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Determination of some heavy metals impurities in facial cosmetic products available at markets of Khartoum state

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Abstract
This study determined the concentrations of some heavy metals present in facial make up products available in Khartoum markets of Sudan.
The samples included eight lipsticks, eight face powder and eight eye shadow of various prices. the samples were digested and analyzed for heavy metals (copper, lead, cadmium, nickel, zinc) using atomic absorption spectrophotometer(AAS) .the range of the concentrations in lipsticks (1,081-9,551)ppm,(21,04-39,40)ppm,(1,24-16,16)ppm,(0,031-1,008)ppm for Cu, Pb,Ni, Cd- respectively, and zinc not detected. The range in face powder(0,898-6,78)ppm, (18,99 -44,488)ppm,(0.008 -0,189)ppm,(0,988 -4,58)ppm for Cu, Pb, Cd,Zn- respectively, and nickel not detected. The range in eye shadow (0,081-1,00)ppm,(13,42 - 74,2)ppm,(0.128 -0,612)ppm for Cu, Pb, respectively, zinc and nickel not detected.
The results showed that the concentration of heavy metals in all samples were below of US FDA limits for cosmetic products' exception that lead concentration in samples was higher than US FDA limits recommendation.

Keywords: FDA, face powder, zinc, Khartoum, AAs

Introduction
A facial cosmetic is substance or preparation intend to be placed in face like (lipsticks, eye shadow, face powder. Etc) Make up is applied to enhance the beauty of the face, to highlight the good features and hide the bad ones. Most of cosmetics are mixtures of some surfactants, oil and other ingredients, which are required to be effective, long – lasting, stable and safe to human use. Makeup products contain particles of heavy metals such as (Cd, Ni, Pb, Cu,Zn**),**as impurities in the pigments added during the manufacturing process or released by the metallic devices used during the manufacturing cosmetics.

Heavy metals toxicity of facial cosmetics
Dermal exposure is expected to be the most significant rout for facial cosmetics products since the majority of make-up applied to the skin. heavy metals like cadmium, lead have been described as highly toxic and carcinogens, exhibiting wide-raining toxic effects on bodily systems, including the nervous, endocrine, renal, musculoskeletal, immunological, and cardiovascular systems. on the other hand, copper, zinc and nickel,have been classified as micronutrients and are essential in very low concentration for the survival of all forms of life, but when present in higher concentrations can cause various types of metabolic anomalies.

Disadvantages of make-up
- Make up made skin oilier
- It can create skin cancer
- •extra make up can damage eyes

Materials
Hydrochloric acid HCL, Nitric acid HNO_3, De ionizer water**.** All chemicals used were of analytical-reagent grade. Deionizer water was used throughout. Standard (various concentrations) and model solution were prepared by dilution of single element 1000 mg in litter, solutions.
The concentrations of heavy metals were determined in an air-acetylene flame. Instrumental parameters were optimized in accordance with manufacturer's recommendations.

Methods
Sample preparation
All the samples were digested using the standard method. 5 g of homogenized sample were weighed and carefully transferred into flask and wet digested with 10 ml of acid (HNO_3 65% and $H_2O_2$30%). Digestion process were run on a hot plate set at temperature 70 □C for 1 hrs or until the formation of white fumes, marking the end of the digestion process. On completion of digestion, the samples were allowed to cool to room temperature, then the samples were filtered (Whatman filter paper) and made up to 10 ml with distilled water into a calibrated flask.
The clear solution was used for metal quantification.

Analysis of makeup products
After preparation the samples were directly analyzed, by AAS .the result shown in tables1, 2 and 3 for the lipsticks', Eye shadow and compact powder respectively.

Results and Discussion
Heavy metals which can be absorbed in the body through dermal absorption, for long time may cause various health problems. This study focused to determination of some heavy metals present in facial make up available at Khartoum state markets, the results showed the concentration of heavy metals in the lipsticks are summarized in tables (2, 3, 4) .from results it can be seen the concentration of copper in the lipsticks were highest the

face powder and eye shadow, but the all concentrations according to FDA recommendation.

The concentration of lead in all samples were highest the FDA acceptable levels and the concentration of lead in eye shadow were highest the face powder and lipsticks.

The concentration of nickel and cadmium in all samples were according to FDA recommendation.

Zinc not detected in all samples expect face powder and the concentration within FDA acceptable levels.

Tables and figures

Table 2: Concentrations of heavy metals in lipsticks

Sample	Cu	Pb	Ni	Cd	Zn
A1	5,374	25,83	1,24	0,472	ND
A2	1,081	30,01	3,05	0,223	ND
A3	4,188	41,88	4,25	0,404	ND
A4	9,021	32,05	6,70	0,031	ND
A11	6,45	22,55	11,24	0,238	ND
A12	9,55	39,30	16,16	0.187	ND
A13	7.77	21,04	5,88	1,008	ND
A14	3,96	25,80	3,18	0.512	ND

Table 3: Concentrations of heavy metals face powder:

sample	Cu	Pb	Ni	Cd	Zn
B1	3,561	30,84	ND	0.042	3,692
B2	1,031	37,81	ND	0.018	2,812
B3	3,013	40,88	ND	0.189	4,581
B4	6,78	26,52	ND	0.023	1,118
B11	8,12	32,02	ND	0.017	0,988
B12	2,33	24,13	ND	0.053	1,812
B13	4,08	21,77	ND	0.131	1,395
B14	0,898	18,99	ND	0.008	3,213

Table 4: Concentrations of heavy metals in eye shadow

Sample	Cu	Pb	Ni	Cd	Zn
C1	0,412	74,2	0,472	ND	ND
C2	1,001	51,08	0,821	ND	ND
C3	0,512	39,9	0, 128	ND	ND
C4	0,132	41,08	0, 318	ND	ND
C11	0,081	53,01	0,52 1	ND	ND
C12	0,713	33,98	0,6 12	ND	ND
C13	0,182	13,42	0,4 21	ND	ND
C14	0,098	28,81	0,223	ND	ND

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