

Idaho State Police

Forensic Laboratory Training Manual

Spot Tests

1.0.0 Background

Spot tests are color tests used for rapid screening of samples to determine what drugs may or may not be present. They are usually performed:

1. In the laboratory prior to instrumental analysis;
2. On the site of a clandestine laboratory;
3. By law enforcement officers prior to submission of samples to a laboratory.

A spot test is usually performed by placing one or two drops of reagent in a depression of a spot plate, adding small amount of sample and observing the color produced. Some tests, e.g., the modified Duquenois and Scott tests require the use of a test tube instead of a spot plate. The color produced during a spot test is usually indicative of a class of compounds (e.g., Dille-Koppanyi turns purple with barbiturates). The first appearance of a color is frequently the most important. A weak response may fade, and samples containing sugars will char on standing in the presence of reagents made with sulfuric acid (e.g., Marquis). The drug to be tested must be soluble in the reagent in order to produce a color. For example, diazepam and methaqualone base are both insoluble in water; therefore, in order to obtain a proper response for these compounds, it is necessary that a drop of methanol be added prior to the addition of the testing reagent, Cobaltous Thiocyanate.

The reagents used in spot tests can be classified as either general or special. General reagents give different colors for different types of compounds. For example, the Marquis reagent yields the following results:

1. Purple with opiate
2. Orange turning brown with amphetamine/methamphetamine
3. Pink with aspirin
4. Yellow with diphenhydramine

Special reagents yield one color for a particular class of compounds. For example, the Sanchez reagent yields red with primary aromatic amines such as procaine and benzocaine.

Why a particular drug reacts with a certain reagent to give a specific color is often not known; however, it is important to know which reagent(s) can be used to screen for a particular compound or class of compounds. The non-inclusive list, which follows, is provided as an aid for testing many of the commonly abused drugs.

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<u>DRUG</u>	<u>REAGENT</u>	<u>COLOR</u>
amphetamine	Marquis	orange to brown
antipyrine	tannic acid	white precipitate
aspirin	Marquis	pink (slow red)
barbiturates	Dille-Kopannyi Zwicker	purple purple
benzocaine	Sanchez	red
caffeine	tannic acid *	white precipitate
cocaine	acidified Co(SCN) ₂	blue
(s)	Scott *	blue, pink, blue
codeine	Marquis	purple
diazepam	MeOH + Co(SCN) ₂	green
Demerol	Marquis	orange
DET	Van Urk or Erlich	purple
DMT	Van Urk or Erlich	purple
diphenhydramine	Marquis	yellow
fentanyl	Marquis	faint orange
glutethimide	Liebermann Co(Ac) ₂ + LiOH crystals *	yellow blue
hashish	modified Duquenois *	red-violet
heroin	Marquis Mecke Froehde conc. HNO ₃	purple green purple green
(20%)		
lidocaine (acidified)	Co(SCN) ₂	blue
LSD	Van Urk or Erlich	purple
marihuana ^(s)	modified Duquenois *	red-violet
MDA	Marquis	black
methadone	acidified Co(SCN) ₂	blue
methamphetamine	Marquis	orange to brown
methapyrilene	conc. HNO ₃	red
methaqualone	MeOH + Co(SCN) ₂	blue
(s)	N ₂ BH ₄ + p-DMAC	pink
methyprylon	Froehde	light blue
morphine	Marquis	purple
MPP	Marquis	faint orange
MPPP	Marquis	red
MPTP	Marquis	red
opium	Marquis	purple
oxytetracycline	conc. H ₂ SO ₄	red
PCP	MeOH + Co(SCN) ₂	blue

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procaine	Co(SCN) ₂ Van Urk Sanchez	blue yellow red
propoxyphene	Marquis	black
quinine	conc. HNO ₃ or H ₂ SO ₄	blue fluorescence under UV
quinidine	conc. HNO ₃ or H ₂ SO ₄	blue fluorescence under UV

* This test should be performed using test tubes.

(s) Test procedure described in SPECIAL TESTS

2.0.0 Special Tests

2.1.0 Modified Duquenois (Duquenois-Levine) Test

This color test can be used to detect for the presence of marijuana plant material. See the marijuana SOP.

2.2.0 Secondary Amine Test

This test involves the use of two reagents to distinguish methamphetamine from other amphetamines¹:

2.2.1 To a 1% solution of sodium nitroprusside, add 10% by volume of acetaldehyde.

2.2.2 2% solution of sodium carbonate

2.2.3 Procedure:

1. Add one drop of Reagent 1 to well of spot plate.
2. Add two drops of Reagent 2.
3. Add small (1 mg) amount of sample.
4. An immediate deep blue color indicates the presence of methamphetamine or another secondary amine. Benzedrine, dexedrine, or other primary amines yield a slow pink to cherry-red color.

