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## Experimental Competition, Answer Sheet 6<sup>th</sup> IJSO, Baku. Azork ... 6<sup>th</sup> IJSO, Baku, Azerbaijan

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Team Code Country	into the state of	ID Code & Name Signature	The 13 PR	A SECTION OF THE SECT	illing was by the teacher of the tea
Supervisor Signature	und the state of t	Score	W & State	本法學	inte state

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### **Experiment I. Peroxidase determination**

I-1. Fill in the table with number of colors (given in instruction sheet) you observed after 2 min. (2.5 points)

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Colour	numbering:			
1- Brow	n, 2- Pink, 3-Ord	ange, 4-red, 5 - gr	een, 6 - Blue,	7-No colour change
Mistitute &	Sample	No heating (1)	Heated (2)	7-No colour change
		Number	Number	
The state of the s	Feykhoa (F)	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7	13 PR
Tilly itale And	Potato (P)	1,2,3,4	THE SHAPE	iiillitito Ana
	Cabbage(C)	1,2,3,4	7	
S 18 18 18 18 18 18 18 18 18 18 18 18 18	Control (W)	7	7	18 M

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I-2. Which of the investigated vegetables/fruit contain peroxidase? Choose the correct answer. (1.5points)

☐ Feykh	ioa	X Potato	X	Cabbage
The Bill State of	The Birth Oliver	the state of	अपार केल केर	The Title Shirt:
THE STATE OF THE S	Timestale	Hilly March	Timy Mark	E-

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# Experimental Competition, Answer Sheet 6<sup>th</sup> IJSO, Baku. Azon<sup>L</sup> ...

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	I-3. I	Do you observe an	ny color change in	control tubes? Tick	k the box. If y	es, choose	one of the
	follo	wing reasons?(Vol	don't have to cho	ose anything if the	ongwar ig na)	1/2 1/2	· Ve
松下			i don t nave to end	ose anything if the a	allswel is ilo)	X es	□ No
atitute Am	(0.5)	points)	atitute m	atitute Ami	atitute Am		THE ME
Million	A	Peroxidase is read	cted with peroxide	and formed colored	product	THE PARTY OF THE P	3

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Million	A	Peroxidase is reacted with peroxide and formed colored product	
	X	Peroxide reacts with hydroquinone very slowly in the absence of enzyme.	
5	C <sub>3</sub>	Peroxidase is reacted with hydroquinone and formed colored product	14 1/3 PM
The Olution	D	Peroxide started to react with water and changes the color of the solution	Co the way
TillyMou		Illight Illight Illight	

I-4. How does boiling affect peroxidase? Circle the correct answer. (1points)

	11	tow does bonning affect peroxidase. Chefe the correct answer.	(Tpoints)	
6	法海豚	S S S S S S S S S S S S S S S S S S S	水水水	
otitute sist	A	No effect	titule sid .	
IIIIII.	В	Boiling accelerates reaction rate by activating peroxidase.	No.	
	X	Boiling reduces reaction rate by denaturizing peroxidase		
6	D <sub>3</sub> %	Boiling reduces reaction rate by inhibiting peroxide	13 Th	

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I-5. How will the color immediately change if only hydroquinone without peroxide is added to diluted juice of cabbage? Circle the correct answer. (1points)

30	XX	No change, because peroxide is absent	W Th
. 3	1/2	* 3 * * 3 * * * * * * * * * * * * * * *	14 B
Test Olution	В	Change will be observed immediately, because peroxidase affects hydroquinone	, K
THINKING .	С	Change will be observed steadily because peroxidase affects hydroquinone slowly	

### Experiment II. Determination of optimum pH of enzymatic reaction

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6	Experiment II. Determination of opti	mum pH of e	nzymatic reaction	1
, <u>, , , )</u>	II-1. Record the pH reading for buffer solution	n 3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	11/1/3
OK Olive	16 348 Mg	Sign of the same	Pick Office	OK OLEK
THE STATE OF	Recorded pH for buffer solution	6,8-7,2	THE STITLING	History
Mir			III	III

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## Experimental Competition, Answer Sheet 6<sup>th</sup> IJSO, Baku. Azoul ... 6<sup>th</sup> IJSO, Baku, Azerbaijan 8 Decom<sup>1</sup>

