Analysis of grape fruits and grape seed for their major , minor and trace elemental contact by XRF technique

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Abstract :

Grapes and grape seeds are important samples employed for environmental medical studies . The air of this work was to identify and concentration calculation of the elements in grapes fruit and thier seeds by using X-Ray fluoresces technique (XRF) . Samples were collected from Abo Ghraib of Baghdad city ,the grape seeds were obtained from those samples . Both samples were taken under experimental procedure to obtain the sample which were ready for analysis .

The samples were then submitted to experimental conditions using a radiation source and then samples were applied for counting analysis shows the elements Na , Mg , Al , Si , P , S , Cl , K , Ca , and Sr as major components of the samples. Fe , Sr , I , Ba and V were found an minor elements other elements Cr , Cu , Sn , Sb , Te gave a value of 5 – 10 ppm , Co , Ni , Rb , Ag ,Cd < 5 ppm for the samples of grape seeds .

The analysis of grape seeds present Sr , Ca , K , Cl , S , Si , P as major components of the samples, and gave a values for Cr and Rb , Sn , Sb and Te (5 – 10 ppm) , while Co , Rb , Ni , Ag ,Cd (Less than 5 ppm) .

Key words: XRF technique, grape seed.

Introduction:

It is evident that physicians of unani medicine were well a ware with the existence and importance of elements and its significant role in human health[1] Trace elements are crucial to virtually all biochemical and physiological process . they are present in tissues only in minute quantity micrograms to micrograms per grams of weight tissue of their iron , chlorate, iodine , copper, zinc, manganese, molybdenum, selenium , chromium, fluorine, silicon, strontium , cadmium, nickel, tin and vanadium are now thought to be essential for animal life. The signs of deficiency may be range in degree from an important of biochemical function to death and essential trace element may or not be practically important to human nutrition. Grapes is compared to milk in nutrition elements but even there are some proportion which is not present in milk .It is one of the rich fruits house good in body building . Some scientist regard it as complementary groups to enzymes.

Varity experimented models have shown that nutritional deficiencies or imbalance of trace elements such as chrome, iron, vanadium, copper and zinc results in elevation of serum levels of cholesterol[2]. XRF technique is one of the methods employed to

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determine the elementals in biological samples .

This method is multi elemental method , nondestructive and cheap comparing with other methods.XRF has been used for the determination in our laboratory. concentration of Na, Mg, Al, K, Si, Ca, Mn, Fe ,S, and P as major elements Ti ,Cl,Rh and Sr as minor elements and Cu, Zn, V, Cr, Ca, as trace elements in the tea samples collected from markets [3] .The group seed servers cultivar is(Aluminum prance, cuircles muscle or harburg Althouse analysed by nortein oil, oil tare ,usfall composition and element content. All results at micro and macro amounts of the elements [4] Major and Trace elements K, Ca, Mg , P, Na, as major Br, Sr ,Mo, Fe, Cu, Ni, Ba , Mn , Zn, Rb, Sn as ultra trace elements were more determent using XRF technique[5] .

To complete the total Iraqi food angle programe which has been started since 1987 Cd- 109 a mention of radioisotopes sources . The elements concentration of K,Fe, Cu, Zn, and Sr miler determined using XRF system . Results show that high concentration of K,Fe , Sr and Ge concentration beet and celery affer from location to another . [6]

Radioisotopes Cd-109 and Fe-55 has been used for the determination of Ca, Na, Mg , Cl , K in lraqi's date samples [7] . Our investigative consistent collecting different origion grape and grape seeds and analysis of these samples using the well established methods. Then contact element were determent using XRF technique and the results were disused .

XRF is one of the powerful technique for angles of trace elements in biological samples and other materials especially for low Z number elements . XRF generated by bombarding matter with high- energy particles such as electrons or alpha particles or X-ray photons . when an atom is go bombarded, an electron is ejected from one of inner shells of the atom .this vacancy is immediately filled by an electron from a higher energy shell, creating a vacancy in that shell that is , in turn , filled by an electron from a yet higher shell.

