UNITED NATIONS INTERNATIONAL DRUG CONTROL PROGRAMME
Vienna

RAPID TESTING METHODS OF DRUGS OF ABUSE

MANUAL FOR USE BY NATIONAL LAW ENFORCEMENT AND NARCOTICS LABORATORY PERSONNEL

UNITED NATIONS
New York, 1994

ST/NAR/13/REV.1

CONTENTS

PREFACE

When the previous edition of the manual on *Rapid Testing Methods of Drugs of Abuse* was published in 1988, it was understood that the manual would be updated from time to time as additional substances were placed under international control.

After the publication of the previous edition, the Commission on Narcotic Drugs placed a large number of narcotic drugs and psychotropic substances under international control, making it necessary for the present revised edition of the manual to be prepared. In addition, under article 12 of the 1988 Convention against illicit traffic in narcotic drugs and psychotropic substances, 22 substances - precursors and essential chemicals - were placed under international control.

The present revised edition incorporates the information contained in the 1988 edition in addition to information on drugs, precursors and essential chemicals recently placed under international control. The principles and criteria used in preparing the present edition were the same as those used in preparing the 1988 edition.

INTRODUCTION

Background

Over the past few years there has been a considerable increase in the number of substances newly brought under international control. This increase reflects a rapid diversification of drugs of abuse and the consequent increased regulatory efforts by Member States result in a larger number of substances put under control with more stringent national legislation and sentencing provisions. At the same time, the seized quantities of drugs under control, such as heroin, cocaine, cannabis products, amfetamine and related compounds have also shown an alarming and unprecedented increase in certain regions.

This worldwide trend of increasing volume and frequency of seizures and the appearance of licit psychotropic and narcotic drugs in the illicit traffic place greater pressures on law enforcement officers in their field operations. Moreover, new forms of the traditional drugs have in recent years appeared in the illicit traffic and new drugs have been produced by clandestine laboratories. This new situation presents a challenge not only to national law enforcement authorities, but also to the technical and scientific staff of forensic laboratories.

The growing number of suspicious shipments encountered at entry points and the increase of illicit street traffic necessitate rapid, simple and reliable techniques for presumptive identification of these materials.

A variety of field testing kits for drugs of abuse have been developed and marketed over the past few decades, most of which are only intended for rapid, presumptive identification of the traditional drugs of abuse.

In view of the developments just outlined and the importance of assisting law enforcement services and national laboratories, it was considered timely and crucial to undertake a thorough review of existing field testing methods.

Such a review would be aimed at selecting and suggesting the best methods available for field and laboratory preliminary testing as well as identifying areas needing further research.

The Commission on Narcotic Drugs, at its thirty-second session took note of the offer of the Government of Austria to host an expert group meeting in 1987 to examine recent developments in rapid field testing methods. The Technical Services Branch (former Division of Narcotic Drugs), through its Laboratory, organized and convened a meeting of experts on 25 - 29 May, 1987, in Vienna, Austria to review and advise on this subject.

The present manual published by the United Nations International Drug Control Programme reflects the views and conclusions of the experts. In addition, it contains information on selected drugs placed under international control by the Commission on Narcotic Drugs after the publication of the previous edition in 1988, including precursors and essential chemicals brought under international control under article 12 of the 1988 Convention.

Purpose and Use of the Manual

The manual has been designed to provide practical assistance to law enforcement agencies and forensic laboratories.

It contains:

- general guidelines for law enforcement officers on the simplest ways of sampling a suspect material for the specific purpose of field testing;
- an outline on the execution of various field testing methods;
- guidelines for the interpretation of the results;
- a selection of chemical tests for field identification of the most frequently seized controlled drugs and tests suitable only for laboratory screening;
- characteristics for precursors and essential chemicals most frequently used in the clandestine manufacture of drugs of abuse as well as tests for their field identification.

The proper use of field testing kits for drugs of abuse requires that the law enforcement officer acquires certain skills and experience especially in the interpretation of the results and the safe handling of the various reagents. Thus, the manual outlines a suggested training programme for chemical field testing to assist law enforcement agencies in developing their training programmes.

