



Unknown powders, pills, and liquids that are presumably considered as illegal drugs are sent to forensic laboratories to undergo identification. Several tests are done to analyze and confirm substances discovered at a crime scene.

PRESUMPTIVE TEST

This test only provides an indication of a substance's **presence**. It does not identify the substances specifically.

Color test is an example of a presumptive test. When a suspected substance is mixed with or exposed to certain chemicals, it will generate a colored solution that indicates the presence of a specific drug or chemical group.



TABLE 1. EXAMPLES OF COLOR TESTS



Fig.1 Sample of Cobalt Thiocyanate Color Test

NAME OF COLOR TEST	CHEMICALS USED	RESULT	SUBSTANCES PRESENT
Marquis Color	formaldehyde and sulfuric acid	purple solution	heroin, morphine, and opium-based drugs
Cobalt Thiocyanate	cobalt thiocyanate, water, glycerine, hydrochloric acid, and chloroform	blue liquid	cocaine
Dillie-Koppanyi	cobalt acetate and isopropylamine	violet-blue solution	barbiturates
Van Urk	p-dimethylaminobenzaldehyde, hydrochloric acid, and ethyl alcohol	blue-purple solution	lysergic acid diethylamide (LSD)
Duquenois-Levine	vanillin, acetaldehyde, ethyl alcohol, and chloroform	purple-solution	cannabis

CONFIRMATORY TESTS

These procedures are more specific and are conducted to determine the unknown substance's identity based on its properties. There are two common known types of confirmatory tests: Microcrystalline and Gas Chromatography Mass Spectrometry (GC/MS).

A. MICROCRYSTALLINE TEST

The precipitation reaction between a suspected substance and a reagent results in a unique crystal complex. These crystals are observed under a microscope and micrograph to determine the suspected substance's identity. Microcrystalline test is usually done for classic drugs such as heroin, amphetamine, and cocaine since each drug has a known crystal pattern.

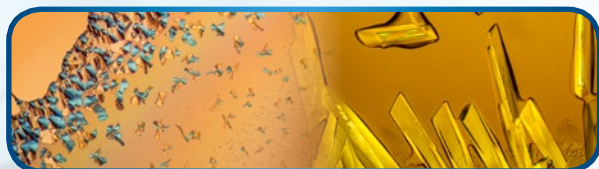


Fig. 2 Sample of microcrystalline test

B. GAS CHROMATOGRAPHY MASS SPECTROMETRY (GC/MS)

A small amount of suspected substance is injected into a gas chromatograph. This process isolates the drug from other mixing agents since larger molecules will move slower in the column while smaller and lighter compounds will move quickly. The separated substance is then transferred into the mass spectrometer where it is broken apart to help identify the specific drugs present.



Fig. 3 Unknown drug samples in vials subjected to GC/MS confirmatory test.

Different drug test procedures use a variety of chemicals that expose analysts to toxic chemical fumes. These hazardous vapors may cause skin irritation, lung inflammation, or severe respiratory diseases.

Esco's wide range of fume hood models, compliant to ASHRAE 110 and EN 14175, are designed to provide superior fume containment, ergonomic features, and operator protection.

References:

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- [2] Leonie E. Elie, Mathieu P. Elie. (2009). Microcrystalline Test in Forensic Drug Analysis. <https://onlinelibrary.wiley.com/doi/abs/10.1002/9780470027318.a9102>
- [3] Matthew Quin, Monica Joshi, PhD. Library of microcrystalline tests for Novel substances. <https://www.wcupa.edu/sciences-mathematics/chemistry/forensicResearch/default.aspx>

