Journal of Positive School Psychology
2022, Vol. 6, No. 3, 9945 – 9952

http://journalppw.com

Evaluation of the Healing Properties of Some Medicinal Plants through the Method of Chemical and Photochemical Analysis

Ibrokhim R. Askarov [1*], Azizbek S. Xojiqulov [2], Kobuljon Q. Otakhonov [3]

[1]Doctor of Chemical Sciences, Professor, Andijan State University, 170100, Andijan, Uzbekistan
*E-mail: xojiqulov76@inbox.ru

[2]PhD in Chemistry, Senior Lecturer, Andijan State University, 170100, Andijan, Uzbekistan
E-mail: xojiqulov76@inbox.ru

[3]PhD in Chemistry, Associate Professor, Andijan State University, 170100, Andijan, Uzbekistan
E-mail: xojiqulov76@inbox.ru

Abstract

The article provides information on the methods of assessing the healing properties of localized varieties of persimmons, lemons and pumpkins in the climatic conditions of the region using spectrophotometric, potentiometric and iodometric analysis, as well as aqueous extracts from these fruits have high antioxidant properties. The article also states that it has been found that the content of iodine in 100 g of persimmons is 59.9 mcg, in lemon peel - 0.53 mkg, in a pumpkin - 0.85 mkg, using potentiometric and iodometric analysis.

Keywords: Iodine deficiency, thyroid disease, oxidative stress, antioxidants, Diospyros kaki, persimmon chocolate, Diospyros kaki, Korolyok-Xiakume persimmon fruit, Exocarpium Citri L-lemon fruit peel, Cucurbita pepo L-pumpkin fruit, spectrophotometric, potentiometric and iodometric analysis.

I. INTRODUCTION

There are many types of herbs in Uzbekistan. In the climatic conditions of the country, Diospyros kaki (KhCh) persimmon chocolate, Diospyros kaki (KX) Korolyok-Xiakume persimmon varieties, lemon Exocarpium Citri L variety and more than 10 varieties of pumpkins such as pumpkin, Bukhara kadi and watermelon are widespread. As these plants are grown in the sunny soil of Uzbekistan, they have high-yielding, very tasty fruits, which are rich in medicinal micro-and macronutrients [1; 37-40 p.].

One of the most pressing health issues in the world today is iodine deficiency. Because complex diseases such as endemic goitre, cretinism, and hypothyroidism caused by iodine deficiency are developing. About 400,000 babies in the Republic of Uzbekistan are born with serious illnesses, such as mental retardation caused by iodine deficiency during pregnancy. In addition, about 500,000 adolescents are suffering from iodine deficiency, thyroid and other thyroid diseases, skin diseases, and memory impairment. Given these circumstances, one of the most pressing issues in the development and implementation of effective, environmentally friendly, harmless, natural medicinal food supplements that contain iodine from plant fruits [2; 19-23 p.].

Physicians, chemists, and biochemists pay close attention to the problems of oxygen metabolism in the human body. This is because oxidative stress in the human body occurs when the balance between the biochemical mechanisms of oxygen oxygenase utilization is disturbed. Oxidative stress relief is achieved using biologically active substances (BFMs), particularly antioxidants [3; 25-28 p., 4; 7-14-p., 5; 13-19 p.].

Antioxidants stop the rapid growth of oxidative processes, forming inactive radicals and expelling them from the body. Free radicals usually accumulate in cell membranes and begin to destroy them, causing the cells of the human body to gradually break down and die. This results in rapid ageing of the body, damaged tissues, immune strain and other health problems, including more than 60 different diseases, such as atherosclerosis, cancer, cataracts, Parkinson's disease, Alzheimer's disease and heart disease [6; 1911-1915 p., 7; 93-99 p.].

II. EXPERIMENTAL PART

2.1. An investigation of the antioxidant activity of fruit extracts.

The object of analysis in our study was Diospyros kaki (KhCh) persimmon chocolate grown in the climate of the Andijan region, Diospyros kaki (KX) Korolyok-Xiakume persimmon varieties, Exocarpium Citri L-lemon peel and Cucurbita pepo L-fruit used [8; 24-26 p.].

