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SHORT COMMUNICATION

Fingerprint Powder Formulation based on Azure II Dye

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ABSTRACT

A novel fingerprint-dusting composition based on an organic dye, azure II, has been prepared. The proportion of the dye in the formulation is 1 per cent, the remaining being an adhesive mixture of meshed aluminum, boric acid, talc, and barium carbonate. The powder gives sharp and clear prints on a wide range of absorbent and non-absorbent surfaces, including multicoloured ones. Weak, chance prints may be detected under ultraviolet light.

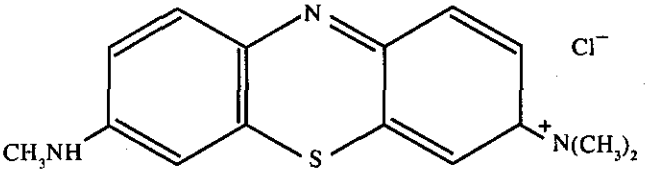
Keywords: *Fingerprint technology, azure II dye, fingerprinting , fingerprint powder, fingerprint detection, black powder*

1. INTRODUCTION

The application of finely divided materials and subsequent removal of excess powder by brushing, blowing, or tapping has been the universal method of intensifying fingerprints on various surfaces[1,2]. The technique relies on the mechanical adherence of fingerprint powder to the moisture or oily components of the skin ridge deposit. Regular fingerprint powders consist of a resinous polymer for adhesion and a colorant for contrast. Over the years, it became evident that powders containing toxic salts posed a health hazard[3,4]. As a result, the organic-based fingerprint powders became more popular[5,6].

Besides its conventional utility in crime detection, fingerprint technology finds applications in areas related to defence[7]. The science of fingerprinting helps in establishing the identity of war victims whose bodies are badly mutilated. It also helps in the identification of prisoners of war who escape under disguise. It assists intelligence agencies in dealing with cases of espionage or counter-espionage[8]. Further, when strategic areas are located at high altitudes–as in the case of our country–it becomes very difficult to lift fingerprints by conventional methods. The reason being that under cold conditions, the sweat glands secrete infinitesimally meager amount of perspiration that may be fixed for developing fingermarks.

In an earlier communication[9], the properties of fingerprint-dusting formulations based on phloxine B dye were investigated. The utility of a novel formulation, which contains 1 per cent of azure II dye has been reported in this paper. The azure II dye is a mixture of equal parts of azure I (A) and methylene blue (B) and imparts luminescent characteristics to the composition.



(A) AZURE I

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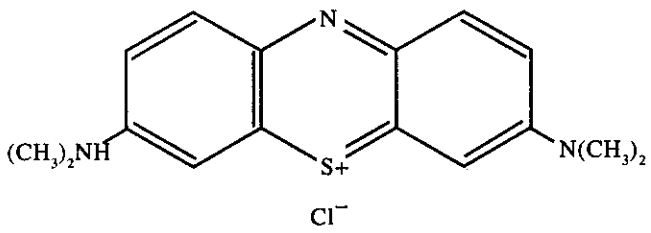

(B) METHYLENE BLUE

2. EXPERIMENTAL PROCEDURE

Azure II was procured from Aldrich Chemical Co, USA and used without further purification.A solution of Azure II (0.05 g) was prepared in a mixture of alcohol (30 ml) and water (1:1). A mixture of meshed aluminum (2.50 g), boric acid (1.00 g), talc (1.00 g) and barium carbonate (0.45 g) was added to the dye solution. The contents were stirred vigorously and then allowed to dry at room temperature for 4-7 days. The dried mass was ground with a mortar and pestle, and the fine powder was stored in a tightly stoppered vessel. The composition was applied to the surface impinged with the latent fingermark with a camel hair brush. The excess powder was blown off. The surface was then photographed.

The fingerprints detected by the novel formulation were compared with those developed by commercial black powder[R]. For this purpose, a latent impression was impinged on the relevant surface. The surface was then cut into two halves. One half was developed by azure II-based formulation, while the other half was treated with the commercial composition.