X- ray technique has been employed for the analysis of Iraqi vegetables such as okra ,carrot , cab-badge ….etc. [8] . Qeadhuns has determined the trace elements in different types of vegetable using XRF technique [9] .It was very high value of K, Ca, P,Mg, Fe, Na and Mn from sugar and oil grape is one of the fruits that regicidal as one of this type of fruit [7]. It is important for near discares are central Narre system [10].

It has been used in disorders liver and spleen clear to the presence of suger in it which grape is regarded as fast food as having nutrition value and used to prevent kidney problem it is also content of compound which is resemble to insulin therefore it is always advanced to here a special of grape which is high content to organic and inorganically the green grape is used to treat the thought and in rejecting headache .

Materrial and Methods:

Sample preparatren

Grape and grape seeds has been collected from Abo Ghraib of Baghdad City. The samples were kept in the oven (vector types) at 60 ºC for 2 hours and drying . the dried samples were graned to fine hours genius power using an electrical agate mortor. The samples were prepared in pellets of a diameter of 32mm.

Analysis

A Germany system was used for the analysis containing Si(Li) flash type detector which does not

need liquid nitrogen for cooling ,The system can be operated at 25 ºC it has a source as tube from radium window using three targets (Pd, Ti, W) to provide X-ray with different energies in order to cover the large range of spectrum using vacuum system with pressure 10mm Hg helped in getting more efficiency of analysis especially for higher elements the total exposure time is 900 sec for three targets (300 sec for each target). Then all information about the data analysis or spectrum of the samples are driven from a computer that added to the system .

Results and Discussions:

Eleven samples of grapes and their seeds were collected and treated according to prouder recommended by our laboratory for the perpose of getting a role samples ready for analysis table.(1).

Table -2- gives the concentration of elements Na, Mg, Al, Si, P,S, Cl,K,Ca and Zr as major elements . Table -3- shows the minor elements Fe , Sr , Mo , I , Ba and V in grape fruits samples , and the detection limite of each elements .

Table -4- gives the concentration of Ti , Cr , Mn , Co , Ni , Cu , Zn , Br and Rb as a trac elements . Table -5- gives us the concentration of major elements Na , Mg , Si , P , S , Cl , K , Ca and Sr in the grap seeds . While table -6- present the concentration of Al , V , Cr , Zn , Fe , Mo , I , Ba , Mn , and Sr as minor elements detected in grap seeds . Table -7- present trac and altratrace elements detected in the grap seeds , it gives the concentration of Cr , Co , Ni , Cu , Pb , Ag , Cd , Sn , Sb , W , Te , V and ultratrace elements Br , Pb , and Th in these grap seeds .

Major elements deformed for grape samples show values for Na only in the sample ZK.1 (table-2)which give a value of 0. 205% may give a concentrate value of Cl, S, P,Si and Al all gave a very low value all between 0.01 - 0.154 % Potassium give a concentration value between 0.717 - 1.608 % of all elements, the minor elements Fe , Sr, Mo , l , Ba and V gave a concentration value less than 1mg/g in all the analyzed samples except at ZK-2, which gave a value of 1.246 mg/g. For trace elements which were investigated using the same method of analysis chromic show a value of 3.7-9.9 ppm or (µg/g) which for in 4.8-6.9 ppm it was reported to be Cu between 2.9-8.9 ppm this a good indicator for guardians Co were arranged to (0.6-2.0) ppm , Br(0.2 - 1.2) ppm while Zn gave account rater range 1.9-15.4 ppm . The above returned results showed that grape are not highly concentration with the elements present in the field where they grown(tables 2-4).

One can see (table -5) regarding samples grape seeds of the elements determented Na , Mg , Si , P , S , Cl , K , Ca , Sr, all these elements were in the concentration values are higher for Mg, P, S,K and Ca which concentration values for the Na ,Si , Cl ,Sr are found to be lower than the above mentioned . the minor elements Al , V, Cr,Zn,Fe,Mo , I , Ba ,Mn,and Sr gave a concentration value less than 1mg/g in all samples(table-6).

