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REVIEW ARTICLE

Determination of some heavy metals concentration in selected liquid soap, fruit and vegetable sterilizers used in Baghdad, Iraq

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ABSTRACT

Detergent is one of the pollutants that poses significant threats to ecological systems. Detergents can also dissolve in wastewater and negatively impact the efficiency of wastewater treatment facilities. They are used for a variety of functions, most notably hygiene, and are an integral aspect of human life. This means that there are a variety of routes by which detergent components can reach the environment. In this Study, twenty-three detergent samples from local markets in Baghdad. The aim of this study is to investigate the concentration of heavy metals Cobalt (Co), Chromium (Cr),Lead (Pb),Zinc (Zn), Iron (Fe) and Cadmium (Cd) in some detergents using Atomic Absorption Spectrophotometer. The results of the concentration of heavy elements in the studied samples showed that Cobalt was range (0.023-0.069), Cr range (1.280-2.163), Pb range (0.08-0.390), Zn range (0.14-0.940), Iron range (1.720-9.683) and Cd range (0.004-0.047(. Those who are frequent consumers of these detergents may be exposed to risks that can add up over time and have an impact on their health.

Keywords:

INTRODUCTION:

Because of the many contaminates discharged into natural ecosystems, industrial activities are increasingly recognized as a major source of environmental contamination. Industrial pollutants are hazardous to human health and the environment due to their properties [1;2]. Among the industrial contaminants, a considerable attention has been concentrated on the environmental problems arising from production and consumption of detergent components [3]. The term “detergent” is commonly referred to synthetic soap replacements, but in general, any component that can be used as a cleaning agent is known as a detergent [4]. Detergents are surfactant or a mixture of surfactants that have the cleaning properties in solution. The solution helps in the removal of dirt or other foreign material from contaminated surfaces [5]. Because pure water cannot remove oily or ground-in stains, detergents and soap are needed to clean. This allows oil and water to interact, allowing oil filth to be removed during rinsing. Because they work on a surface, detergent chemicals are sometimes referred

to as surface-active or surfactants [6]. There are large amounts of detergent discharged to the environment and subsequently release many organic pollutants and heavy metals, which damage the environment and human health. It is therefore important to investigate the content of hazardous substances in detergents [5].

Excessive use of these detergents may result in heavy metal buildup. This became necessary in order to assess the quantity of various heavy metals in these detergents, as well as the harm they may represent.As a result, the goal of this research is to assess the presence of some heavy metals in a variety of soap brands in Baghdad.

Materials and Methods

Samples collection

Twenty-threeliquid soap samples were collected from different local markets in Baghdad city, Iraq, in 2023

Preparation of standard solution

The acid digestion method used in this study was based on procedures recommended by Nnorom *et al*. with some modifications as follows. (i) A weight of 2.0 g of sample was dissolved in a mixture of 6 mL of high quality concentrated 69% nitric acid (HNO3; Merck, Darmstadt, Germany) and 4 mL of concentrated 37% hydrochloric acid (Scharlau, Spain) in a porcelain crucible and heated on a hotplate to near dryness. (ii) An aliquot of 15 mL HNO3 (1.00 M) was added to the digested sample and filtered through a Whatman No. 40 filter paper. (iii) The digested sample was transferred quantitatively into a 25 mL volumetric flask and then diluted with deionized water. (iv) Each digested sample was evaporated at 70 °C to about 1 mL and transferred into a polyethylene flask and diluted with 25 mL deionized water. (v) Blank was treated in the same procedure.