3. RESULTS & DISCUSSION

The formulation detects latent fingerprints on both absorbent and non-absorbent surfaces. It is specifically useful on multicoloured articles. It gives optimum results at short wavelength ultraviolet range, both for white and multicoloured surfaces. However, the luminescent characteristics of the formulation are retained only if the concentration of azure II dye is 1 per cent.

Good quality prints have been lifted from lamination sheets. Thus, the present method may be extended for obtaining fingerprints on laminated documents, such as archeological scripts, certificates, driving licenses, and identity cards.

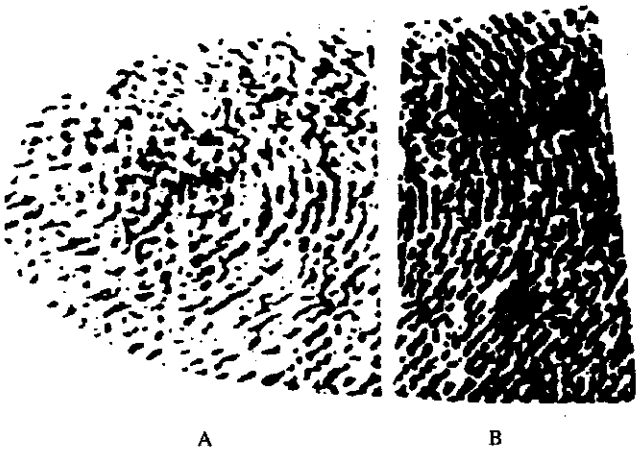

Figure 1. Fingerprints developed on paper using (A) azure II-based formulation and (B) commercial black powder.

Fingermarks have been visualised on obverse and waxed, reverse sides of postal stamps. Prints may also be developed on polythene bags commonly used for carrying household items. Normally, the

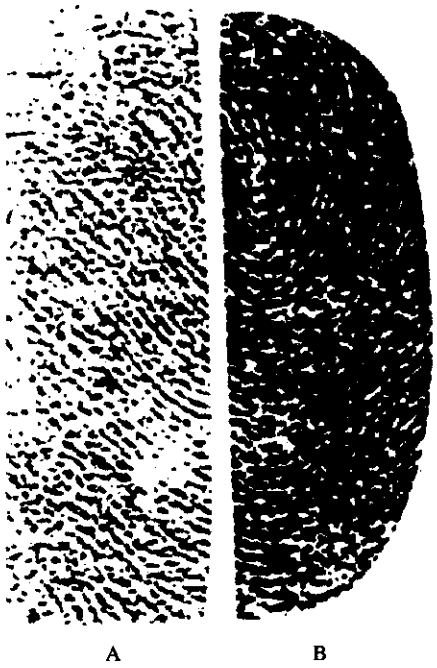

Figure 2. Fingerprints developed on lamination sheet using (A) azure II-based formulation and (B) commercial black powder.

cyanoacrylate fuming technique has to be used for polythene surfaces[10].

Other surfaces on which an unscrupulous element is likely to leave fingerprint impressions include glassware; steel handles, knobs and almirahs; bakelite switches and switchboards; bonechina and porcelain crockery; polished furniture; and enameled utilities like cars, washing machines and refrigerators. The present formulation gives good results on all these surfaces.

Figure 1 represents a latent impression on paper. Part (A) has been developed with azure II-based composition and part (B) with commercial black powder. Figure 2 shows the corresponding prints on a lamination sheet. It is quite obvious that the novel powder gives sharp and clear prints than the conventional composition. Azure II is a mixture of cationic metachromic thiazine dyes and is commonly used as a blood stain[11].

4. CONCLUSION

Azure II-based powder is a versatile composition, which can detect latent fingerprints on a wide range of surfaces, absorbent and non-absorbent; white and multicoloured. Weak imprints may be observed under short wavelength ultraviolet radiation. The formulation is cost-effective and non-toxic.

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