The chemical field tests described in the manual and the suggested techniques are by no means exhaustive. In fact, available commercial field testing kits in most cases incorporate similar chemical tests or modifications thereof in a wide range of configurations. In selecting the field tests described in this manual and the methodology to carry them out, highest priority was given to simplicity and cost-effectiveness. National authorities are therefore encouraged to make use of the information contained in this manual to establish their own field testing programme and to develop testing kits taking into consideration the prevailing national/regional drug situation.

This manual is one of a series of similar publications dealing with the identification and analysis of various groups of drugs under international control. These include manuals on the analysis of heroin (ST/NAR/6), cocaine (ST/NAR/7), cannabis (ST/NAR/8), amfetamine and metamfetamine (ST/NAR/9), opium and crude morphine (ST/NAR/11), ring-substituted amfetamine derivatives (ST/NAR/12), methaqualone/mecloqualone (ST/NAR/15), benzodiazepine derivatives (ST/NAR/16), lysergide (LSD) (ST/NAR/17), barbiturates (ST/NAR/18), peyote cactus/mescaline and psilocybe mushrooms/psilocybine (ST/NAR/19) and a manual on clandestine manufacture of drugs under international control (ST/NAR/10).

The area of field testing may develop as a function of the changing pattern of the illicit drug traffic and scientific developments. It is therefore important to update the contents of this manual to meet such developments. In this connection, the Technical Services Branch would welcome observations, suggestions and comments on the contents and usefulness of this manual. Comments and suggestions may be addressed to:

Technical Services Branch
United Nations Drug Control Programme
Vienna International Centre
P.O. Box 500
A-1400 Vienna
Austria

I. GENERAL CONSIDERATIONS

A. THE SUSPECTED MATERIAL

The quality, physical appearance as well as the concentration of the active substance(s) in the illicit drug material vary considerably. At the production and wholesale level it can be almost pure (near 100% purity) but at "street" level it may be significantly diluted. In addition, the actual size/amount of the suspected material to be tested may be very low (e.g. LSD). Moreover, the presence of a dye or a coloured diluent/adulterant as well as natural materials (opium, cannabis) may obscure or disturb the course of the reaction and the evaluation of its result.

Combinations of drugs are also frequently encountered in the illicit market and in this situation the colour tests may also be interfered with. Therefore such samples should undergo special examination in a laboratory. Although these factors may limit the value of simple field tests, longstanding experience shows that they are a useful tool which has demonstrated its operational usefulness.

In order to ensure maximum reliability of the tests, the following general instructions should be observed:

1. If the amount of the suspected material is too small to be subjected to both a field test and a laboratory examination, the entire sample should be submitted to the laboratory;

2. For powdered samples perform the test with only a few grains/particles. If it is necessary to repeat it, increase the amount up to approximately the size of a match-head;

3. For tablets or other solid or resinous drug material (e.g. hashish, opium), chip a small piece with a spatula or a cutting device, grind it into a powder and proceed with the test;

4. For capsules, open one capsule very carefully and use only a few particles of its contents for the test;

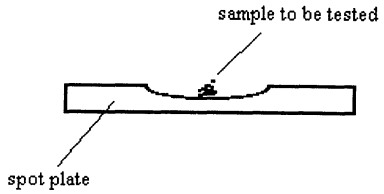
5. For plant material, take a few pieces of the suspected sample, grind them and proceed with the test;

6. For cigarettes, open one cigarette and take a small amount of the plant material, grind it and proceed with the test;

7. For plant material giving negative results with the usual tests but which is suspected to have been treated or combined with another chemical or drug, the entire sample should be submitted to the laboratory for analysis.

B. EXECUTION OF THE FIELD TESTS

Field tests on any suspected drug material can be performed in many different ways. The most commonly used method employs a spot plate where the sample is placed in a depression of the plate and treated with the reagent(s) (see figure below). The spot plate is usually white in order to enhance the perception of the test's colour. Spot plate testing is probably the simplest to perform but is inconvenient for certain reagents and cannot be used for some reactions. The spot plate must be washed with water and an organic solvent (acetone or methanol) and dried after each use to prevent contamination.



Another technique uses open test tubes where the sample is introduced into the test tube and the test is performed according to the protocol provided.

Other methods are also available making use of filter paper, test strips or pre-measured and pre-packaged reagents in a test container (ampoules). As these techniques use similar reagents or modifications of these reagents, they may all be employed with comparable success.