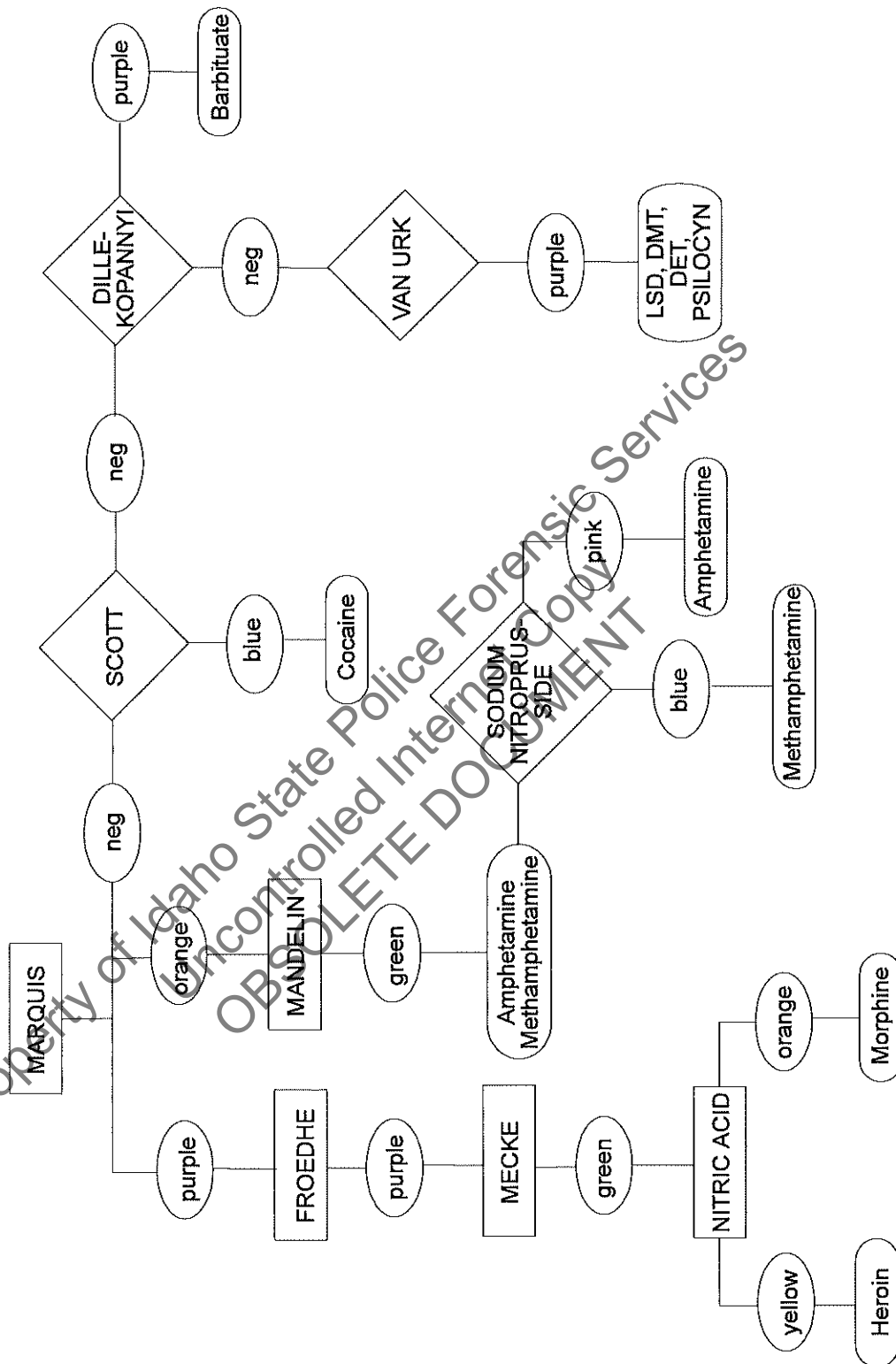
3.0.0 Reagent Preparation

Directions for preparation of the commonly used spot test reagents can be located in Clarke's Isolation and Identification of Drugs or other sources.

¹Feeny, F.J., (2/1968), Microgram, Volume 1, No. 5

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SPOT TEST FLOW CHART FOR UNKNOWN POWDER



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4.0.0 Readings

1. Scott, L.J., (1973), Microgram, Vol. 6, 179-181
2. Clarke, E.G.C., Isolation and Identification of Drugs, 2nd Edition, 128 - 147

5.0.0 Exercises

1. Prepare the spot test reagents assigned by the instructor. Then use these reagents to test the reference standards supplied by the instructor.

6.0.0 Questions

1. A tablet or capsule that has been tentatively identified by use of the PDR should also be subjected to spot tests.
True or False
2. A powder turns raspberry red with Marquis. What probably is in the powder?
3. A purple Dille-Kopannyi is conclusive for the presence of a barbiturate.
True or False
4. Explain the difference between sensitivity and specificity.
5. What can be done to verify that a spot test has yielded the correct color for a sample being tested?
6. How often does ISP SOP require a blank spot tests to be ran?
7. What is the formulation for the Marquis spot test reagent at the ISP?

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