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Case Report

Identification of unknown dye in disguise liquor- A case study

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ABSTRACT

Illegal liquor is locally brewed alcohol at illicit spots, that is sold at cheap prices at license-less shops. The evading of tax is responsible for its cheap price which further accounts for its widespread consumption in rural areas and by the wokring class in urban areas. As a matter of fact, two-thirds of the alcohol consumed in the country is illegal hooch made in remote villages or smuggled liquor, this popularity among the working class is why illegal liquor is a lucrative business and is practiced through out country.
The present communication deals with detection and identification of Triaryl methane group dye identified in the illicit liquor sample by physical, chemical, thin layer chromatographic and instrumental method of analysis like U.V. visible spectra, FTIR spectra.

1. Introduction

The pyridine bases, caoutchouine and methanol are suggested by the Indian excise authorities as denaturants for preparing denatured spirit. The obnoxious odour and toxicity render the ordinary denaturated spirit unfit for human consumption known as denatured spirit this liquor is misused for potable purpose in India, claiming hundreds of live every year.[1] The forensic science laboratory regularly receives these liquor samples for analysis confiscated by police authorities on the contrary criminals disguise the investigating authorities by adding some more unknown adulterants which were happened in this study. The present communication deals with detection and identification of Triaryl methane group dye identified in the illicit liquor sample by physical, chemical, thin layer chromatographic and instrumental method of analysis like U.V. visible spectra, FTIR spectra.

2. Brief Study of Case

The police station Nishatpura district Bhopal MP received an information that a person is selling illicit liquor to varify this police procured two quarters from them with the help of puinter and than police searched the house and recovered the drum which was filled with the violet coloured liquid having peculiar smell police inquired about that liquid but according to that person it was a normal coloured solution kept for colouring the cloths but police seized sample of that liquids and sent for analysis with some quarries like is it a illicit liquor? If so what kind of chemicals are present in this liquid. After complete chemical, TLC and instrumental analysis of this liquor, the exhibits found positive for ethanol, pyridine and violet colored chemical compound which were identified as crystal violet dye (non permissible caramel dye by excise department) belongs to tri aryl methane group having molecular formula $C_{25}H_{30}N_3Cl$ formula weight 407.996 with molecular structure-1 as below

There are various methods based on paper and thin layer chromatography[2–6] (TLC) for detecting of pyridine and caoutchoucine but very little work as reported on detection and identification of unusual adulterants (dyes) in illicit liquor so it was thought worthwhile to identify the unknown dye in liquor.

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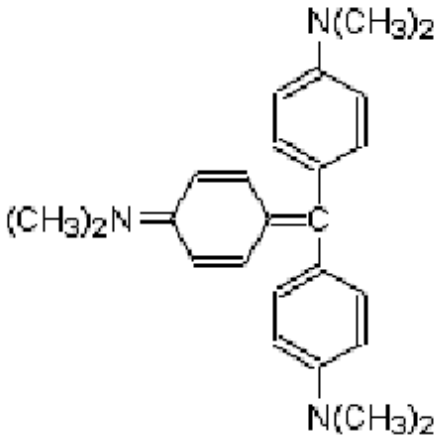

Fig. 1:

Fig. 2: Exhibits sent for chemical analysis

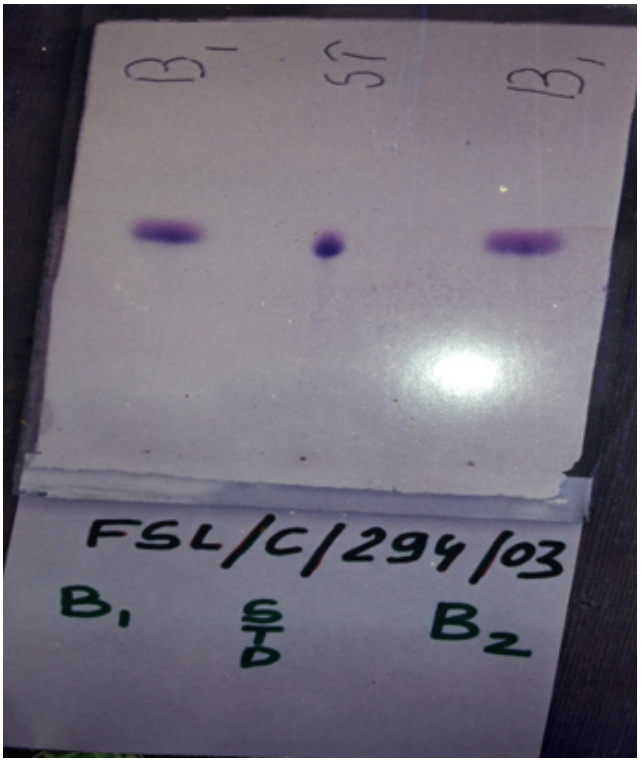

Fig. 3: TLC Plate

3. Experimental

3.1. Chemical and reagents

All reagents were analytical reagent grade distilled water used throughout. A solution of crystal violet dye (1 mg / 10ml) in ethanol was prepared.

