the sample against TP	6		
TT CO TT (0.7 TT 10.00			

 $egin{array}{ll} H_2CO_3: & pK_{a1}=6.35; & pK_{a2}=10.32 \\ H_2C_2O_4: & pK_{a1}=1.25; & pK_{a2}=4.27 \\ \end{array}$

Extra samples given or column broken

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