The antioxidant activity of the samples studied was determined by photochemical studies. The antioxidant activity of the samples was determined by inhibiting the autooxidation reaction of adrenaline in vitro and was tested to prevent the formation of the free form of oxygen. The method is based on the inhibition of the autoxidation reaction of adrenaline, in which the in vitro conditions of the samples are expressed as a percentage of the formation and autooxidation of adrenaline over time [9; 117-121 p.].

The following reactive and concentrated solutions were used for spectrophotometric analysis: Na_2CO_3 (k.t.), $NaHCO_3$ (a.u.t.), adrenaline hydrochloride, glycloside, quercetin, bidistillate water, persimmon fruit extracts and 5 types of them, 50%, 75%, 25%, 100%) concentrated solutions, 0.2 M sodium carbonate (Na_2CO_3-$NaHCO_3$) buffer solution with pH = 10.65, adrenaline hydrochloride solution.

Cary 60 UV-Vis Agilent Technologies spectrophotometer with a thickness of 10 mm to determine the antioxidant activity of extracts from Diospyros kaki (KHSH) persimmon chocolate, Diospyros kaki (KX) Korolyok-Xiakume persimmon fruit, lemon peel and pumpkin fruit A 25 ml cuvette, graduated measuring cups (beakers, micropipettes), 50-100 cm3 chemical cups, plain filter paper, a glass funnel, and a 250 cm3 flask were used.

For the experiment, 2.0 ml of 0.2 M sodium carbonate (Na_2CO_3-$NaHCO_3$) buffer with pH = 10.65, 56 ml of 0.18% solution of adrenaline (epinephrine) hydrochloride were taken and 30 ml of antioxidant sample was added., and the optical densities of the solutions were tested on a Cary 60 UV-Vis Agilent Technologies spectrophotometer in a 10 mm cuvette with a wavelength of 347 nm for 30 seconds to 10 minutes with rapid stirring. The amount of extract under study (1 mg per 1 ml) was used as standard. 0.2 M 2.0 ml of buffer and 0.18% 56 ml (5.46 mM) of adrenaline were used as a control sample. Processing of the obtained results was carried out using t-student criteria and the Original 6.1 USA program [9; 117-121 p.].

2.2. Determination of iodine content in fruit extracts by potentiometric titration.

The potentiometric analysis includes methods for determining the concentration of ions in a solution based on the measurement of the potential difference between the electrodes immersed in the test solution. For potentiometric determinations, an I-130 ionomer, a magnetic stirrer, a 25 ml volumetric micro burette, a polyethene-coated iron rod, a platinum indicator electrode, and a silver chloride comparison electrode were used. 2 grams of persimmons, lemons and pumpkins, weighing to the nearest 0.01 g, were placed in three separate porcelain crucibles, each moistened with 3 ml of 20% potassium carbonate and 2 ml of distilled water, the lids were closed and left at room temperature for 16 hours. . The crucibles were then placed in a sand bath with the lid open and heated to 150-250 ℃ until the smoke stopped. The muffles were then placed in the oven with the crucible lid closed and kept at 250 ℃ for 30 min. The temperature in the crucibles was gradually raised to 500–550 ℃ until the samples were completely burned. The roasting process was continued until a white residue remained in the crucibles. A solution of 2 N sulfuric acid was added to the white ash until pH = 2, and distilled water was added to make up 100 ml. Due to the slight turbidity in the resulting solutions, the solutions were centrifuged for 10 minutes and separated from the precipitate [10; 30-33 p.].

