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TEST FOR DETECTION OR IDENTIFICATION OF POISON

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ABSTRACT

Cases of acute as well as chronic toxicity are increasing in number. Day by day a lot of new poisons in various forms are emerged with the development of human beings. So the new techniques and methods for diagnosis of poisoning is a need. Diagnosis by sign & symptoms is the main key till now. With the help of chemical screenings & thin layer chromatography like techniques, a qualitative diagnosis of majority of poisons can be done. Other highly developed methods like gas liquid chromatography, high performance liquid chromatography, ultraviolet – visible spectroscopy, atomic absorption spectroscopy, etc., possesses high specificity & accuracy for qualitative as well as quantitative estimation of poisons in any sample. Other than this chemical test or color test are also be done in various forensic laboratories and at site of crime. With help of these test type of poison detection becomes more easy.

KEYWORD: Poison, chemical test, color test, forensic laboratories, chromatography, poison detection.

INTRODUCTION

Preliminary screening of drugs are basically done by color test, also sometimes referred to as chemical spot tests, provide with one of leading tools for the presumptive identification of drugs. These color tests are most practically applied to pharmaceuticals and scene of crime residues and, to lesser extent, to biological fluids such as stomach contents, urine etc.[1] In Ayurveda our acharyas also describes the methods of identification of poison. these methods were used at that time to protect the king and others.

हुतभुक तेन चान्नेन भृशं चटचटायते I मयूरकंठप्रतिमो जायते चापि दु:सह:II
भिन्नार्चिस्तीक्ष्णधूमश्च नचिराच्चोपशाम्यति I चकोरस्स्यक्षि वैराग्यं जायते क्षिप्रमेव तु II
दृष्ट्वाअन्नं विषसंसृष्टं म्रियन्ते जीवजीवका: I कोकिल: स्वरवैकृत्यं क्रौंचस्तु मदमृच्छति II
हृष्येन्मयूर उद्विग्न: क्रोशत: शुकसारिके I हंस: क्ष्वेडति चात्यार्थं भृंगराजस्तु कूजति II
पृषतो विसृजत्यश्रु विष्ठां मुंचति मर्कट:I[2] **(सु.क.१/ २९-३३)**

Examination of poisoned material was also be done in animals and birds in ancient era.- After animal experiments our sages conclude that the voice of *kokila* (cukoo) changed, gait of swan gets altered, *bhringraja* bird (domestic crane) becomes exciated, *karkavaku*(cock) hoots loudly, *suka* (green parakeet) and *sarikaa* (mynah) makes long loud sounds. *Chamikara* vomits. *Karandava* (white breasted goose) fly away. Jeevanjeeva birds either dies or faints. *Nakula* (moongoose) gets horripilated. *Vanara*(Monkey) eliminates faeces. *Prushta* (spotted deer) weeps. *Mayoora* (peacock) gets elated.[3,4]

In ancient time detection of poison was also be done according to sign and symptoms appear after ingestion and use of poisoned drugs. e.g-

***Vishjushta tailadi*(poisoned oil)**- used for oil bath produce burning sensation in the skin, perspiration, ulcers, bleed and lacerations. **Poisoned oil for application on head** – produce headache, appearance of nodules, and falling of hairs.[5] **Poisoned comb**- causes falling of hair, headache, bleeding from passage and appearance of cysts on head.[6] **Poisoned wooden foot wear**- causes inflammation, discharge, numbness, and eruption of boils in feet.[7] **Poisoned ornaments**- causes

burning sensation, suppuration and tearing of poisoned material.[8]

Chemical analysis is certainly one of the most significant aspect of forensic science. Almost every piece of evidence produced additional information when analyzed by a chemical procedure. Test used to determine poisonous substances-

1. **Presumptive** test.
2. **Confirmatory** test.

Presumptive test are less accurate and rarely show that the suspected element may be present. Confirmatory test provide an informative identification of substance & query. Presumptive test or the color test is a chemical procedure in which the substance tested for, is acted on a reagent which causes a change in the reagent. Color test may be used to determine the presence of specific compound or general class of compound. The procedure is usually rapid and can be easily performed.

The approach of color test have different mechanisms in terms of underline scientific principles. They both serves a similar function in the field of toxicology.