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	matitute &		Tilly it	Nig	Militate ?		<b>Till</b> kil	8 D	ecemb	er, 20	09	<b>Tinstitute</b>
	II-1. Fill in the ch	art with	recorded	d pH of the	e tubes (fro	om 1 to	10) (3pc	oints)				
	Added solution	0.05 n	ol·L <sup>-1</sup> so	lution of	HCl	14 18 18 18 18 18 18 18 18 18 18 18 18 18	0.1 mg	ol·L <sup>-1</sup> sol	ution of	NaOH	7/ 1/2 1/3	
Imstitute	Number of tube	1	The state of the s	3	4 Allahille	5	6 mini	7	8	9	10	Tilly little
Mylithte #	mL of solution added	3	1.5	0.75	0.3	0 X 3	0,2	0.4	1	2	3	. The second
Timb it the	Recorded pH	1,8- 2,6	2,6- 3,5	3,8-4,8	5,2-6,3	6,7-7,3	8,0- 9,2	9,2-10,0	10,2- 11,00	11,1 - 11,9	11,5 - 12,3	ling/ithe
निर्देश श्रीमारिशाला	II-2. Identify the	range of	f optimal	pH for per	roxidase e	nzyme.(	(2points	· 旅歌	13 Th	of alm.	13 - 13 V	Store.
Tilly tille	pH range:		6,7-10		Till Strong		Till VI	198		NIII III		Milling
	II-3. Identify the	tube in	which the	e peroxidas	se enzyme	is the r	nost acti	ive.(1.5p	points)			
#\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Number of tul	决场		冰水		法法		从从	13 Ph	26	冰冷	
lingitute And	II-4. According to experimental results, predict which of the substances following would inhibit peroxidase activity. Tick the boxes. (0.25 x 2 points)						Mistilité					
	0.1M Oxalic acid	d X	0.1 M	NH <sub>4</sub> OH		0.1 M1	Na <sub>2</sub> CO <sub>3</sub>	0	O.1 M Acc CH <sub>3</sub> COC	etic acid	l X	
milyitute of the	0.1M Oxalic acid	100	Mistitute	<b>公</b>	Ministrate ?	AND THE PROPERTY OF THE PROPER	lingii	ute sta	CH <sub>3</sub> COC	stitute #	X	Mistitute

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## Experimental Competition, Answer Sheet 6<sup>th</sup> IJSO, Baku. Azorb... 6<sup>th</sup> IJSO, Baku, Azerbaijan 8 Decomb

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## White the state of **Experiment III. Determination of Vitamin C in Cabbage Juice**

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	III-1. Write down the reduction half equation in acidic medium for iodate ions and the oxidation half equation for the iodide ions.(1points, 0.5points for each half equations)										
* Title of the state of the sta	Reduction half equation:(0.		Oxidation half equation:(0.5points)								
mistitute And i	none mone	F-111100	one	Milling 1							
	III 2 Combine the helf equation	ong and write the even	rall aquation between	indata and indida ions (O	5)						
	III-2. Combine the half equation	ions and write the over	rail equation between	lodate and lodide ions.(0.							
· · · · · · · · · · · · · · · · · · ·	none	THE WAS	19 40	THE WAY	上状况外						
The autitude of the	III-3. Complete the table give	en for the titration step	s.(3.5points)	titite son attiti	18 36 S						
Willen	Million H	Trial-1	Trial-2	Trial-3 (if necessary)							
	Initial reading of										
	burette (mL)	16 Th	16 Th		W.						
100	Final reading of burette (mL)	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	数型 X-23	数 数 3	海水						
Ministrate And	Volume of KIO <sub>3</sub> used (mL)	Withing .	Rithards	Situle " Impitul	18						
	Average volume of	12- 16 mL	10-12 mL	16-18 mL							
	KIO <sub>3</sub> solution (mL)	(3.5 points) %	(2 points)	(2 points)							
45T	L. B. W. B.	(3.5 points)	(2 points)	(2 points)	冰水						
matitute And	misitude and	ditute and	withite was	tititle sas	B Na.						
	III-4. Calculate the amount in moles of iodate that reacted forming iodine. (1.5points)										
	Show your calculations her	·e:									
	12 9h	a analy is the	S. C. C.	S. The	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
Till aline	n(iodate) = Average volum	e x 0.002 ≠	mol	has the state of t	数数						
The autitude And	Average volume 10- 18 mI	olmasa hesablamal	ar nəzərə alınmır	Milling Milling	物族等						
Maitine And	The little was to be a little wa	A30.	A30	A32	∆32.						
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The state of	X 3	第三 第三 · · · · · · · · · · · · · · · · ·	第一次·	松水 3	<b>海状</b>						
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					L-4						



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## Experimental Competition, Answer Sheet 6<sup>th</sup> IJSO, Baku, Azerbaijan 8 December, 2009

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1/2	<u> </u>		n the	na Ka	Moles of IO <sub>3</sub> :	cavab
ame	ount of moles	of iodine form	e reaction between	n the iodate ions an	d iodide ions, calc	ulate the
	ow your calcul od) = n(iodate	ations here: $x3 = \dots$	mol <sup>®</sup>	Time the the little of the lit	itute ## # 18 18	Mitthe Mark
10 加州省	No. of the state o		加州	inte state is the	ituto ita iki iki iki	Mittale Market
cab	76.75	.5points)	on determine the a	mount of moles of	Moles of I <sub>2</sub> :	Situle Man
n (a	ascorbic acid)	= n (iod)	加度 辦 林 沒 %	Time star st. '3 18	itute ## # 18 18	Mittale star st.
物源			加州海州	Moles	of Ascorbic acid:	Stitute star st.
加州海	Natitive Marities	ik ik ik	班	think the state of	Hara Mark 13 18	Situle Man At .