Iodine in solutions of persimmon, lemon, and pumpkin samples prepared for analysis was separated from 50 ml of solutions obtained for potentiometric testing. Potentiometric titration of I-ions in the obtained solutions determined the amount of iodine in the solution. I-130 ionometer was used for the potentiometric determination of iodine. Initially, the filtrate from the persimmon sample was separated from 10 ml using a 10 ml graduated pipette and placed in a 50 ml titration beaker. To the solution was added 1 ml of 2 n H_2SO_4 solution, stirred with 10 ml of 0.1 N KI solution, then cover the container with a stopper and leave in the dark for 10 minutes. Add 0.01 N $Na_2S_2O_3$ from the burette to the test solution, stirring until the orange solution turns light yellow. Approximately 2 ml of starch indicator solution was added to determine the free iodine in the test solution. As a result, the mixture turned brownish-blue, and titration was continued with 0.01 N $Na_2S_2O_3$ solution until the final colour of the solution disappeared. The Pt indicator and silver chloride comparison electrodes, as well as a sterile piece of iron coated completely with polyethene, were washed and dissolved in distilled water. The solution in the beaker was placed in an MM-3M sample magnetic stirrer with electrodes and a magnetic stirrer rod. A constant speed of the magnetic stirrer was set to keep the solution continuous during the titration. The main attention was paid to the fact that the solution does not scatter and does not form a gap around the electrode. The titration process was continued until the solution turned brown [10; 30-33 p.].

Their ox-redmetric capabilities were used for the potentiometric determination of iodine in persimmon, lemon, and pumpkin fruit solutions. Since the iodine ion is electroactive in an aqueous solution under given conditions, the oxidation-reduction pair is formed by titrant to determine the endpoint, ie 1 drop of 0.1 N KI solution is added to the solution to form IO_3^-/I^- pair.

$$KIO_3 + 3H_2SO_4 + 5KI \rightarrow 3K_2SO_4 + 3I_2 \downarrow + 3H_2O$$

The I_2 sank. The solubility of the precipitate is small (0.28 g / l).

$$2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$$

When the titration of I_2 in the solution is complete, the last added 1 drop of $Na_2S_2O_3$ leads to an increase in the electrode potential.

The volume of sodium thiosulfate corresponding to the potential jump in the first titration was approximated, and in subsequent parallel titrations, the titrant was added dropwise in the jump area. For approximate titration, 1 ml of titrant was added [10; 30-33 p.].

2.3. Determination of iodine content in fruit extracts by iodometric titration.

The iodometric titration method was used to estimate the potentiometrically determined amount of iodine in the extracts of persimmons, lemons and pumpkins.

Dissolve 10 ml of the test sample taken for analysis in 100 ml of distilled water in a 250 ml conical flask. The resulting solution was filtered because it was cloudy. To the resulting solution was added 1 ml of 2N solution of H_2SO_4, stirred with the addition of 5 ml of 10% KI solution, cover the container with a stopper and leave in the dark for 10 minutes. This is because, before the titration, an additional process of oxidation of the iodide ions to iodine may take place in the reaction mixture under the influence of light. Add 0.01 N $Na_2S_2O_3$ from the burette to the mixture by stirring the orange test solution until it turns light yellow. When approximately 2 ml of starch indicator solution was added to the test solution, the mixture turned brownish blue. The titration was continued until the final colour of the solution disappeared [11; 102-105 p.].

III. RESULTS AND THEIR DISCUSSION

In the spectrophotometric analysis of the analytical solutions obtained from persimmon, lemon peel and pumpkin fruit extracts, their antioxidant activity (%) was calculated based on the values of optical densities of the tested samples as follows:

$$AA = \frac{(D_1 - D_2)*100}{D_1} = \frac{(0,29208 - 0,2541)*100}{0,29208} = 13,0\ \%$$

For comparative analysis of the antioxidant activity of the tested samples, gliclazide ($C_{15}H_{21}N_3O_3S$) used in pharmaceuticals and medicine, as well as quercetin ($C_{15}H_{10}O_7$) used as a Dietary supplement (Ds) in the food industry, were used as standard samples.

Graphs of the concentration dependence of AA activity of 5 different concentration solutions of the tested samples Diospyros kaki (KHSH) - in Figure 1 for the sample, Diospyros kaki (KX) - in Figure 2 for the sample, Exocarpium Citri L- in figure 3 in the sample, Cucurbita pep -for example, shown in Figure 4 [6; 1911-1915 p., 7; 93-99 p.].