This manual described procedures which employ spot plates except in these cases where the execution of the reaction necessitates other methods.

The suggested reactions and reagents have been selected taking into account practical aspects such as simplicity, rapidity, safety and economy as well as the chemical aspects such as the chemical mechanism of the reactions involved, their sensitivity and specificity. Two levels of application were considered, namely the field level and the laboratory level. Law enforcement officers are strongly advised to use only those tests that are specifically recommended for field use and are marked with /F/ on the following pages.

Laboratories, on the other hand, may take advantage of available literature and of their expertise to develop their own rapid testing programme for screening which may include modifications of the individual tests and reagents. Although colour tests are used worldwide in laboratories for screening purposes, they are not substitutes for more specific identification techniques such as chromatography or spectroscopy. Rather, they should be used in a logical combination with these techniques. The tests marked with /L/ on the following pages are more suitable for laboratory use.

With a few exceptions, the group of experts selected for each substance or substance class at least two rapid tests. Indeed, it was concluded that a combination of two tests involving different chemical mechanisms could increase the specificity of the tests, hence their reliability as a presumptive tool.

In certain cases many chemically related drugs in a given group or class are under national and/or international control (for example amfetamine and benzodiazepine derivatives). Many of these compounds within a given class may react with some of the suggested tests and actually give the colour indicated under the individual test procedures.

C. INTERPRETATION OF THE TESTS

The following general guidelines are intended to assist the law enforcement officers in the interpretation of the test results. (see attached)

1. Only the colour(s) indicated for each test should be interpreted as a positive result and in any case means only the possible presence of the substance(s) for which the test is intended.

2. In all cases where positive or doubtful results are obtained, the suspected material must be submitted to a laboratory for detailed analysis.

3. Where a test yields a negative or doubtful result, the law enforcement officer may proceed with the second test suggested for the same substance. If this test is also negative, it can be concluded that the sample may not contain controlled material. However, if there is reason for suspicion based on intelligence, the entire sample should be submitted to the laboratory for analysis, indicating the tests used in the field, their results and the reason for suspicion.

THE READER IS ONCE AGAIN REMINDED THAT ALL TESTS INCLUDED IN THIS MANUAL ARE INTENDED ONLY FOR THE PRESUMPTIVE IDENTIFICATION OF SUSPECTED MATERIAL AND SHOULD IN NO CASE BE INTERPRETED AS DEFINITIVE PROOF.

II. DRUGS TERMINOLOGY

A. DRUG

"Drug" means any of the substances in Schedule I and II, whether natural or synthetic.
(Single Convention on Narcotic Drugs, 1961)

A drug is a substance other than food which is intended to affect the structure or function of the body of man or animal. A drug is also a substance intended for use in the diagnosis, cure, treatment or prevention of disease in man or other animal.
(Webster's Third New International Dictionary)

Any substance used internally or externally as a medicine for the treatment, cure or prevention of a disease or a narcotic preparation.
(Dictionary of Scientific and Technical Terms, Fifth Edition, McGraw-Hill)

NARCOTIC DRUG

(i) Medically, a narcotic is any drug that produces sleep or stupor and also relieves pain.
Legally, the term means any drug defined as such under the 1961 convention.
(Drug Abuse New Revised Edition, Smith Kline & French)

(ii) Narcotic drugs depress the central nervous system to produce a marked reduction in sensitivity to pain, create drowsiness, and reduce physical activity. Other effects can include nausea and vomiting, constipation, itching, flushing, constriction of pupils, and respiratory depression.
(DEA fact sheets)

(iii) A drug which in therapeutic doses diminishes awareness of sensory impulses, especially pain, by the brain; in large doses, it causes stupor, coma or convulsions.
(Dictionary of Scientific and Technical Terms, Fifth Edition, McGraw-Hill)

PSYCHOTROPIC SUBSTANCE

(i) "Psychotropic substance" means any substance, natural or synthetic, or any natural material in Schedule I, II, III or IV.
(Convention on Psychotropic Substances 1971)

(ii) Pertaining to any drug or agent having a particular affinity for or effect on the psyche.
(Dictionary of Scientific and Technical Terms, Fifth Edition, McGraw-Hill)

