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Analysis of Heavy Metals and Acidity In The Metal Cans And Cardboard Cans In Some Orange Juice.

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ABSTRACT

This study include general examination of three types of different origin and orange juice at the rate of sample, the results showed that acid (pH) in theall these allowed to the specific standard. And salts of calcium is 135 ppm in juice B and 8.6 ppm of magnesium in the juice A, for heavy metals the highest rate of lead 0.16ppm recorded in juice A, 1.5 ppm of copper in juice B, 3.5 ppm of iron in the juice A,0.9 ppm of zinc in the juice B, 0.02 ppm of aluminum in each of the sappy B and A, 0.01 ppm of cobalt in the juice A, 0.05 ppm of nickel in the juice B, 159.2 ppm sodium in B juice, but for the acids, organic that the highest rates were 3.1 ppm of Malic acid in B, 166.5 ppm of the acid in the juice the ascorbic C 238.5 ppm of the acid in the lemon juice B.

Keywords: Orange juice, Food additives, Heavy metals, Organic acids, Atomic absorption, Titration Chemistry, pH.

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INTRODUCTION

Orange juice colour ranges from pale yellow at the beginning of the season to red-orange at the end of the season. Apart from the stage of maturity, colour of citrus fruits in general depends on several factors, such as, species, variety and climate, among others [1]. Oranges colour is mainly due to carotenoids, which belong to one of the main classes of natural pigments. Their distribution in the plant kingdom is extremely wide, although they can also be found in animals, algae, bacteria, moulds and yeasts. In this context, Reardon et al. (2009) showed the rapid restructuring of the agrifood industry between 1980s–2000, which included a shift from public to private standards, a shift from spot market relations to vertical coordination of the supply chain using contracts and market inter-linkages, and a shift from local sourcing to sourcing via national, regional, and global networks [2]. This modernization was adopted to reduce costs and increase quality in order to strategically position companies in a sharply competitive marketplace.

Similarly, Shepherd (2007) emphasized the rapid transformation occurring in marketing systems, as traditional marketing channels are being replaced by coordinated links between farmers, processors, retailers and others. Moreover, consumers are becoming more demanding in terms of quality and safety and demographic and income trends are leading to increased demand for convenience foods, together with assurances of product safety [3]. Thus, the adoption of systemic Neves (2013) by International Food and Agribusiness Management Association (IFAMA) [4]. According to Onsekizoglua p. etal, (2010) VMD techniques is very efficient for the concentrated juice presents nutritional and sensorial quality very similar to concentration of Fruit Juices by Vacuum Membrane Distillation [5]. Shukla S. etal (2013), show the original juice specifically regarding the retention of bright natural color and pleasant aroma, which are considerably lost during thermal evaporation [6].

Dooley, R. (2001), the food industry has increased enormously and it's now the second biggest industrial market for membranes after water and wastewater treatment including desalination [7].

Then conducted in unshaved locale orange orchard located in Diyala Province during the years of 2003 and 2004. Afoliar sprays at full bloom from Urea (2%), Iron (150 mg/L), Copper (50 mg/L), GA_3 (30 mg/L), BA (20 mg/L), (GA_3+BA) (30+20 mg/L), Vapor gard (0.1%), Wax-Oil (Liquid paraffin) (0.1%) were used and shading. Orange drink only needed to contain 6 percent orange juice and could also modify to specified optional ingredients [8]. It is observed concentration of juice by vacuum membrane distillation have better result on allowing one component of a mixture to permeate the membrane freely, while hindering permeation of other components like antioxidant properties and the sensory properties of the fruit juices. Thus vacuum membrane distillation has been proved and Optimization of pectin acid extraction from passion fruit peel (Passiflora edulis flavicarpa) using response surface methodology [9], Extraction and Qualitative Assessment of African Sweet Orange Seed Oil [10] are study The levels of some heavy metals in lime, lemon and orange fruit juice from the Abura-Asebu- Kwamankese District of the Central Region of Ghana were determined. Samples were randomly collected from selected farms in the district. The samples were digested with HCl and HNO3 mixture (aqua regia) and H2O2 and analysed for AS, Pb, Cr, Ni, Fe, Zn and Cu using Inductive Coupled Plasma (ICP) Atomic Emission Spectrophotometer [11]. The sources of these metals in food crops include discharges onto agricultural lands, wastewater from industries and sewage, application of some pesticides, metal aerosol deposition from the atmosphere due to emissions from vehicles and other sources. These trace metals are also translocated from the soil solution through the roots to other parts of the plant [12-14].

MATERIALS AND METHODS

This experiment was conducted snapped different samples of orange juice from Baghdad for the month of February. The aim of the research was to determine the sample by analyzing for individual acids and trace metals in orange juices from different brands. The total number of samples which were analyzed was 10 for each type (Original metal cans, and Original and Dalia Carboard cans).

The kinds of impurities found in orange juice in the markets should be highlighted. This can only be done by more research work like this to test the deviation from the standard and by media coverage. The government should start campaigning against food adulteration, forcing the producers to change their methods of production. [15].

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Acid Determination

The total acidity of orange juice was determined by titrating a known volume of juice with a standard solution of NaOH with phenol as an indicator, the result being expressed as citric acid.

pH was determined using an electronic pH meter (Crison, model Micro pH 2002, S.A., Barcelona, Spain), and acidity by titration with NaOH 0.1N [16]. Vitamin C was determined by the method of Bessey and King [17].