Results

Table (1) Mean concentration of heavy metals in all samples

No.samples	Samples name	Co	Cr	Pb	Zn	Fe	Cd
1	**TouriElegance**	0.058	1.696	0.210	0.716	3.286	0.047
2	**Activex (antibacterial)**	0.041	1.363	0.080	0.220	3.213	0.020
3	**Lux (hand wash)**	0.050	1.423	0.143	0.180	1.720	0.023
4	**Arix fruity (hand wash)**	0.069	1.970	0.186	0.313	4.100	0.010
5	**Elegance (hand wash)**	0.051	2.163	0.153	0.153	2.536	0.007
6	**Eipuer (liquid soap)**	0.045	1.560	0.160	0.260	5.750	0.006
7	**Cherry blossom**	0.032	1.413	0.176	0.333	8.133	0.032
8	**Lifebuoy**	0.023	1.623	0.246	0.940	6.716	0.016
9	**+O (hand wash liquid)**	0.090	1.526	0.383	0.200	5.280	0.007
10	**Hand soap nourish–Tight**	0.040	1.280	0.246	0.623	4.133	0.026
11	**DermoViva**	0.061	1.516	0.253	0.400	4.603	0.019
12	**Fin(hand wash)**	0.066	1.590	0.180	0.266	9.683	0.013
13	**Soft wave (hand wash)**	0.062	1.446	0.166	0.163	4.766	0.007
14	**Palmolive (Olive extract)**	0.190	1.573	0.390	0.146	4.466	0.006
15	**berry**	0.068	1.590	0.173	0.200	5.006	0.007
16	**Dial**	0.045	1.716	0.090	0.266	6.360	0.007
17	**Fal(fruit and vegetable wash)**	0.052	1.966	0.250	0.266	6.266	0.005
18	**Al kafeel (fruit and vegetable wash)**	0.057	1.360	0.08	0.14	3.000	0.004
19	**Cocofamily professional**	0.030	1.530	0.08	0.266	4.760	0.004

20	**Cameo**	0.052	1.780	0.200	0.160	5.133	0.005
21	**Gipoy**	0.073	1.633	0.166	0.186	5.4	0.006
22	**Palmolive (honey extract)**	0.051	1.670	0.080	0.850	8.100	0.009
23	**Cameo (liquid wash)**	0.060	1.366	0.140	0.340	2.900	0.041

DISCUSSION

The overall concentration of Co, Cr, Pb, Zn, Fe and Cd in all samples were(0.069,2.163,0.390,0.940,9.683,0.041) PPm. Table (1) show that the Co range is (0.023-0.069) and Cobalt is capable of being absorbed via the skin and it harmful to the cardiac muscle, excessive exposure can result in heart muscle damage (toxic cardiomyopathy) [7], while the Cr range (1.280-2.163) and Human exposure to sufficiently high chromium concentrations might cause damage due to toxic, genotoxic, and carcinogenic effects[8], According to the Agency for dangerous compounds and Disease Registry (ATSDR), chromium is one of eight metals in the top 50 dangerous compounds in the world, and the WHO has categorized chromium as carcinogenic to humans[9]. Pb range (0.08-0.390), Pb toxicity leads to dysfunction of the kidney, reproductive system, and brain while chronic damages are caused to the CNS and PNS.Lead also inhibits the synthesis of hemoglobin. Pregnant women with low calcium, iron or zinc levels are prone to the effects of lead accumulation [10]. Zn range (0.14-0.940) as compared to several other metal ions with similar chemical properties, zinc is relatively harmless, and its enter through the skin to blood circulation. Only exposure to high doses has toxic effects, making acute zinc intoxication a rare event [11].

Several metals and their compounds may produce unpleasant reactions when they come into touch with the skin [12]. Iron range (1.720-9.683) and when the body absorbs large amounts of iron and saturates iron-bound proteins in the body, this problem leads to an increase in iron stores and thus hemochromatosis, which can be observed through the transformation of skin color to bronze [13], Cd range (0.004-0.047)Cadmium is harmful to humans at extremely low levels, and long-term exposure causes renal failure characterized by tubular proteinuria. Sub chronic inhalation Exposure to cadmium and its compounds may result in renal damage [14].

Conclusion

The results obtained shows that Cr and Fe were higher in all the detergents, while other heavy metals in this study were less concentration in the detergents. The high quantity of heavy metals in the detergents indicates that people who use thedetergents on a daily basis are in danger since the heavy metals might accumulate and induce various health problems in the users.

Recommendations

1- Determine local standard specifications for detergents to be used as a guide in evaluating its quality.
2- Attention to the study of detergents and their harmful substances and that the frequent use and diseases they cause to consumers.

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