DESIGNER DRUGS

"*Designer drugs*" are substances chemically related to but slightly different from controlled substances. They are designed by clandestine chemists with the aim to manufacture compounds that produce "the high" or euphoria of parent drugs and avoid the penalties that would be levied against those illegally trafficking the controlled substance. The most common examples are "*designer amfetamines*" (e.g. tenamfetamine (MDA), 3,4-methylenedioxy-metamfetamine (MDMA), *N*-ethyl tenamfetamine (MDE), brolamfetamine (DOB)) and "*designer fentanyls*" (e.g. *alpha*-methylfentanyl (china white), 3-methylfentanyl).

B. CANNABIS

Cannabis is a plant/bush growing widely throughout the temperate and tropical zones of the world.

Cannabis sativa L. is a plant/bush growing widely throughout the temperate and tropical zones of the world. (The plant has been cultivated for centuries for the hemp fibers of the stem, the seeds which are used in feed mixtures, and for the oil as an ingredient in paint, as well as for the biologically active substance contained in its leaves and flowering tops.)

Cannabis is a general term used to describe different forms of the drug obtained from the cannabis plant.

The principal psychoactive ingredient of cannabis is tetrahydrocannabinol also referred to as Delta-9-THC, and the percentage of THC depends to a certain extent on where and how the cannabis plant is grown, and also on how the various forms of the drug are prepared.

Cannabis in small amounts acts as a depressant, but in larger doses has effects similar to those of a hallucinogen.
(United Nations, 1973)

SUGGESTED DEFINITIONS FOR "CANNABIS"
(E/CN.7/1987/8 17 November 1986)

(i) "Cannabis" (except in the expression "cannabis resin") means any plant of the genus cannabis or any part of such plant (by whatever name designated) but does not include cannabis resin or any of the following products after separation from the rest of the plant, namely:

- (a) mature stalk of any such plant;
- (b) fibre produced from mature stalk of any such plant;
- (c) seed of any such plant.

(ii) "Cannabis" means any part of any plant of the genus cannabis from which the resin has not been extracted, by whatever name they may be designated.

(iii) "Cannabis" means any part of any plant of the genus cannabis which contains one or more of the chemicals identified as cannabinoids which are subject to international or national control measures.

CANNABIS PRODUCTS

1. CANNABIS PLANT

Definition

"Cannabis" means the flowering or fruiting tops of the Cannabis plant (excluding the seeds and leaves when not accompanied by the tops) from which the resin has not been extracted, by whatever name they may be designated;
"Cannabis plant" means any plant of the genus Cannabis.
(1961 Convention, art. 1, para. 1)

The leaves and flowering tops of the plant are harvested, dried, and sometimes pressed into "bricks" or twisted into "sticks". Herbal cannabis is similar in appearance to tobacco, although greenish rather than brown in colour.
(Interpol, Drugs Terminology 1978)

Description

Cannabis plant is the tobacco-like greenish or brownish material consisting of the dried flowering, fruiting tops and leaves of the plant.

Illicit production

- air drying of herbal material

Common illicit forms

- loose herbal material
- blocks of compressed herbal material
- corn-cob shaped herbal material wrapped in coarse vegetable fibre
- herbal material tied using twine around a central bamboo cane
- herbal material in a small roll wrapped in brown paper

Certain common street names

- Aunt Mary	- Baby	- Bhang	- Bash
- Can	- Dope	- Earth	- Esra
- Fry daddy	- Gash	- Herb	- Indian boy
- Joint-sticks	- Kaya	- Kif	- Light stuff
- Mother	- Nail	- Panama Red	- Queen -Ann's lace
- Red dirt	- Salt and pepper	- Thirteen	- Zol
- Hemp	- Marie-Jeanne	- Pot	- Buddha-sticks
- Marihuana	- Marijuana	- Sensemilla	- Thai-sticks

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs & Crime Data", January 1994)

2. CANNABIS RESIN

Definition

"Cannabis resin" means the separated resin, whether crude or purified, obtained from the cannabis plant.
(1961 Convention, art. 1, para. 1)

The resinous secretion of the flowering tops of the cannabis plant is collected, dried and sometimes baked, then is either pressed into powdery blocks or mixed with wax to form rigid slabs. In colour it varies from light brown to green, dark brown or black.
(Interpol, Drugs Terminology, 1978)

Description

The dried dark brown or black resinous secretion of the flowering tops of the cannabis plant.

