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Determination of Heavy Metals in Hair Chalk Using Inductively Coupled Plasma Atomic Emission Spectroscopy

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Structured Abstract

Background: Hair chalk is a popular temporary hair coloring cosmetic that offers a convenient way for individuals to change their hair color without the commitment of permanent dye. Heavy metal concentration, including iron (Fe), zinc (Zn), cadmium (Cd), mercury (Hg), and magnesium (Mg), has raised concerns about possible health dangers related to its use. To ensure customer safety, precise scientific techniques, such as inductively coupled plasma atomic emission spectroscopy (ICP-AES), are employed to precisely measure these heavy metal concentrations in hair chalk, as exposure to excessive quantities of these metals over time might be harmful to one's health.

Methods: The samples were weighed 0.1g and triplicated. 7ml HNO_3 were added and left overnight. The sample were heated until fumes stopped. The sample were left to cooldown. 3ml H_2O_2 was added and heated again until solution is reduced. The sample were filtered and marked up in 100ml volumetric flask. 10ml sample solution was pipetted into 50ml volumetric flask and marked up with deionized water. The sample was transferred in centrifuge tube and was run in the ICP AES instrument.

Results: Based on the ICP result, heavy metal in sample of all 3 brand (Faber Castle, Daiso, Mini Hair Chalk) were successfully determined. The result shows that in Faber Castle and Mini Chalk got the present of Iron, Zinc, Cadmium, Mercury and Magnesium meanwhile Daiso Hair Chalk got no Cadmium and Mercury metals since the intensity of both metals were low and not detected. But based on the intensity calculation, magnesium was the biggest concentration compared to the other metals in Daiso Brand.

Conclusion: In a nutshell, Hair chalk samples were effectively extracted for further examination using the wet digestion procedure. The following determination of iron, zinc, cadmium, magnesium, and mercury was made possible by this method's successful breakdown of the hair chalk's intricate matrix. The concentrations of these components in the hair chalk samples were disclosed by the analytical findings. By guaranteeing customer safety and product quality, this study advances knowledge of the elemental composition of hair chalk and its compliance with regulatory requirements.

Keywords: Hair chalk, heavy metals, concentration, intensity.

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