

ESTIMATE THE CONCENTRATIONS OF SOME HEAVY METALS IN SOME SHOES POLISH SAMPLES

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Abstract:-

The contents of some heavy metals (Cadmium, Copper, Lead and Cobalt) were determined in some shoes polish samples collected from local markets at El – Beida City, Libya. The flame atomic absorption was used to estimate the concentrations of the selected metals. The results of the studied metals showed that the cobalt contents were ranged between (0.93-2.69 µg /g), while the contents of lead were ranged between (1.21-1.84 µg/g). The contents of copper were fluctuated between (0.42-0.84µg / g) and the contents of cadmium ranged between (0.35 -0.56 µg /g). The high values of the selected heavy metals were related to the lead (pb), (Average value 1.48 µg / g) and cobalt (average value 1.89 µg / g). On the other side the low value was related to cadmium and copper, with averages (0.11 and 0.19 µg / g) respectively.

Keywords:- Heavy metals, Shoes polish.

INTRODUCTION

Various substances have been used as shoe polish for hundreds of years, starting with natural substances such as wax and tallow. Modern polish formulas were introduced early in the 20th century and many of those original formulations are still in use today. Today, shoe polish is usually made from a mix of natural and synthetic materials, including naphtha, turpentine, dyes, and gum in addition some of metals as lead, copper, silver, etc., using straightforward chemical engineering processes. ⁽¹⁾ Shoe polish is usually flammable, can be toxic, and, if misused, can stain skin. It should be used in a well-ventilated area with care taken to protect clothes, carpet and furniture ⁽¹⁾. The popularity of shoe polish paralleled a general rise in leather and synthetic EPH - International Journal of Applied Science | ISSN: 2208-2182120 shoe production, beginning in the 19th century and continuing into the 20th. The World Wars saw a surge in demand for the product, in order to polish army boots. Usage Shoe polish is applied to the shoe using a rag, cloth, or brush. Shoe polish is not a cleaning product, and therefore the footwear should be both clean and dry before application. A vigorous rubbing action to apply the polish evenly on the boot, followed by further buffing with a clean dry cloth or brush, usually provides good results. Another technique, known as spit-polishing or bull polishing, involves gently rubbing polish into the leather with a cloth and a drop of water or spit. This achieves the mirror-like, high-gloss finish sometimes known as a spit shine or bull which is especially valued in military organizations⁽²⁾. Despite the term, saliva is less commonly used as the vehicle or diluents with polish than is water. Polishes containing carnauba wax can be used as a protective coating to extend the life and look of a leather shoe ⁽³⁾

Shoe polish may be purchased pre-soaked into a hard sponge, which can be used to buff leather without needing to apply any additional polish to either the leather or the sponge. This is usually known as an applicator ⁽⁴⁾. A number of companies that manufacture shoe care products also sell a liquid shoe polish in a squeezable plastic bottle, with a small sponge applicator at the end. To decrease its viscosity, bottled polish usually has a very low wax content. There are many products closely related to shoe polish, but not strictly considered as such heavy metals. Other chemical products may be used to clean and shine shoes in particular whiteners for white shoes, and a variety of sprays and aerosols for cleaning and waterproofing suede shoes. A banana peel can also be used to effectively shine shoes, but it is not recommended ⁽⁴⁾. Although shoe polish is primarily intended for leather shoes, some brands specify that they may be used on non-porous materials, such as vinyl. The polish is generally the same colour as the shoes it will be used upon, or it may be neutral, lacking any intrinsic colour. This study was carried out to determine some heavy metals in some shoes polish samples collected from El –Beida markets. The heavy metals including: (Lead (pb), Cobalt (Co), Cadmium (Cd) and Copper (Cu)).

MATERIALS AND METHODS

Sampling

Five types of shoes polish were collected from different markets at El –Baida city (Libya) during summer 2017. The samples were shown in Table (1).

Table (1): The studied samples of shoes polish

Sample Name	Type (Color)
Silver (China)	Black
World (Turkish)	Black
Lode (Egyptian)	Brown
Silver (China)	Brown
Lode (Egyptian)	Black

Samples preparation:

Aquatic 0.5 g of each sample was designed by using 5 ml of concentrated nitric acid (HNO₃), until dryness. Then the 10 ml of distilled water was added to the sample, after heating for few minutes. The samples were filtered, then the samples were transferred to measuring flask 100 ml and completed to the mark of measuring flask by distilling water.