Illicit production

- threshing herbal material against a wall
- rubbing herbal material between the palms of the hands or against a rubber sheeting
- crushing dried herbal material to a powder which is later kneaded
- immersing the plant material in boiling water and removing the resin from the surface

Common illicit forms

- fine powder
- fine powder compressed into slabs
- material placed in cloth bags and compressed
- material wrapped in cellulose and compressed
- resin pressed or rolled into slabs, rods, balls or other shapes

Certain common street names

- Charas
- Ganja
- H
- Hash
- Hashish
- Khif
- Pot
- Shit

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs & Crime Data", January 1994))

3. CANNABIS OIL

Definition

Concentrate of cannabis obtained by extraction of cannabis or cannabis resin and usually containing a vegetable oil.
(ST/NAR/1/Rev.1, 1993)

The end product is a dark, viscous extract produced by the repeated extraction of cannabis plant or resin. A vegetable oil is usually added to the extract.

Description

The dark viscous liquid produced by repeated extraction of cannabis plant or resin.

Illicit production

- extracting cannabis plant or resin; process similar to that used to percolate coffee

Common illicit forms

- dark thick oil

Certain common street names

- Honey oil
- Red oil

C. OPIUM

Definition

"Opium" means the coagulated juice of the opium poppy. "Opium poppy" means the plant of the species *Papaver somniferum L.*.
(1961 Convention, art. 1, para. 1)

Papaver somniferum L. is an annual plant growing in many countries around the world with moderate climate. It has white to red flowers and round capsules with dark violet seeds.

SUGGESTED DEFINITIONS FOR "OPIUM POPPY" AND "OPIUM"
(E/CN.7/1988/CRP.4)

(i) Opium poppy means any part of any plant of the genus Papaver which contains morphine (seeds excluded).

(ii) Opium poppy means any part of any plant that contains morphine.
Opium means the coagulated juice obtained from any plant containing morphine, whatever its content of morphine and in whatever form the coagulated juice exist.
Opium means the coagulated juice of opium poppy.

OPIUM PRODUCTS

1. RAW OPIUM

Description

Raw opium is a non-homogeneous material containing poppy capsule fragments and is produced by air drying of opium. It is sticky, tar-like and dark brown when fresh. It becomes brittle and hard with age.

When the unripened seed pod of the opium poppy is incised it exudes a milky white juice which coagulates (thickens when it comes into contact with air) and turns brown or almost blackish in colour.
(Interpol, Drugs Terminology, 1978)

It is non-homogeneous material containing poppy capsule fragments.

Common illicit forms

- sticky or hard, dark brown material in any form or shape
- blocks wrapped in vegetable leaves followed by plastic wrapping

Certain common street names

- Ah-pen-yen	- Aunti	- Big O	- Chandoo
- Dopium	- Easing Powder	- Gum	- Hops
- Joy plant	- Midnight oil	- Mud	- Noir(e)
- Ope	- Pen yan	- Toxy	- Zero

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

2. PREPARED OPIUM

Description

Prepared opium is a sticky dark product obtained as a result of various treatments of raw opium, e.g. water extraction, in order to make it suitable for smoking.

Raw opium which has undergone relatively simple processes such as cooking and fermentation or water extraction in order to make it suitable for smoking.

Common illicit forms

- sticky or hard, dark brown material in any form or shape
- sticks in the form of cigarettes

Certain common street names

- Chandu

3. OPIUM DROSS

Description

Opium dross is the product that remains in the pipe after opium has been smoked and still contains morphine.

Opium dross is the cindered residue, black in colour, of prepared opium after smoking, being either a cindered pellet or the scrapings from the opium pipe bowl.
(Interpol, Drugs Terminology, 1978)

Opium dross still contains morphine.

Common illicit forms

- cindered pellet
- scrapings from opium pipe

4. MEDICINAL OPIUM

Definition

"Medicinal Opium" means opium which has undergone the processes necessary to adapt it for medicinal use.
(1961 Convention, art. 1, para. 1)

Description

Medicinal opium is a light yellowish-brown powder consisting of yellowish or reddish-brown particles.