Table 1. Spectrophotometric and antioxidant activity index (AA%) of persimmon varieties, lemon peel and pumpkin fruit extracts

№	*Solutions to be analyzed*	*Control (D_1)*	*Experiment (D_2)*	*$AA_{\%}$*
Diospyros kaki(KhCh)				
1	Diospyros kaki (KhCh) - (10%) 100 mg/ml	0,29208	0,2541	**13,0**
2	Diospyros kaki (KhCh) - (25%) 250 mg/ml	0,24964	0,2122	**14,9**
3	Diospyros kaki (KhCh) - (50%) 500 mg/ml	0,19449	0,1640	**15,6**
4	Diospyros kaki (KhCh) - (75%) 750 mg/ml	0,21651	0,1810	**16,4**
5	Diospyros kaki (KhCh) - (100%) 1000 mg/ml	0,28018	0,2319	**17,2**
Diospyros kaki(KX)				
1	Diospyros kaki (KX) - (10%) 100 mg/ml	0,21561	0,1822	**15,5**
2	Diospyros kaki (KX) - (25%) 250 mg/ml	0,23685	0,1940	**18,1**
3	Diospyros kaki (KX) - (50%) 500 mg/ml	0,20312	0,1657	**18,4**
4	Diospyros kaki (KX) - (75%) 750 mg/ml	0,22234	0,1804	**18,8**
5	Diospyros kaki (KX) - (100%) 1000 mg/ml	0,28612	0,2294	**19,8**
Exocarpium Citri L				
1	Exocarpium Citri L (10%) 100 mg/ml	0,19179	0,1642	**14,38**
2	Exocarpium Citri L (25%) 250 mg/ml	0,29216	0,2389	**18,23**
3	Exocarpium Citri L (50%) 500 mg/ml	0,24811	0,2024	**18,42**
4	Exocarpium Citri L (75%) 750 mg/ml	0,30005	0,2369	**21,04**
5	Exocarpium Citri L (100%) 1000 mg/ml	0,40394	0,3012	**25,43**
Cucurbita pepo L				
1	Cucurbita pepo L - (10%) 100 mg/ml	0,23611	0,1970	**16,56**
2	Cucurbita pepo L - (25%) 250 mg/ml	0,27326	0,2247	**17,77**
3	Cucurbita pepo L - (50%) 500 mg/ml	0,29455	0,2384	**19,06**
4	Cucurbita pepo L - (75%) 750 mg/ml	0,36258	0,2918	**19,52**
5	Cucurbita pepo L - (100%) 1000 mg/ml	0,36806	0,2927	**20,47**
6	Gliclazide - (10%) 100 mg/ml	0,02782	0,0235	**2,0**
7	Gliclazide - (25%) 250 mg/ml	0,03895	0,0329	**2,8**
8	Gliclazide - (50%) 500 mg/ml	0,06955	0,0587	**5,0**
9	Gliclazide - (75%) 750 mg/ml	0,11823	0,0998	**8,5**
10	Gliclazide - (100%) 1000 mg/ml	0,13909	0,1174	**10,0**
11	Quercetin - (10%) 100 mg/ml	0,11128	0,0940	**8,0**
12	Quercetin - (25%) 250 mg/ml	0,18778	0,1586	**13,5**
13	Quercetin - (50%) 500 mg/ml	0,27819	0,2396	**20,0**
14	Quercetin - (75%) 750 mg/ml	0,38251	0,3294	**27,5**
15	Quercetin - (100%) 1000 mg/ml	0,67247	0,5348	**34,7**

Analyzes have shown that solutions prepared from extracts of all fruits have antioxidant properties. A potentiometric titration method was used to determine the amount of iodine in solutions made from persimmon, lemon peel and pumpkin fruits. The results of the exact and approximate titrations are presented in Table 2.