Determination of the studied Heavy metals

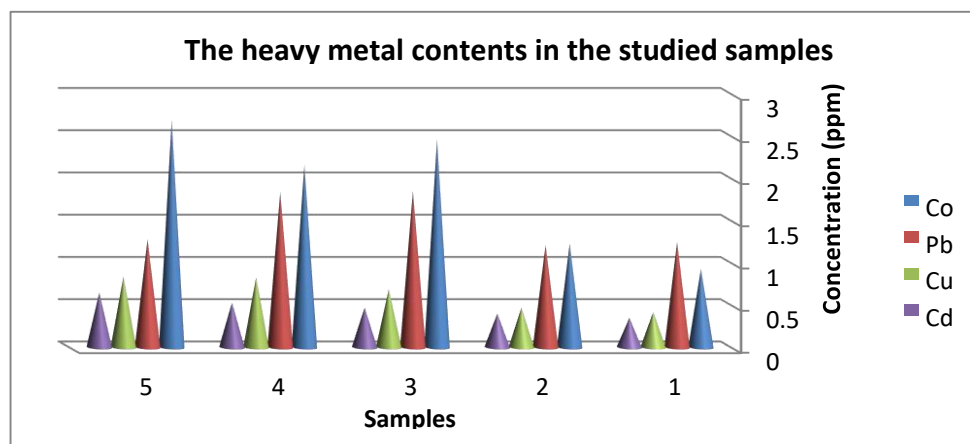
The selected metals were determined by Atomic absorption (Type thermo company) at central lab of El –Mukhter center, Libya, the concentration was expressed as (µg / g).

RESULTS AND DISCUSSION

The contents of the studied metals were illustrated in Table (2) and represented in Figure (1).

Table (2): The contents of heavy metals in the shoes varnish samples.

Element Samples	Co	Pb	Cu	Cd
1	0.93	1.25	0.42	0.35
2	1.23	1.21	0.47	0.40
3	2.46	1.85	0.69	0.47
4	2.16	1.84	0.83	0.53
5	2.69	1.28	0.84	0.65
Average	1.89	1.48	0.65	0.48
±SD	0.77	0.32	0.19	0.11

**Figure (1): The contents of the studied metals in the selected samples.**

DISCUSSION

The results of the studied metals showed that the cobalt contents were ranged between (0.93-2.69 $\mu\text{g/g}$), while the contents of lead were ranged between (1.21-1.84 $\mu\text{g/g}$). The contents of copper were fluctuated between (0.42-0.84 $\mu\text{g/g}$) and the contents of cadmium were ranged between (0.35-0.56 $\mu\text{g/g}$). The high values of the selected heavy metals were related to the lead (pb), (Average value 1.48 $\mu\text{g/g}$) and cobalt (average value 1.89 $\mu\text{g/g}$). On the other side the low value was related to cadmium and copper, with averages (0.11 and 0.19 $\mu\text{g/g}$) respectively.

The primary ingredients found in shoes polish are wax, oil, alcohol, and dye. Though, the heavy metals are not an ingredient of the shoe polish, it might be present as impurities in the color additives. The heavy metal contents in lipsticks and probably other cosmetics may cause harm to consumers ⁽⁵⁾. The risk can be reduced by international cooperation between toxicologists to investigate of the safety of polish and personal care products and their ingredients on a daily basis. Shoe polish contains chemical substances which can be absorbed through the skin, or inhaled. When handling shoe polish, one should ideally wear gloves, and stay in a wellventilated area. Shoe polish should be kept out of reach of children and animals. It can stain the skin for a protracted period of time, and will cause irritation to the eye if there is direct contact ⁽⁶⁾.

In our study, the studied shoes polish samples were found to have dangerous high lead contents, therefore we suggest authorities to monitoring safety checks on polish products. The safety assessment of polish products such as shoes polish and their ingredients is a complex issue that is not only affected by scientific questions, but also by the responsible regulatory organizers as well as consumers, health ministry and governmental organizers, there is an urgent to halt importing unsafe shoe polish as Lead and other heavy metals in shoes polish might not cause an immediate health problem but its accumulative effects due to repeated application cannot be eliminated ⁽⁷⁾. Shoe polish with a shoe brush, Shoe polish consists of a waxy colloidal emulsion, a substance composed of a number of partially immiscible liquids and solids mixed together in addition to some heavy metals ⁽⁸⁾.

It is usually made from ingredients including some or all of naphtha, lanolin, turpentine, wax (often Carnauba wax), gum Arabic, ethylene glycol, and if required a colorants, such as carbon black or an azo dye (such as aniline yellow) ⁽⁸⁾. It typically has a specific gravity of 0.8, is negligibly soluble in water, and is made of between 65 and 77% volatile substances usually naphtha. The high amount of volatile substances means that the shoe polish will dry out and harden after application, while retaining its shine.

CONCLUSION

According to the results which obtained in this study the selected shoe polish for this investigation, there are different values of heavy metals, but the study recorded high levels of lead comparing with the other studied heavy metals (Cd, Co and Cu).

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