Common illicit forms

- fine brown powder
- pastilles
- syrup

POPPY STRAW

"Poppy straw" means all parts (except the seeds) of the opium poppy, after mowing.
(1961 Convention, art. 1, para. 1)

The upper part of the stem and the capsule of the poppy plant.

CONCENTRATE OF POPPY STRAW

The material arising when poppy straw has entered into a process for the concentration of its alkaloids, when such material is made available in trade.
(1961 Convention)

D. OPIATES

Definition

Strictly, drugs immediately derived from *OPIUM*, such as *MORPHINE* and *CODEINE*; more generally applied to other (including synthetic) compounds with comparably potent pain-relieving activity.
(A Handbook of Psychoactive Medicines, T. Duquesne and J. Reeves, 1982)

1. CRUDE MORPHINE

Definition

Crude morphine is an alkaloid extracted from opium or poppy straw.
(Interpol, Drugs Terminology, 1978)

Description

Crude morphine is found in the form of compressed blocks or as powder. In colour, they range from off-white to dark brown and in many cases bear the "999" trade mark moulded onto the surface. In certain parts of South East Asia, it is sometimes called "Heroin No.1".

Common illicit forms

- finely grained powder
- compressed blocks, in many cases with "999" trade mark
- tablets

2. MORPHINE

Definition

The principal alkaloid of opium and of poppy straw. Morphine is an alkaloid manufactured from raw opium or extracted directly from poppy straw.

4. HEROIN

Definition

Heroin is a semi-synthetic opiate synthesized from morphine.

Description

Heroin No. 1: Crude morphine is sometimes called Heroin No. 1 in certain parts of South-East Asia.

Heroin No. 2: Heroin base is derived from morphine by acetylation (diacetyl-morphine) prior to conversion to the hydrochloride salt. In short, heroin base is partly manufactured heroin. Dry heroin base is a solid that can be ground to powder between the fingers. In colour it varies from pale grey to dark brown or dark grey. In certain parts of South East Asia it is sometimes called "Heroin No.2".

Heroin No. 3: Generally found in granular lumps but sometimes ground into powder, it varies in colour from light brown to dark grey. Caffeine is the main diluent although barbital is occasionally added during the manufacturing stage.

Heroin No. 4: A fine, white or creamy coloured powder, with a concentration of up to 98% heroin hydrochloride. This type of heroin usually contains very few impurities and is often extensively diluted with lactose by the time it is retailed to the addict.

Brown Heroin: Heroin which is produced through a manufacturing process incorporating no purification steps. The material is brown in colour, usually consists of hard chunks, and frequently has a strong vinegar-like odour.

Certain common street names

- Aries
- Aunt Hazel
- Boy
- Big bag
- Chip
- Courage pills
- Dirt
- Dope
- Estuff
- Ferry dust
- Foolish powder
- Girl
- Harry
- Horse
- Isda
- Junk
- Schmeck (smack)
- Stuff
- Witch

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

BLACK TAR HEROIN

Definition

Black tar heroin is a crudely processed high-purity heroin mainly of Mexican origin. (The average heroin content of black tar at street level is 60-70% in comparison to 2-6% of powdered heroin).

Description

Black tar heroin is of dark brown or black colour. It has a repulsive vinegar-like odour, which is stronger and longer-lasting than that of powdered heroin. Its consistency may be sticky like roofing tar of hard like coal. Due to its crude, shortcut manufacturing process black tar heroin contains many contaminants, such as plant by-products (from opium), and residual acetylation reagent (most often acetic anhydride), which is the reason for the strong odour and makes black tar appearing to melt in the presence of heat or humidity (formation of acetic acid).

Common illicit forms

- packed in balloons, aluminium foil of plastic bags
- in cellophane "twists" (like candies)
- wrapped in newspaper or high-temperature plastic wrap

Certain common street names

- Ball
- Black Heroin
- Brown Tar
- Bugger
- Carga
- Chiclosa
- Chiva
- Dogfood
- Gum
- Gumball
- Mexican Tar
- Pedazo
- Raw Heroin
- Tootsie Roll

(DEA, Special Report on Black Tar Heroin in the United States, Washington, 1986)

E. SYNTHETIC NARCOTICS

Definition

Synthetic narcotics are a group of potent analgesics ("pain-killers") with actions similar to those of morphine, but chemically not related to it and of synthetic origin.