Trace elements in the seed of the grape chromic gave a value of 16.4 for sample SZK-7, Rb value give a value of 10.9 ppm for sample SZK-8. For the other elements Cu , Sn , Sb ,Te , give values higher than the range 5-10 ppm , while the other elements Co , Ni , Rb , Ag , Cd , gave less than 5 ppm , Te give a value of 8.2 – 5 ppm . Br , Pb and Th where found at concentration lower than elements determined the concentration values range 0.5 - 3 ppm (table-7).

This methode improved the ability of analysis for multi-elements

determination of elements in the sample , which is giving a dictionary values for the content grapes and their seed . Grapes is well known as a medicine for certain deseases .

Table (1) Signs employed for the samples recognization

Samples	Grapes Symbols	seeds
Kamali	ZK-1	SZK-1
Rishmo	ZK-2	SZK-2
Shadasoda	ZK-3	SZK-3
Dise Al nize	ZK-4	SZK-4
Abassi	ZK-5	SZK-5
Shada bayda	ZK-6	SZK-6
Halawani	ZK-7	SZK-7
Romi Aswad	ZK-8	SZK-8
Baitamoni	ZK-9	SZK-9
Aswad Aynoni	ZK-10	SZK-10
King Romi	ZK-11	SZK-11

Table(2) Major concentration for all types 0f grapes %

Element	ZK-1 %	Zk-2 %	ZK-3 %	ZK-4 %	ZK-5 %	ZK-6 %	ZK-7 %	ZK- 8 %	ZK-9 %	ZK-10 %	ZK-11 %	**Detection Limit**
Na	0.205	<0.087	<0.071	0.0136	<0.048	0.073	<0.071	<0.077	<0.120	<0.086	0.090	0.01466
Mg	0.072	0.0101	0.084	0.069	0.035	0.071	0.034	0.096	0.139	0.074	0.078	0.06
Al	0.027	0.171	0.050	0.026	0.010	0.030	0.192	0.035	0.052	0.0196	0.038	0.0317
Si	0.097	0.187	0.137	0.101	0.042	0.0101	0.072	0.133	0.145	0.090	0.116	0.014
P	0.167	0.135	0.102	0.167	0.095	0.115	0.146	0.149	0.154	0.164	0.122	0.00514
S	0.099	0.108	0.068	0.094	0.039	0.068	0.073	0.106	0.209	0.084	0.066	0.001
Cl	0.095	0.084	0.059	0.863	0.038	0.034	0.037	0.036	0.107	0.089	0.049	0.001
K	1.212	0.0918	0.904	1.213	0.717	0.836	1.196	1.652	1.608	1.232	0.965	0.0124
Ca	0.127	0.128	0.110	0.111	0.038	0.073	0.0107	0.138	0.070	0.111	0.113	0.0057
Zr	bdL	bdL	bdL	bdL	<0.05	<0.05	<0.05	bdL	<0.05	bdL	0.002	0.00008

Table (3) Minor elements concentration for all types of grapes(mg/g)

Element	ZK-1	ZK-2	ZK-3	ZK-4	ZK-5	ZK-6	ZK-7	ZK- 8	ZK-9	ZK-10	ZK-11	Detection Limit
Fe	0.084	1.246	0.0131	0.067	0.054	0.075	0.052	0.078	0.093	0.057	0.069	0.0011
Sr	0.020	0.017	0.015	0.021	0.010	0.013	0.015	0.014	0.018	0.015	0.016	0.00005
Mo	0.015	0.014	<0.014	<0.014	<0.017	<0.021	<0.016	<0.013	<0.02	<0.002	<0.014	0.0002
I	0.024	0.019	0.025	0.023	0.036	0.047	0.021	<0.013	0.023	<0.017	<0.018	0.0003
Ba	0.032	0.061	0.025	0.029	<0.045	<0.039	0.048	0.040	<0.034	<0.034	<0.035	0.00025
V	0.012	0.011	0.008	0.010	<0.005	<0.005	0.010	0.007	0.015	0.010	0.007	0.001