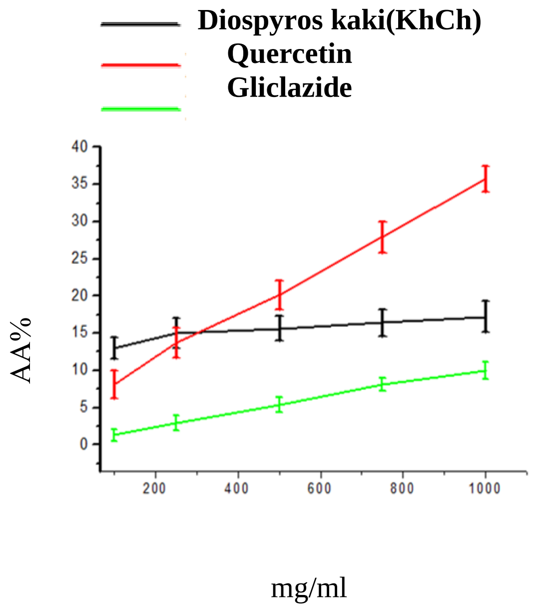

Figure 1. Concentration dependence of antioxidant properties of Diospyros kaki (KhCh) sample

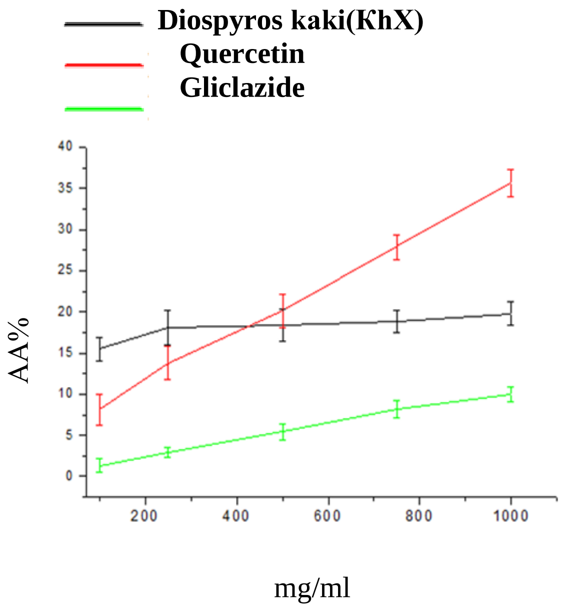

Figure 2. Antioxidant properties of Diospyros kaki (KhX) sample dependence on concentration

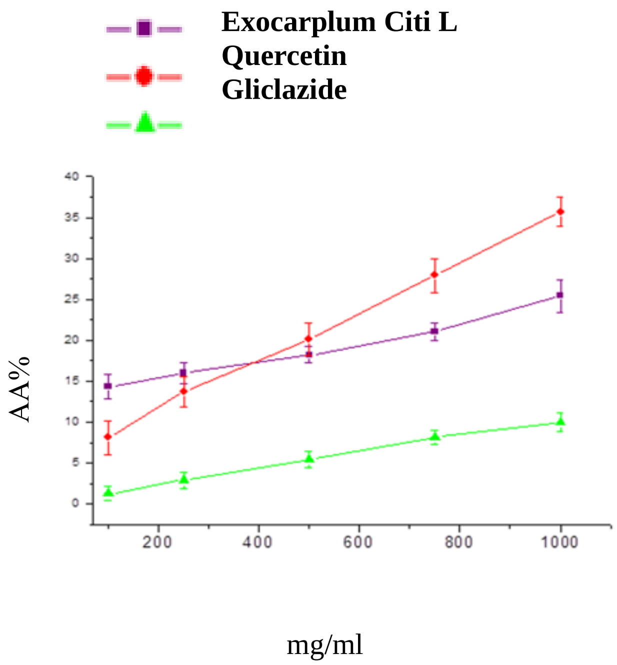

Figure 3. Concentration dependence of the antioxidant properties of the Exocarpium Citri L sample