3.2. Color Test

The dye persist violet color in acidic medium and becomes colorless in alkaline medium on adding ammonia. The violet color again reappears on adding small amount of acetic acid.

3.3. 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 100°C for about 1 hour an aliquots of crystal violet 0.01 - 0.5 μg in ethanol along with questioned liquor 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 10 cm. The plate was removed from the chamber dried in air in which bluish violet self locating spot appeared at Rf 0.88 in white background.

3.4. UV Spectroscopy

The UV spectra were taken as shimadzu UV spectrophotometer model 2550 the questioned illicit liquor shown λ max at 577 mm with strickly accordance to λ max of standard crystal violet dye simulated sample similarly λ max 262 suggested presence of pyridine in the liquor.

3.5. 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 pulvarised using agate pastel mortar about 1mg of the dye was also mixed and ground thoroughly in case of liquid samples a layer of the oil was made on KBr pallet and infrared spectra of such mixture were recorded and the obtained peaks at 725.81, 742.91, 757.88, 796.66, 828.27, 910.37 with strict accordance of structure 1.

The similar results were also obtained with similuated samples and with illicit liquors.

4. Result and Discussions

The changing of colour of dye in acidic as well as in basic medium is due to the quinanoid and benzenoid structure of dye. This type of dye can easily be used by criminals

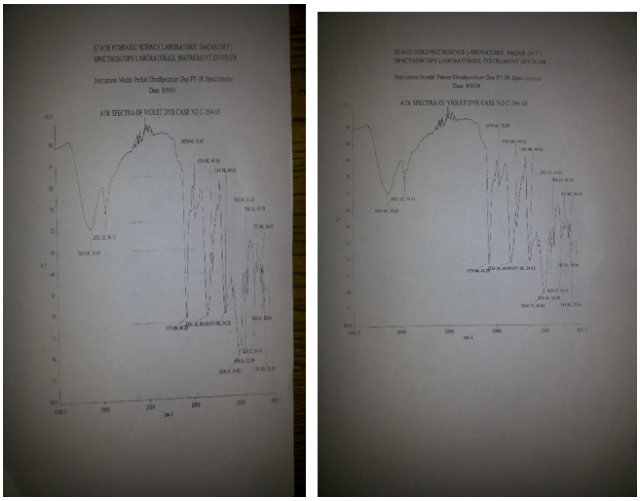

Fig. 4: FTIR Graph

investigating agencies because it is cheap, easily available in local market and better disguising agent for illicit liquor so we suggest investigating agencies/officers that at scene of crime also concentrate on coloured liquids and other chemicals like bleaching powder which can decolourise this type of coloured liquor so we may save several precious lives.

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6. Source of Funding

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7. Conflict of Interest

None.

References

1. Pai PP, Vaidya PV, Joshi SB, Ambade AK. *J Indian Forensic Sci*. 1974;13:10.
2. Mali BD, Ambade KA. Paper Chromatographic Method for Identification and Semiquantitative Determination ofPyridine and α-Picoline in Denatured Spirit, French Polish, and their Derived Preparations. *J AOAC Int*. 1985;68(1):105–7.
3. Jakovljevic IM, Bishara RH, Kress TJ. Thin-layer chromatographic separation of several chloro- and methyl- substituted 2-aminopyridines. *J Chromatography A*. 1977;134(1):238–41.
4. Damani LA, Patterson IH, Gorrod JW. Thin-layer chromatographic separatio and identification of tertiary aromatic amines and their n-oxides. *J Chromatogr*. 1978;155:337–48.
5. Pearse GA, Ericsson M. Separation of isomeric moncyanopyridine and pyridinemonoamidoxime hydrocholorides by thin-layer chromatography. *J Chromatography A*. 1979;177(1):174–6.
6. Stahl E. Thin layer Chromatography. Springer; 1969. p. 618.

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