Common synthetic narcotics

- Dextropropoxyphene
- Fentanyl
- Methadone
- Pethidine
  etc.

1. FENTANYL AND ITS DERIVATIVES

Definition

Fentanyl and its derivatives are synthetic, short-acting narcotic analgesics with actions similar to those of morphine, but up to hundreds of times more potent.

Common fentanyls

- Alfentanil (Alfenta)
- Fentanyl (Sublimaze)
- Sufentanil (Sufenta)
  etc.

Common licit/illicit forms

- liquid pharmaceutical preparations for injection

DESIGNER FENTANYLS

Definition

Designer fentanyls are synthetic substances closely related to fentanyl and of similar actions (see "designer drugs", page 9).

Common designer fentanyls

- *Alpha*-methylfentanyl
- 3-methylfentanyl
  etc.

Common illicit forms

- white, off-white to brown powder

Certain common street names

- China white
- Dance fever
- Goodfellas
- Jackpot
- King ivory
- Murder 8
- Poison
- Synthetic Heroin
- TNT
- Tango & Cash

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

2. METHADONE

Definition

Methadone is a synthetic narcotic analgesic also used in the treatment of heroin addiction as a substitute drug.

Common licit/illicit forms

- white powder
- tablets
- liquid preparations for injection or ingestion (syrup)

Certain common names

- Dolophine
- Heptanon
- Polamidone
- Symoron

3. PETHIDINE

Definition

Pethidine is a synthetic narcotic analgesic with actions similar to those of morphine.

Common licit/illicit forms

- white powder
- tablets
- liquid pharmaceutical preparations for injection and ingestion (syrup)

Certain common names

- Demerol
- Dolantin
- Meperidine

MPPP

Definition

MPPP is the abbreviation for 1-**m**ethyl-4-**p**henyl-4-**p**ropionoxy**p**iperidine. It is a clandestinely produced analogue of pethidine (see "designer drugs", page 9). Clandestine production of MPPP produces a neurotoxic by-product, MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine). A number of cases of severe irreversible Parkinsonism, a central nervous system disorder affecting movement, have been reported due to the use of MPPP/MPTP.

Common illicit forms

- white crystalline powder to brown granular substance

Certain common street names

- Desmethylprodine
- PPMP
- Synthetic Heroin

(WHO, Programme on Substance Abuse, Information Manual on Designer Drugs, Geneva, 1991)

F. COCA

Definition

"Coca bush" means the plant of any species of the genus *Erythroxylon.*
(1961 Convention, art. 1, para. 1)

The coca plant (e.g. *Erythroxylon coca, Erythroxylon novogranatense*) grows in tropical climates (500-2000 metres above sea level) as a bush or tree. Its leaves can be harvested for about 20 years.

1. COCA LEAF

Definition

The leaf of the coca bush, except a leaf from which all ecgonine, cocaine and any other ecgonine alkaloids have been removed.
(1961 Convention, art. 1, para. 1)

Description

The green to yellow-greenish elliptical leaves of different erythroxylon species vary in size and appearance. Characteristics are the two lines parallel to the midrib on the underside of the leaf.

2. COCA PASTE

Definition

Coca paste is an extract of the leaves of the coca bush. It contains mainly coca alkaloids and is also referred to as cocaine base. Purification of coca paste yields cocaine.

Description

Coca paste is an off-white, creamy or beige coloured coarse powder which often contains aggregates and is generally damp. Its odour is characteristic.

3. COCAINE

Definition

An alkaloid found in coca leaves or prepared by synthesis from ecgonine.
(ST/NAR/1/Rev.1, 1993)

Description

Cocaine is an odourless white crystalline powder that is prepared from coca paste. It is usually found in the form of a salt such as cocaine hydrochloride. Cocaine hydrochloride is usually inhaled ("snorted") intranasally or injected.