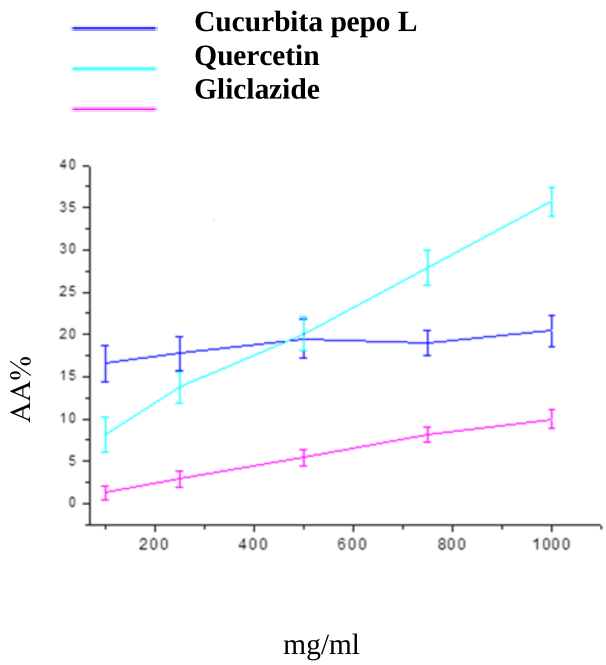

Figure 4. Concentration dependence of antioxidant properties of Cucurbita pepo L sample

The results in the table show that the abrupt jump of the highest point (HP) corresponds to a titrant area of approximately 5 ml in the approximate titration and 7 ml in the exact titration. After adding 4 ml of titrant in the approximate titration and 6 ml in the exact titration, drip titration was started to find the exact equivalent point. Titration curves were constructed based on the values entered in the titration account.

Table 2. Fruit extracts of persimmon, lemon peel and pumpkin potentiometric titration results

Results of potentiometric titration of persimmon fruit extracts			*Results of potentiometric titration of lemon peel extracts*			*Results of potentiometric titration of pumpkin fruit extracts*		
Added titrant volume, (drops) ml	Measured the HP values, mV	The HP values difference	Added titrant volume, (drops) ml	Measured the HP values, mV	The HP values difference	Added titrant volume, (drops) ml	Measured the HP values, mV	The HP values difference
1	400	-	1	400	-	1	400	-
2	400	-	2	400	-	2	400	-
3	398	0,02	3	398	0,02	3	398	0,02
4	394	0,04	4	396	0,02	4	396	0,02
5	**220**	**1,74**	5	390	0,06	**5**	**280**	**1,16**
6	200	0,20	**6**	**274**	**1,16**	6	254	0,26
7	184	0,16	7	258	0,16	7	230	0,24
8	170	0,14	8	246	0,12	8	208	0,22
9	158	0,12	9	236	0,10	9	188	0,20
10	148	0,10	10	228	0,08	10	170	0,18
11	140	0,08	11	222	0,06	11	154	0,16
12	134	0,06	12	218	0,04	12	140	0,14
13	134	-	13	216	0,02	13	128	0,12
14	134	-	14	214	0,02	14	118	0,10
			15	214	-	15	110	0,08

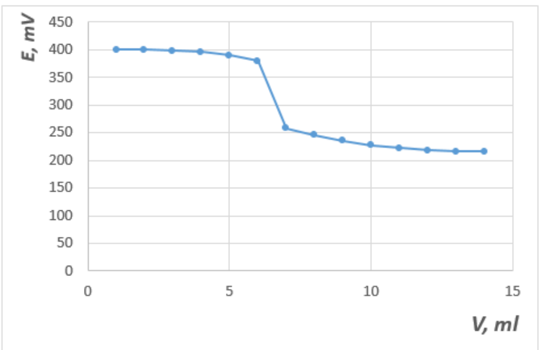

Figure 5. Graph of potentiometric titration of iodine content in persimmon extract solution

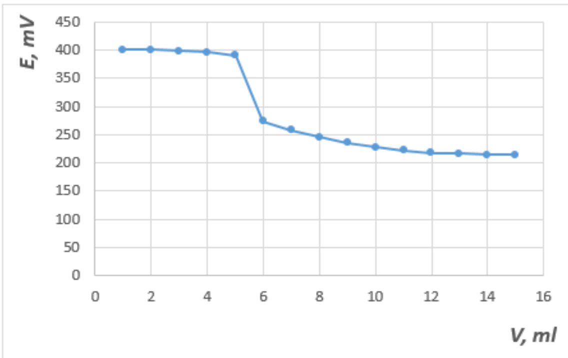

Figure 6. Graph of potentiometric titration of iodine content in lemon extract solution