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# Experimental Competition, Answer Sheet 6<sup>th</sup> IJSO, Baku, Azerbaijan 8 December, 2009

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.,	III-7. Calculate the concentration in mol·L <sup>-1</sup> , of ascorbic acid in the <b>cabbage juice</b> (1points)	K.
Mikitith sin s	III-7. Calculate the concentration in mol·L <sup>-1</sup> , of ascorbic acid in the <b>cabbage juice</b> (1points)  Show your calculations here:  n (ascorbic acid) / 0.03= mol·L <sup>-1</sup>	liilyittit <sup>e</sup>
Mylithe # *	Molarity of Ascorbic acid:	Maritate
Military of the state of the st	Show your calculations here:	THINKING .
Mylithe start	n (ascorbic acid) x 176.2= mass of ascorbic acid	imeritut?
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### Maritule was 14 13 1980 Experiment IV. Density measurements IV-1.

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	Amount of water	Sunk depth	Amount of	Amount of feykhoa
	(ml)	(ml)	pomegranate juice (ml)	juice (ml)
٥ , ,	4.0	12.2	3.8	4.2
<b>编</b>	4.6	12.6	4.2	5.1
alititle	5.2	13.0	4.6	5.4
IIIII	IIIII	IIIII	IIII	IIIII A

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### 0.5 point per data

write space below IV-2. Write the equation that will be used to find the density of the juices at the provided

### 0.5 points for the figure

Since the test tube is floating, buoyancy force is equal to the weight of the test tube with fluid.

$$F_b = W$$

$$\rho_w V_s g = m_t g + \rho_f V_f g$$
Canceling  $g$ 

$$\rho_w V_s = m_t + \rho_f V_f$$
(0.5 points)
Since the sunken volume of the test tube can obtained in the experiment (volume of the way)

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Since the sunken volume of the test tube cannot be obtained in the experiment (volume of the wall is significant) a different method has to be used. depth of the test tube with known volume of water. That is We can try to add as much juice as possible to the test

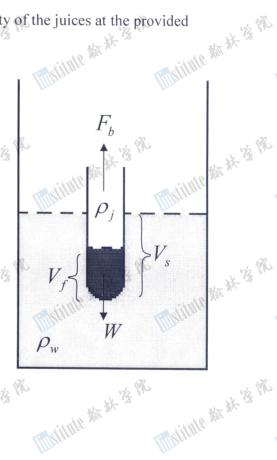
$$\rho_w V_s = m_t + \rho_f V_f$$

$$\rho_w V_s = m_t + \rho_w V_w \Rightarrow \rho_w V_w = \rho_f V_f$$

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(0.5 points)A Militalli

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Malitude Mark 13 192 Asithte Mark 's 18 IV-3. Density of the pomegranate juice  $P_{pj}$ 

Astitute the the 18 18 1081.7 kg/m

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Density of the feykhoa juice

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$$\rho_{fi} =$$

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Marking scheme for pomegranate juice:
Range 980 kg/m<sup>3</sup> Range 980 kg/m<sup>3</sup> - 1180 kg/m<sup>3</sup> - 1.0 point Range  $880 \text{ kg/m}^3 - 1280 \text{ kg/m}^3 - 0.5 \text{ points}$ Outside the described range -0.0 points

Maritude 3/4 1/4 3

Marking scheme for feykhoa juice:

Range  $860 \text{ kg/m}^3 - 1060 \text{ kg/m}^3 - 1.0 \text{ point}$ Range  $760 \text{ kg/m}^3 - 1160 \text{ kg/m}^3 - 0.5 \text{ points}$ Outside the described range -0.0 points