Table (4) Trace elements concentration for all types of grapes(µg/g)or (ppm)

Element	ZK-1	ZK-2	ZK-3	ZK-4	ZK-5	ZK-6	ZK-7	ZK-8	ZK-9	ZK-10	ZK-11	Detection Limit
Ti	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	0.00015
Cr	4.9	<5.0	9.9	5.0	4.2	3.7	<4.6	<5.4	5.5	<4.9	<4.3	0.0002
Mn	4.8	7.3	6.4	6.9	3.3	5.6	4.0	5.7	4.2	6.4	7.1	0.00012
CO	0.6	1.3	1.0	1.2	0.8	0.9	1.1	1.3	1.4	2.0	1.0	0.001
Ni	0.6	3.0	1.5	0.7	0.4	<0.7	<0.8	1.1	12.1	0.6	0.8	0.0001
Cu	5.0	6.0	4.8	5.1	2.9	4.3	3.4	8.9	4.0	4.1	3.3	0.0002
Zn	6.5	15.4	8.2	5.8	2.6	3.2	3.2	2.9	3.4	1.9	2.8	0.00098
Br	1.2	0.9	0.6	1.2	0.0	1.0	1.0	0.2	0.7	0.9	o.9	0.00006
Rb	4.4	2.2	3.6	1.9	2.9	<7.0	3.1	29.8	3.8	2.5	<3.0	0.00005
Sn	<4.2	<3.7	<3.7	<4.8	<5.3	<3.7	<4.0	<3.5	<0.7	<5.1	<5.2	0.00001
Sb	<6.2	<5.6	<5.2	<6.1	<8.0	<8.0	<4.4	<4.8	<9.0	<6.1	<7.3	0.00008
Te	<9.5	15.9	6.9	<10	<11	bdL	bdL	bdL	bdL	bdL	bdL	0.0001

Table (5) Major elements concentration for all types grape seeds

Element	SZK-1 %	SZK-2 %	SZK-3 %	SZK-4 %	SZK-5 %	SZK-6 %	SZK-7 %	SZK-8 %	SZK-9 %	SZK-10 %	SZK-11 %
Na	O.091	0.083	0.090	0.086	0.092	0.079	0.082	0.097	0.086	0.097	0.10
Mg	0.235	0.253	0.196	0.268	0.232	0.239	0.246	0.247	0.194	0.2	0.193
Si	0.019	0.031	0.016	0.016	0.0081	0.021	0.007	0.007	0.017	0.002	0.067
P	0.381	0.295	0.361	0.323	0.424	0.325	0.310	0.416	0.286	0.475	0.377
S	0.230	0.211	0.262	0.181	0.201	0.185	0.190	0.266	0.179	0.257	0.246
Cl	0.032	0.020	0.024	0.030	0.020	0.016	0.016	0.019	0.025	0.023	0.020
K	0.646	0.244	0.490	0.599	0.630	0.486	0.478	0.637	0.412	0.557	0.361
Ca	0.875	1.08	0.965	0.906	0.764	0.802	0.764	0.637	0.977	0.923	1.308
Sr	0.01	0.012	0.012	0.0111	0.008	0.010	0.010	0.010	0.010	0.010	0.014

Table (6) Minor elements concentration for all tayps seeds of grapes(mg/g)

Element	SZK-1	SZK-2	SZK-3	SZK-4	SZK-5	SZK-6	SZK-7	SZK-8	SZK-9	SZK-10	SZK-11
Al	O.030	0.230	0.167	0.082	0.032	0.030	0.028	0.060	0.087	0.035	0.288
V	0.010	0.013	0.005	0.007	0.008	0.010	0.008	0.015	0.015	0.007	0.014
Zn	0.012	0.012	0.069	0.011	0.010	0.01	0.008	0.014	0.01	0.01	0.0145
Fe	0.050	0.086	0.069	0.044	0.050	0.055	0.035	0.064	0.047	0.050	0.086
Mo	0.016	0.018	0.019	0.018	0.016	0.022	0.019	0.019	0.016	0.020	0.025
I	0.017	0.022	0.022	0.025	0.018	0.025	0.020	0.019	0.019	0.021	0.03
Ba	0.033	0.034	0.045	0.043	0.038	0.049	0.042	0.040	0.039	0.040	0.059
Mn	0.012	0.086	0.022	0.044	0.058	0.015	0.035	0.069	0.011	0.050	0.086
Sr	0.093	0.012	bdL	bdL	bdL	bdL	bdL	bdL	bdL	bdL	bdL

