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Case Report

Identification of Rhodamine Dye in Rape Assault: A Case Study

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Abstract

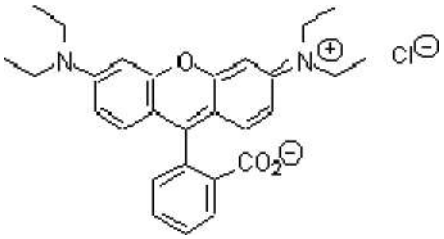
Due to rise in crowds naturally there is fall in cultural values and escalation in crimes. Crime against women is on the rise especially sexual crimes. Though crime is prevalent in every country and society, most of them .either goes undetected or unreported. Forensic chemistry plays an important role in helping early detection, providing expert scientific reports at earliest, which will result in quick trial and instant administration of justice to victims.

In the present communication a case of rape assault is reported in which Rhodamine B a cheap red dye used as a coloring agent in Holi festival identified by thin layer chromatographic analysis, ultraviolet spectroscopy and FT-IR analysis.

Keywords: Dye; Color; Rhodamine; Rape Assault.

Introduction

The examination of physical evidences by a forensic scientist usually undertaken will be for comparison or identification. Identification has as its purpose the determination of the physical or chemical identity of a substance with as absolute certainty as existing analytical technique will permit. A comparative analysis subjects a suspects and a control specimen to the same tests and examination for the ultimate purpose of determining whether or not they have a comman origin. Rhodamin B dye is a cheap easily available in local markets can be a vital clue in criminal cases as happened in this case. Rhodamin B is red/brown or green crystalline compound with chemical name is Ammonium, (o-carboxyphenyl)-6-(diethylamino)-3H-xanthen-3-ylidene) diethyl-chloride having melting point: 165ÚC, molecular formula: $C_{28}H_{31}N_2O_3Cl$**,** molecular Weight**:** 479.02 the chemical structure of Rhodamine B is shown below.



Chemical structure of Rhodamine B

Brief study of case

At the time of Holi festival parents of a thirteen year old aged girl lodged a complaint in police station that an unidentified intruder who painted his face with some dye attacked on girl with an intention to molest and rape the girl. According to girl the boy was of age of eighteen year wearing blue coloured jeans and white lined shirt having height five feet eight inches. A suspects subsequently arrested on the same day after one hour searching by I.O. was found

to have similar characteristics along with red coloured dye material sticked on the face of girl and similar type of greenish red particles was also found on the face and cloths of accused. These articles were seized and sent to the forensic science laboratory for the identification and comparison of these stains and dye material.

After through analysis the presence of Rhodamine B (a cheap dye) mostly used at the time of Holi was confirmed by FT-IR analysis on the sent articles and the contact of culprit to the victim was confirmed.

Experimental

All the reagents were of analytical grade distilled water were used as and when required. A standard Rhodamine B procured from local market for comparison study. A dry crystalline material scrapped from victims / accused clothing's was directly used for study.

Thin layer Chromatography

A standard TLC plated was coated with slurry of silica gel G in water to a uniform thickness of 0.25 mm the plate was activated by heating in an oven at 100ËºC for about 1 hour an aliquots of Rhodamine B 0.01-0.5mg in ethanol along with scrapped material were spotted on to the plate which was developed with butanol, acetic acid and water 40:10:50 (upper organic layer were used for development) in a presaturated TLC chamber to a height of 10cm. The plate was removed from the chamber dried in air in which red self-locating spot appeared at Rf 0.88 in white background.

UV Spectroscopy

The UV spectra were taken as Shimadzu UV spectrophotometer model 2550 the scrapped material shown ë max at 542.75 nm with strictly accordance to ë max of standard Rhodamine B dye sample.