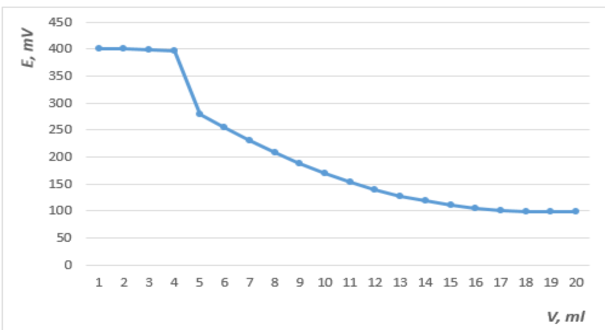

Figure 7. Potentiometric titration graph of iodine content in pumpkin extract solution

In the potentiometric titration process, the titrant consumption at the equivalent point was 5 ml and the total titrant volume consumed was 14 ml when titrated with sodium thiosulfate with the addition of 15 ml of distilled water to 10 ml of persimmon extract solution [12; 1692-1699 p.].

Given that the normality of the titrant used in the experiment was 0.01 n, the iodine content of the test persimmon solution was 214 equivalents of potassium persimmon, and the amount of iodine in the persimmon extract was determined based on the following formula:

$$\chi = \frac{N_{Na_2S_2O_3}\ V_{Na_2S_2O_3}\ Э_{KJO_3}\ V_{er}}{1000\ \ V_{ek}} = \frac{0{,}01*14*214*10}{1000*5} = 0{,}0599\ \text{mg} = 59{,}9\ mkg$$

15 ml of 0.0001 N solution of sodium thiosulfate obtained as a titrant was used to carry out potentiometric titration with the addition of 15 ml of distilled water to 10 ml of a solution of lemon peel extract.

The amount of iodine in the titrant was determined taking into account that the volume consumed at the equivalent point is 6 ml:

$$\chi = \frac{N_{Na_2S_2O_3}\ V_{Na_2S_2O_3}\ Э_{KJO_3}\ V_{er}}{1000\ \ V_{ek}} = \frac{0{,}0001*15*214*10}{1000*6} = 0{,}00053\ \text{mg} = 0{,}53\ mkg$$

For potentiometric titration of 15 ml of pumpkin extract solution with the addition of 15 ml of distilled water, 20 ml of 0.0001 N titrant solution was used. The amount of iodine in the titrant was determined taking into account that the volume consumed at the equivalent point is 5 ml:

$$\chi = \frac{N_{Na_2S_2O_3}\ V_{Na_2S_2O_3}\ Э_{KJO_3}\ V_{er}}{1000\ \ V_{ek}} = \frac{0{,}0001*20*214*10}{1000*5} = 0{,}00085 mg = 0{,}85 mkg$$

The results of potentiometric and iodometric determination of iodine content in solutions of persimmon, lemons and pumpkins are given in Table 3.

To assess the accuracy of the results of potentiometric determinations, the amount of iodine in persimmon, pumpkins and lemon peel was also determined directly by iodometric titration [12; 1692-1699 p.].

Table 3. Results of potentiometric and iodometric determination of iodine ions in persimmon, lemon peel and pumpkin fruit solutions

№	*Objects to be analyzed*	*Theoretical amount, mkg*	*Analysis results per 100 g of sample (χ, mkg)*	
			Potentiometric titration	*Iodometric titration*
1	Persimmon	60	59,9	57
2	Lemon	0,6	0,53	0,49
3	Pumpkin	1,0	0,85	0,77

IV. CONCLUSIONS

1. Diospyros kaki (KhSh) persimmon chocolate, Diospyros kaki (KX) Korolyok-Xiakume persimmon varieties, Cucurbita pepo L - pumpkin fruits and Exocarpium Citri L-lemon peel sample grown in Andijan region as the object of analysis for the research work.
2. Aqueous extracts of the obtained samples were isolated, analytical solutions were prepared from them, and methods of analysis were selected in order to study the composition and biological properties of these solutions.
3. The antioxidant activity of the aqueous extracts obtained by the method of spectrophotometric analysis of the samples taken as the object of study was carried out by the method of autooxidation of adrenaline in vitro and evaluated by photochemical examinations.
4. Antioxidant properties of the analyzed solutions Compared with standard antioxidants quercetin and gliclazide, it was found that these solutions have antioxidant properties.
5. It was found that the AA activity of low-concentration solutions of all tested samples was higher than that of gliclazide, and that of high-concentration solutions was closer to that of quercetin.
6. Iodine in persimmon, lemon peel and pumpkin fruit extracts was found to be in the

form of iodine (IO3-) using potentiometric and iodometric titration methods.