Chemical analysis for different samples in according with standard methods followed by:-

A) Mixing sample by food mixer then become spontaneous. Drying for samples juice in the furnace at 20^0C for determines the percentage of steaminess for samples. Then grind the dry sample by mortar that becomes for metals analysis, then keep after grind in poly ethylene bags with identification cards for all pieces.
B) Put 1g from sample to550^0C, then added HCl (2N) and complete the volume to 50ml by using 0.1 N HCl, then can be measured [18].
C) Estimate the samples by using atomic absorption spectrophotometer, the study consist three types of orange juice according to table (1).

Table (1)- Type of Orange Juice, Original and Capacity

Type	Original	Capacity
Metal cans Original	Saudi Arabia(KSA)	240ml
Cardboard Cans Original	Saudi Arabia(KSA)	250ml
Cardboard cans Dalya	Kuait	250ml

D) Measure the acidity by PH for all orange juice and measure acidity.

Determination of Heavy Metals

Metal measurement was with a Perkin-Elmer model 2380 Atomic Absorption Spectrometer, double beam and deuterium background correction. Hollow cathode lamps of Pb, Cd, Co and Se were used at specific wave length of every metal. Measurements were operated against metal standard solutions [19].

This quantitatively determined the composition of heavy metals like Pb, Cu, Mn, Ni, Zn & Fe in 24 different fruit juice samples. Analysisof these juice samples for the presence of heavy metals were carried out using Atomic Absorption Spectrophotoscopy (AAS). That shows high level of some of the heavy metals, although they are within the legal limits [20].

RESULT AND DISCUSSION

The results showed Entries in the table (2) that there are differences in acid ratios, all of which are pH and malic acid and Ascorbic acid for all types of juices under study where the pH in the juice (C) higher values and amounted to 3.8ppm and thus was the approach to Asaran A and B were all within the Iraqi specification [21] did not exceed the value (3.8 ppm). As for malic acid highest values of the rates recorded in the juice (A) and worth (2.9ppm) as well as all of the sappy B and C record (3.1-2.7ppm), respectively, and are these values are not permitted within the Iraqi standard quality of the product, while Ascorbic acid recorded values allowed within the specification of Iraq in 1989 and this value (300ppm) in the juice was worth C (16 5.5ppm) Both juice no record of A and B concrete results of this acid, and the Ascorbic acid record high values and all kinds of juices and the highest value in the juice C was (238.5ppm) which is not within the specification of Iraq in 1989 and for all kinds of juices. With regard to all species except the pH it was within the permissible in the Iraqi specification limits and thus These results are identical to those stated in [22] in terms of recorded values high acids measured in the juices under study.

As for the mineral salts for each of the saline calcium CaCl and magnesium MgCl recorded the highest values of the salts of the CaCl in juice B amounted to (135ppm) and all the juices were within the limits of the specification allowed Iraqis and this value (300 ppm), while MgCl scored its highest value in the juice B reached (8.6ppm), juice A (7.6ppm), and juice C (8.0 ppm) were all kinds of juices that are not permitted within the boundaries of good product and this value (zero ppm) Iraqi Specification 1989 [23].

The heavy metals were among the table (2) that the measured elements are Pb, Cu, Fe, Zn, Al, Co, Ni, and Na began the element Pb has recorded its highest values in the juice A amounted to (0.16ppm) and all kinds of juices were within the Iraqi specification (1989) and this value (0.3ppm) and record copper, according to the table (2) its highest value in the juice B amounted to (1.5 ppm) and also had all kinds of juices within the Iraqi specification (1989) and adult (5ppm) Fe values were recorded the highest ratios in the juice A (3.5ppm) and thus be part of a good standard and allowed Iraqis (15ppm). Regarding Zn highest values he has scored in the juice B (0.9ppm) were all kinds of juices among others and allowed the border where (0.2 ppm) Iraqis in 1989, scoring the Al highest percentages him in sappy A and B (0.02ppm) scored Co highest ratios his juice B (0.05ppm) is all of the elements Al, Co, Ni and for all kinds of juices that are not permitted within the boundaries of the Iraqi Specification (1989) (zero ppm). And record Na highest proportions of his juice B (159.2ppm) were all kinds of juices within the specification allowed for Iraqis (300 ppm) for the year 1989, the results of the current study was matching with numerous studies in terms of registration and then highest ratios of heavy elements which [24] and [25].

Table 2: Compare between the standard specification and laboratory for orange juice:-

Examination Recorder	Orginal (ppm) (A)	Orginal Cardboard(ppm) (B)	Dalya(ppm) (C)	Standard specification (ppm)
PH	3.4-3.8 3.6	3.4-3.9 3.7	3.3-3.6 3.8	2.7-3.8
CaCl	120-130 125	132-138 135	119-121 120	300
MgCl	8.3-8.9 8.6	8.2-8.5 8.4	7.9-8 8.0	_____
Pb	0.12-0.2 0.16	0.08-0.1 0.09	0.02-0.06 0.04	0.3
Cu	1.2-0.2 1.3	1.01-1.9 1.5	1.2-1.3 1.3	5
Fe	2.7-4.3 3.5	2.2-2.9 2.6	1.9-3.2 2.6	15
Zn	0.7-0.9 0.8	0.8-0.9 0.9	0.02-0.03 0.03	0.2
Al	0.01-0.02 0.02	0.01-0.02 0.02	0.01-0.002 0.006	_____
Co	0.009-0.01 0.01	0.001-0.007 0.004	0.003-0.004 0.004	____
Ni	0.01-0.03 0.02	0.04-0.06 0.05	0.002-0.003 0.003	____
Na	138.2-140.3 139.3	157.7-160.7 159.2	148.3-160.9 154.6	300
Malic acid	2.8-2.9 2.9	2.9-3.3 3.1	2.5-2.9 2.7	From best production
Ascorbic acid	- 	- 	123-210 166.5	300
Citric acid	215-250 232.5	234-243 238.5	200-210 205	From the best production

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