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Screening/Spot/Colour test of hallucinogens

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ABSTRACT

Hallucinogens are diverse group of chemicals occurring naturally as well as synthetic. These drugs produce bizarre effects on the mind, such as distortion of time, space, sound, colour, and other sensations. It acts primarily on the central nervous system and interfere with the filtering mechanisms of the mind causing alterations in perceptions, thinking and moods. In India, Forensic Science Laboratories run by Government under the Home ministry usually carry out this. The samples must be analyzed by the forensic toxicologist/chemists/scientist. This article deals with the screening/spot test for hallucinogens. It attempts has been made for screening/spot/colour test of Hallucinogens in a stepwise manner, which can be of handy reference for the forensic toxicologist/scientist/chemist.

1. Introduction

Hallucinogens are the substance that produce an alteration in environmental awareness while the individual maintains the capacity to recognise that what he is experiencing is not real. Hallucinations produced by drugs usually have environmental stimulus which provides the basis for the illusions. The potential hazards from the use of hallucinogens are psychological and includes intense anxiety, panic, depressive and paranoid reactions, mood changes, confusion, and inability to differentiate between reality and fantasy. Sympathetic symptoms may include dilated pupils, hyperthermia, diaphoresis, dizziness, weakness, hyperactivity, muscle weakness, ataxia, altered mental status and coma. Parasympathetic symptoms include salivation, nausea, vomiting, diarrhoea, and hypertension.[1–6]

Most hallucinogens are classified by the United States Drug Enforcement Administration (DEA) as Schedule I controlled substances, meaning they have no known medicinal uses and have a high potential for abuse and physical or psychological dependence. It causes mostly psychoactive, or mind-altering, effects, which can be mild to intense. These effects vary from drug to drug, from person to person, from one drug-taking episode to the next, and can even change dramatically within one time of use.[7–13]

Table 1: Types of hallucinations

S. No.	Types of hallucinations	Examples
1.	Psychedelics	LSD, peyote, mescaline
2.	Dissociatives	PCP, ketamine, DXM
3.	Deliriants	Datura, Jimson weed

These approaches are designed to help the person think differently, change their expectations and behaviours. We have tried to set out standard procedures for screening/spot test for hallucinogens which are easily available and useful for the forensic science laboratory. This article covers the spot test/colour test of bufotenine, diethyltrptamine, dimethyltrptamine, harmaline, harmine, lysergamide, lysergic acid, lysergide, mescaline, methoxyamfetamine, phencyclidine, psilocin, and psilocybine.

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1.1. Bufotenine

1.1.1. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Green to brown colour is observed which indicates the presence of bufotenine.

1.2. Diethyltryptamine

1.2.1. Mandelin test

1. Two ml of extract is taken in test tube.
2. Few drops of mandelin's reagent are added to it.
3. Play of colour is observed from grey to green and finally to yellow which indicates the presence of diethyltrptamine.

1.2.2. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Yellow to brown colour is observed which indicates the presence of diethyltrptamine.

1.3. Dimethyltryptamine

1.3.1. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Orange colour is observed which indicates the presence of dimethyltrptamine.

1.4. Harmaline

1.4.1. Mandelin test

1. Two ml of extract is taken in test tube.
2. Few drops of mandelin's reagent are added to it.
3. Green to brown colour is observed which indicates the presence of harmaline.

1.4.2. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Brown to green colour is observed which indicates the presence of harmaline.

1.5. Harmine

1.5.1. p-Dimethylaminobenzaldehyde test

1. Two ml of extract is taken in test tube.
2. Few drops of p-dimethylaminobenzaldehyde reagent are added to it.
3. Red colour is observed which indicates the presence of harmine.

1.5.2. Mandelin test

1. Two ml of extract is taken in test tube.
2. Few drops of mandelin's reagent are added to it.
3. Blue to green colour is observed which indicates the presence of harmine.

1.5.3. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Orange colour is observed which indicates the presence of harmine.

1.6. Lysergamide

1.6.1. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Brown colour is observed which indicates the presence of lysergamide.

1.7. Lysergic acid

1.7.1. Mandelin test

1. Two ml of extract is taken in test tube.
2. Few drops of mandelin's reagent are added to it.
3. Green to brown colour is observed which indicates the presence of lysergic acid.

1.7.2. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Brown colour is observed which indicates the presence of lysergic acid.

1.8. Lysergide

1.8.1. p-Dimethylaminobenzaldehyde test

1. Two ml of extract is taken in test tube.
2. Few drops of p-dimethylaminobenzaldehyde reagent are added to it.
3. Violet colour is observed which indicates the presence of lysergide.

1.8.2. Mandelin test

1. Two ml of extract is taken in test tube.
2. Few drops of mandelin's reagent are added to it.
3. Grey colour is observed which indicates the presence of lysergide.

1.9. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Grey colour is observed which indicates the presence of lysergide.

1.10. Mescaline

1.10.1. Libermann's test

1. Two ml of extract is taken in test tube.
2. Few drops of libermann's reagent are added to it.
3. Black colour is observed which indicates the presence of mescaline.

1.10.2. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Orange colour is observed which indicates the presence of mescaline.

1.11. Methoxyamfetamine

1.11.1. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. No colour change is observed which indicates the presence of methoxyamfetamine.

1.11.2. Mandelin test

1. Two ml of extract is taken in test tube.
2. Few drops of mandelin's reagent are added to it.
3. Green colour is observed which indicates the presence of methoxyamfetamine.

1.12. Phencyclidine

1.12.1. p-Dimethylaminobenzaldehyde test

1. Two ml of extract is taken in test tube.
2. Few drops of p-dimethylaminobenzaldehyde reagent are added to it.
3. Heat the solution for 3mins at 100°C
4. Red colour is observed which indicates the presence of phencyclidine.

1.13. Psilocin

1.13.1. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Green to brown colour is observed which indicates the presence of psilocin.

1.14. Psilocybine

1.14.1. Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Orange colour is observed which indicates the presence of psilocybine.

2. Conclusion

In any analysis of poison, screening/spot test is especially useful for knowing the presence of the hallucinogens which can be confirmed by the more confirmatory tests. It saves time for the toxicologist in ruling out the poisons which can be confirmed by the more confirmatory tests. It saves time for the toxicologist in ruling out the poisons and gives a quick clue to the doctors for patient management in emergency poisoning cases. The result of the analytical methods depends on the amount and purity of the sample extracted. Screening/spot test has been developed after repeated trial and testing. The techniques are being improved every time. It is important for the forensic toxicologists to know the best available method and help to detect the poison in the crime investigations.

3. Preparation of Solutions

1. **Libermann's reagent:** 1 gm of sodium or potassium nitrite is dissolved in 10 ml of sulphuric acid with cooling and swirling to absorb the brown fumes.
2. **Mandelin's reagent:** 1 g of ammonium vanadate is dissolved in 1.5 ml of water and dilute to 100 ml with concentrated sulphuric acid.
3. **Marquis reagent:** 100 ml of concentrated sulphuric acid is mixed with 1 ml of formaldehyde solution.
4. **p-Dimethyl amino benzaldehyde:** 1 g of p-Dimethyl amino benzaldehyde is dissolved in 100 ml of ethanol. The solution is acidified with 10 ml of dilute hydrochloric acid.

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5. Conflict of Interest

None.

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