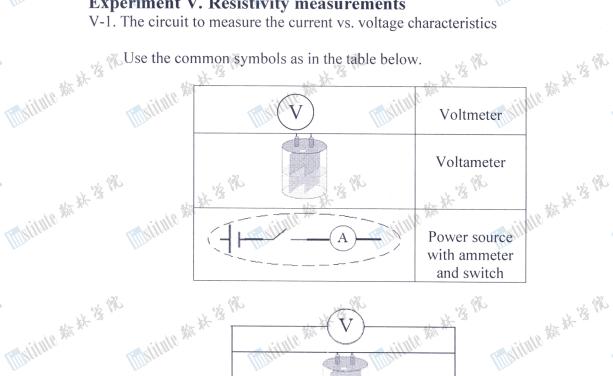


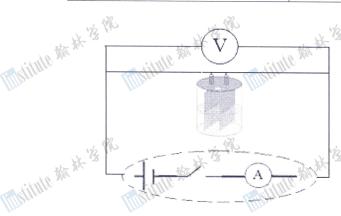
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### **Experiment V. Resistivity measurements**

Marithe Mark & PR V-1. The circuit to measure the current vs. voltage characteristics

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Correct circuit -0.5 points Wrong circuit -0.0 points Maritha And Art 3

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The width of the plates

The height of the plates

The effective area of the plates

V-3.

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L=	15mm	
		0.15 points
a=	30mm	.30
1	1/2 Th	0.15 points
b=	40mm	W. W. W.
	atillity .	0.15 points
A =	$1.2 \times 10^{-3} \text{m}^2$	
		0.05 points

	Pomegran	nate juice	加州海水	
Milytitute state	Voltage (V)	Current (mA)	松 水	
of Ultita	O dilile	0	III And	
Hillyone	1,03	0		1
	2,17	10		
	3,04	40		
	4,03	. 80	, %	
Maritale &	5,07	120	加斯米洛州	
Fitt alms.	6,15	170	16 86	
THE STATE OF THE S	7,14	210	Me	1
	8,18	250		
	9,03	290		
Maritate ##	10,01	330	-3/1	
	10,99	370	加维茶溪水	-
振"	12,05	420	被逐渐	-
dititit!	12,99	460	All A	
Million	13,93	510		
	14,95	560		-
>	48	486	No Ph	-
zhe )	X-13	13 · 3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
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Voltage (V)	Current (mA)	- '20
11110	01110	
0,97	111190	
2,03	10	
3,00	40	
4,07	80	. 0%
5,02	120	3 1
6,08	120	
7,07	210	
8,01	260	
8,98	300	
9,98	350	
11,00	400	13 PM
12,98	500	· 25
14,08	560	
14,99	610	
institute of the state of the s	1988 Indiana de	1/3 PM

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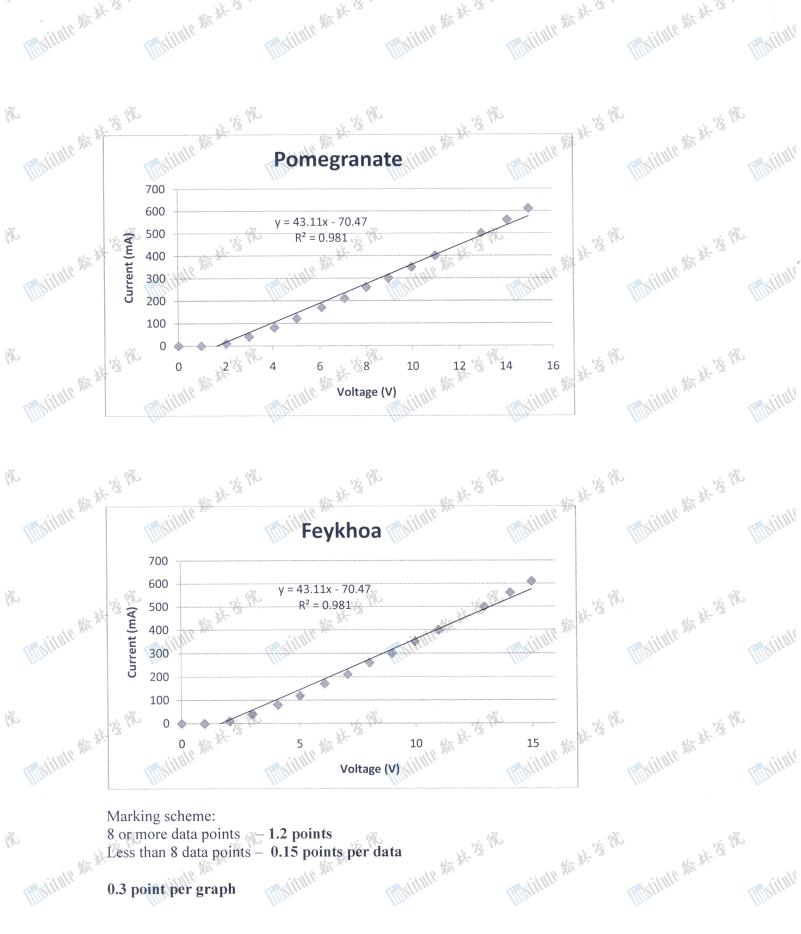
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