F.T.I.R. Spectroscopy

F.T.I.R. spectra were recorded on Perkin Elmer one F.T.I.R. spectrophotometer instrument in the range 400 cm^{-1}-4000 cm^{-1} of electromagnetic radiation using KBr pallet method prepared by handset die about 100 mg of spectroscopic grade dried KBr stored in decicator was used every time KBr was pulverized

Fig. 1: FT-IR Spectra of dye from exhibit

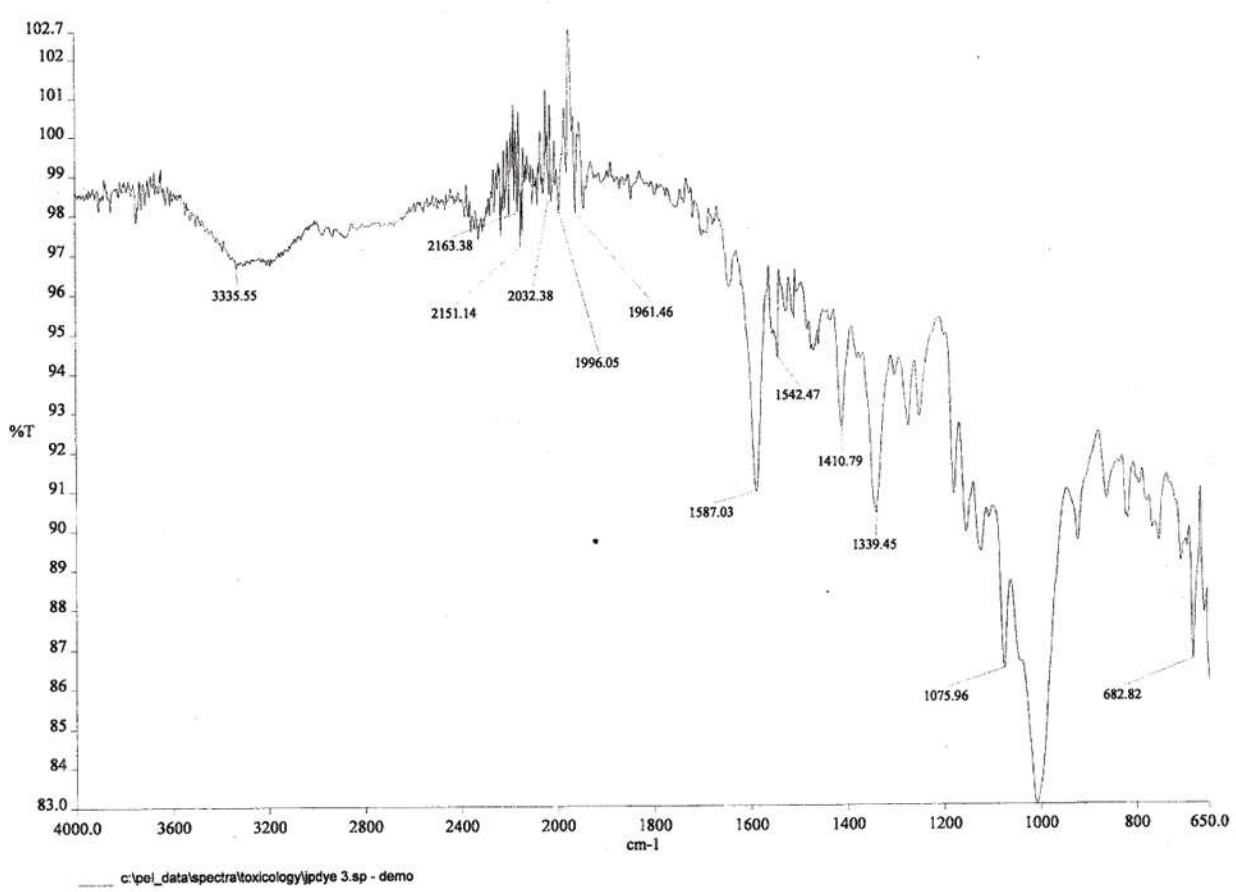
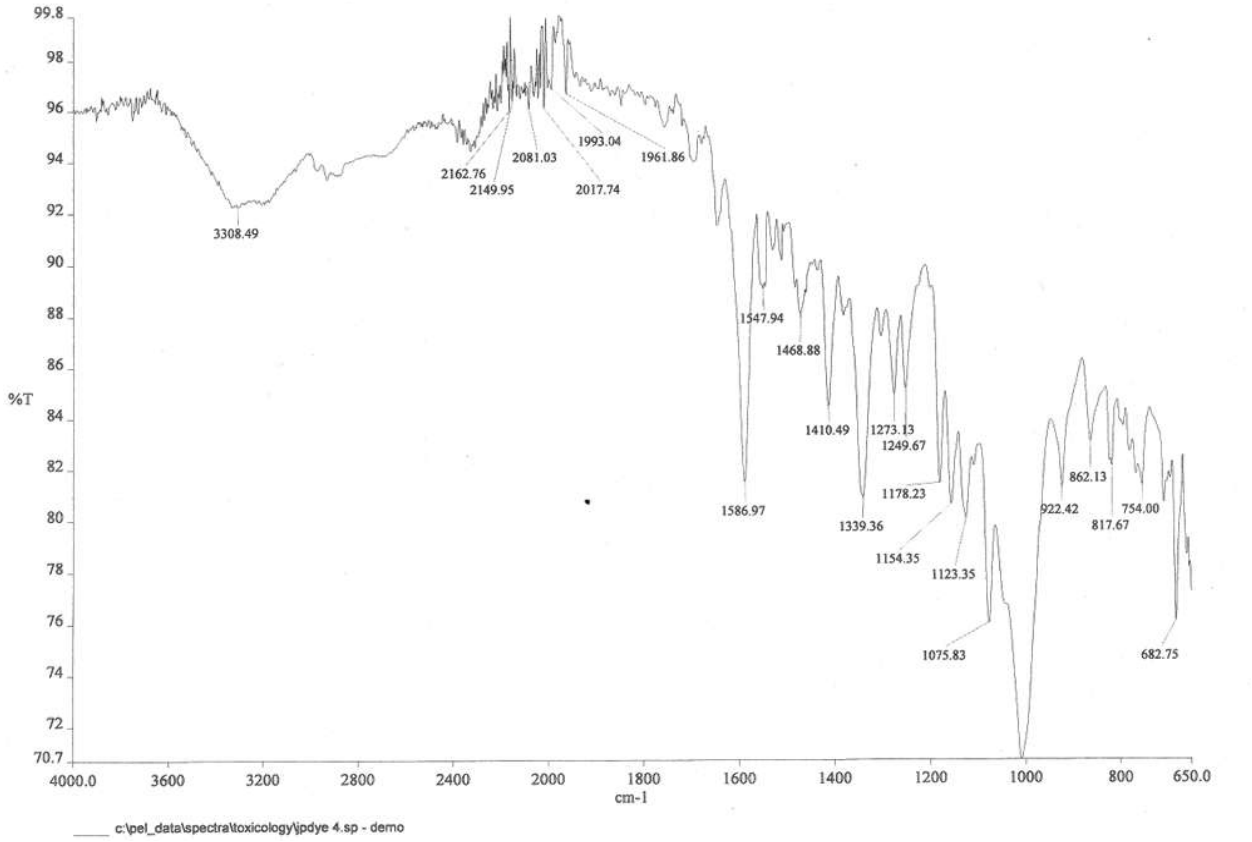


Fig. 2: FT-IR Spectra of standard Rhodamine B dye



using agate pastel mortar about 1mg of the dye was also mixed and ground thoroughly infrared spectra of such mixture were recorded and the obtained peaks at 3335.55, 2163.38, 2151.14, 2032.38, 1996.05, 1961.46, 1587.03, 1542.47, 1410.79, 1339.45, 1075.96, 1000 and 682.82 with strict accordance of structure of Rhodamine B.

The similar results were also obtained with scrapped sample of dye.

Result and Discussions

The above method is rapid, sensitive and simple in day-to-day forensic analysis of chemical dyes since little information is available on analysis of this type of dye so it will add new avenue in analysis of dye samples in day-to-day analysis work.

Acknowledgement

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