7. Analysis of iodine content in persimmons, lemon peel and pumpkin fruits by potentiometric and iodometric titration methods revealed that 100 g of persimmons contained 59.9 mcg, lemon peel - 0.53 mcg, pumpkin - 0.85 mcg.

ACKNOWLEDGEMENTS

The authors acknowledge the immense help received from the scholars whose articles are cited and included in references to this manuscript. The authors are also grateful to the authors/ editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

The authors report no conflicts of interest.
The Source of funding is nil.

REFERENCES

1. Askarov I.R., Khodzhikulov A.S. Medicinal properties of pumpkin and its use in folk medicine. Traditional medicine (+) plus (journal). T. 2020. No.3, pp. 37-40.
2. Askarov I.R., Khodzhikulov. A.S. Drugs used in the treatment of iodine deficiency, and their chemical composition. Journal of Scientific Bulletin of FarDU. F. 2019. No. 4, pp. 19-23.
3. Askarov Ibragim Rakhmanovich, Khadzhikulov Azizbek Sobirovich. Study of antioxidant properties of lemon peel extract. Universum: chemistry and biology, 2020. No. 10-1 (76), pp. 25-28.
4. Yashin Ya.I., Vedenin A.N., Yashin A.Ya. Natural antioxidants are an integral part of a healthy, nutritious diet, protecting a person from dangerous diseases and ageing. Interlab, M. 2016. pp. 7-14.
5. Petrova S.N., Ivkova A.V. Chemical composition and antioxidant properties of species of the genus Rosa L. Chemistry of vegetable raw materials, 2014. No. 2. pp.13-19.
6. Ibragim Askarov, Azizbek Khojikulov, Qobuljon Otakhonov. The evaluation of healthful properties of pumpkin fruit extract through the antioxidants indicator. ACADEMICIA: An International Multidisciplinary Research Journal. 2021. Volume: 11, Issue: 10, P.1911-1915.
7. Askarov, Ibrohim Rahmanovich. Khadjikulov, Azizbek Sobirovich. Preparation of pumpkin food additives and their classification by chemical composition. Scientific Bulletin of Namangan State University. 2020. Vol. 2: Iss. 10, Article 16. pp. 93-99.
8. Khodzhikulov A.S. Natural food supplement based on persimmon. Traditional medicine (+) plus (journal). T. 2020. No. 2, pp. 24-26.
9. Ryabinina E.I., Zotova E.E., Vetrova E.N., Ponomareva N.I., Ilyushina T.N. A new approach to assessing the antioxidant activity of plant raw materials in the study of the process of adrenaline autoxidation. Chemistry of vegetable raw materials. 2011. No. 3, pp. 117-121.
10. Turaev Kh.Kh., Umbarov I.A. Potentiometric studies of the oxidation of iodine ions from sodium nitrite. Universum: technical sciences: electron scientific journal. 2017. No. 12 (45) pp. 30-33.
11. Ermolenko V.P., Kharchenko O.O., Moisenko I.E. Modern aspects of iodine control in food products. Comparative analysis of methods. Odesa scientific Academy of Kharkiv Technology. 2010. pp. 102-105.
12. Ibragim Askarov, Azizbek Khojikulov Determination of iodine content in some medicinal plants through potentiometric and iodometric titration.
13. ACADEMICIA: An International Multidisciplinary Research Journal. 2021. Volume: 11, Issue: 10, pp.1692-1699.
14. Yogesh Hole et al 2019 J. Phys.: Conf. Ser
15. . 1362 012121