Some basic test or color test for detection of poison

Test name	Procedure	Result
Marquis reagent test[9]	Place a drop of marquis reagent (prepared by adding 3ml of conc. Sulphuric acid and 3 drops of formalin) on the suspected scene residue or add few drops to stomach contents.	A purple coloration which gradually turns into violet and finally to blue color indicates the presence of **opium** and its derivatives.
Fujiwara test[10]	Dilute 1ml of sample with 2ml of sodium hydroxide solution.	A blue color indicates the presence the presence of
	Add 2ml ferrous sulfate solution. Add sufficient hydrochloric acid to dissolve the ferrous hydroxide precipitate.	**cyanide**.
Reinsch test[11]	Take a copper foil or wire, which is cleaned in nitric acid until the copper acquires a bright surface. Rinse the same with purified water and add 10 ml of conc. Hydrochloric acid and 20 ml of test solution in 100 ml conical flask. Heat on a boiling waterbath in a fume cupboard for 1 hour. Maintain the volume of solution by adding dilute hydrochloric acid as necessary.	Color staining on the copper can be interpreted as follows: • Copper black indicates **antimony** • Dull black indicates **arsenic** • Shiny black indicates **bismuth** • Silver color indicates **mercury**
Trinders test[12]	Add 100 ml of trinders reagent to 2ml urine and mix for 5 seconds.	A violet color indicates the presence of **salicylate**.
Duquenois levine test[13]	Small amount of suspected residue of extract is placed in a test test tube and shaken with 2ml.of a duquenois reagent for one minute and further 2ml of conc. Hydrochloric acid is added, shaken and allowed to stand for 10 minutes. If a color develops, 2ml of choroform is added.	The violet colored layer gives the positive indication of presence of **cannabis**.
Gerrard's test[14]	1-2 ml of 2% mercuric chloride solution in 50% of alcohol is added to a portion of residue of the extract. A red colour develops immediately.	**Hyoscyamine** produces a yellow colour which becomes red on burning, while **hyoscine** does not produce any change of color
Ferricyanide/ ferrocyanide test[15]	To 50 ml of filtered stomach contents or scene residue add 100 ml of aqueous hydrochloric acid (2 mol/L) and 50 ml of aqueous potassium ferricyanide solution (10 gm/l). To a further 50 ml of sample add	A deep blue precipitate with potassium ferricyanide or ferrocyanide indicates the presence of **ferrous**.
	100 ml of hydrochloric acid and 50 ml potassium ferrocyanide solution (10 gm/L)	
FPN test[16]	5ml of ferric chloride solution , 45 ml of 20% solution of perchloric acid and 50 ml of 50% solution of nitric acid is added to make a final solution.	Color ranging from pink to red, orange , violet or blue color indicates presence of **phenothiazines**.

Some other methods for detection of poison are gas liquid chromatography, high performance liquid chromatography, ultraviolet – visible spectroscopy, atomic absorption spectroscopy, etc., possesses high specificity & accuracy for qualitative as well as quantitative estimation of poisons in any sample. Chromatography is a term used to describe the analytical techniques, which separate, the various compounds in a mixture according to relative adsorption potential of their molecules. This technique is used in the analysis of organic substances. The two main systems are: Gas chromatography (GC) and Thin layer chromatography (TLC).[17]

Forensic significance of drug testing-Most cases that arrive in forensic laboratory start with the suspicion that a drug is present. A fatality might be an suicide, homicide or accident, but a toxicological examination must be carried out to assist the investigating officer will not know whether or not any offense has been committed until the results of the toxicological analyses are available.[18] Color test are particularly important to toxicology when a patient is being treated an accident and emergency and clinical symptoms may point towards some forms of poison. In this situation the clinician needs to know as quickly as possible what substance are involved in order to initiate the treatment properly. Color test is the first tool for the presumptive identification of drugs and poison.

CONCLUSION

Forensic science is a boon to the crime field in todays world. With the help of this branch of science it becomes so easy or accurate to solve a mystery of cases like suicidal, homicidal accidental or other crime cases. By using techniques of forensic science we can also identify various poisons. Toxicological clinician needs to know how to identify various poisons and poisonous conditions to treat the patients. Color test or spot test are used in that conditions because it gives instant results. Color test may be used to determine the presence of specific compound or general class of compound. These color tests are most usefully applied to pharmaceuticals and scene residues and to lessor extent to biological fluids such as stomach content, urine etc. They can performed in field by police officers or technician required minimal reagents and give immediate results that can be viewed by naked eyes. In many instances color test can also be used as TLC location reagents applied by process of spraying and dipping. It's a mild step to introduce these techniques to peoples. This article reviews the introduction, application of various color test in field of forensic medicine.

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