Table (7) Trace elements concentration for all tayps seeds of grapes(µg/g)

Element	SZK-1	SZK-2	SZK-3	SZK-4	SZK-5	SZK-6	SZK-7	SZK-8	SZK-9	SZKI-10	SZK-11
Ti	bdL	bdL	bdL	7.20	bdL	bdL	8.3	bdL	bdL	bdL	10.4
Cr	5.00	13.2	4.70	4.90	4.60	3.70	16.4	4.8	11.0	4.5	21.0
CO	1.2	2.51	12.21	0.80	1.10	0.90	0.80	1.10	0.50	1.50	2.20
Ni	1.3	2.40	10.6	1.90	0.70	1.50	8.10	1.50	0.30	1.60	4.10
Cu	9.2	8.70	14.2	8.3`1	7.80	7.50	6.80	17.7	7.90	9.90	8.90
Rb	1.80	1.01	1.50	1.70	8.41	1.7	9.39	10.9	1.8	1.9	1.8
Ag	3.00	4.509	3.90	4.8	4.10	5.40	3.7	370	4.40	4.70	6.10
Cd	3.90	4.40	4.40	4.70	4.40	6.10	4.40	4.80	4.40	5.30	7.80
Sn	5.5	7.10	5.10	5.10	4.8	6.9	7.00	5.80	8.10	5.20	11
Sb	6.00	7.70	6.8	7.70	7.50	8.7	7./40	5.80	7.80	8.20	10
W	1.5	1.5	1.5	1.40	1.40	1.3	1.3	1.50	1.4	1.3	1.5
Te	8.2	12.0	11.5	13.0	11. 0	13.0	4.2	300	39	40	59
Br	800	800	500	1000	500	500	700	1000	600	500	1800
Pb	<600	2400	300	1300	1600	800	3300	700	2500	3000	1000
Th	<600	1100	800	500	900	800	500	400	1200	1800	1000
V	< 0.7	1.50	2.3	2.3	2.20	1.80	2.00	1.70	1.30	1.30	1.20

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تحليل فواكه العنب وبذورها باستعمال تقنية XRF

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الخلاصة:

العنب وبذوره مهمة جدا في الدراسات البيئية والصحية .لذا يهدف هذا البحث الى ايجاد نوعية وتراكيز العناصر الموجودة في فاكهة العنب وبذوره باستعمال تقنية الاشعة السينية المتفلورة (XRF). وقد تم جمع نماذج العنب من منطقة ابي غريب في بغداد اما البذور فقد تم الحصول عليها من نماذج العنب المجمعة . تحمل هذان النوعان خطوات عمل مركزة للحصول على النموذج الذي يصبح جاهزا للتحليل. بينت نتائج التحليل بان العناصر Na , Mg , Al , Si , P , S , Cl , K , Ca , Sr هي العناصر الرئيسية في حين مثلت العناصر V , Fe , Sr , I , Ba كعناصر ثانوية وقد تراوحت تراكيز العناصر البقية من 10 ppm – 5 للعناصر Sp , Te Cr , Cu , Sn , . واقل من 5 ppm للعناصر Co , Ni , Rb , Ag , Cd .

اما نتائج تحليل نماذج البذور للعنب قد بينت تواجد Na , Mg , Si , P , S , Cl , K , Ca , Sr كعناصر رئيسية واعطت قيم للكروم , الروبيديوم , القصدير والانتيمون (10 ppm – 5) . في حين اعطت Cd , Ag , Co , Ni , Rb (اقل من5 ppm).