Certain common street names

- Bazooka
- Bazucos
- Big C
- Blanche
- Candy
- C-dust
- Coco
- Coke
- Crack
- Flake
- Gin
- Koks
- Lady
- Rock
- Snow
- Speedball
- Star dust

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

4. CRACK

Definition

Crack is cocaine base ("freebase") obtained from cocaine hydrochloride through a specific conversion process to make it suitable for smoking. The name "crack" describes the sound made by the crystals popping when they are heated. Crack is obtained by dissolving cocaine hydrochloride in water, adding baking soda or ammonia, heating and cooling the mixture and collecting the precipitated crystals by filtration. The traditional freebase process involves heating with ether or other flammable organic solvents which creates a high risk of fire and explosion. The following diagramme compares the two processes to convert cocaine hydrochloride to cocaine base:

Freebase Process	Crack Process
- removes diluents	- removes diluents
- solvents used	- does not require solvents
- danger of explosion/fire	- no danger of explosion/fire
- powdery material produced	- hard flakey material produced
- end product is cocaine base	- end product is cocaine base

(Private communication, Special Testing and Research Laboratory, US DEA, McLean, Virginia)

Description

Crack is usually found in the form of white chips, chunks or rocks. It is either smoked in a water pipe or sprinkled on tobacco or marijuana to be smoked as a cigarette.

Common illicit forms

- white or off-white flakey powder
- hard white rocks of cocaine base crystals
- often sold in vials

G. BARBITURATES

Definition

Barbiturates are the most common example of a class of drugs known as sedative hypnotics. These drugs act as central nervous system depressants.

Description

Barbiturates are drugs which produce depression of the central nervous system ranging from sedation through hypnosis to general anaesthesia. The effects produced depend on the specific drug used and the dose taken. In small doses barbiturates are used to reduce restlessness, emotional tension and to induce sleep.
(DEA fact sheets)

Some barbiturates are valuable in the treatment of certain types of epilepsy.

Common barbiturates

- Amobarbital
- Barbital
- Pentobarbital
- Phenobarbital
- Secobarbital
  etc.

Common licit/illicit forms

- white powders
- capsules or tablets of various colours and sizes
- liquid pharmaceutical preparations for injection or ingestion
- suppositories

Certain common street names

Barbiturates in general:

- Barbitos
- Barbs
- Candy
- Downers
- Goofballs
- Peanuts
- Sleepers
- Sleeping pills

Amobarbital sodium:

- Double trouble
- Rainbows
- Reds and blues

Pentobarbital sodium:

- Nimbies
- Yellow jackets

Secobarbital sodium:

- Pinks
- Red birds
- Reds
- Red devils
- Seggy

H. BENZODIAZEPINES

Definition

Benzodiazepines are central nervous system depressant drugs. About 2000 benzodiazepines have been synthesized by the pharmaceutical industry.

Common benzodiazepines

- Diazepam (Valium)
- Chlordiazepoxide (Librium)
- Flunitrazepam (Rohypnol)
- Medazepam
- Oxazepam
  etc.

Common licit/illicit forms

- tablets and capsules of various colours and sizes
- liquid pharmaceutical preparations for injection or ingestion

Certain common street names

- Blue bomb
- Cannasson rouge
- Nerve pills

I. METHAQUALONE

Definition

Methaqualone is a non-barbiturate synthetic sedative drug.

Common illicit forms

- brown, grey or black tacky powder
- tablets or capsules

Certain common street names

- Mandrax
- Quaalude

J. AMFETAMINE AND RELATED SUBSTANCES

Definition

Synthetic, chemically related substances with stimulant effects on the central nervous system.

Common substances

- Amfetamine
- Metamfetamine
- Pemoline
- Fenetylline
  etc.

Common illicit forms

- white to light brown powder
- tablets and capsules in different shapes and colours

Certain common street names

Amfetamine:

- Amp
- Bennie
- Browns
- Dexies
- Footballs
- Glass
- Hearts
- Marathons
- Oranges
- Pep pills
- Rippers
- Wake ups

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

Metamfetamine:

- Black beauties
- Crack meth
- Crystal meth
- Downers
- Fire
- Ice
- Meth

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

DESIGNER AMFETAMINES

Definition

Designer amfetamines are synthetic substances chemically related to amfetamine (see "designer drugs", page 9). They produce central stimulant effects similar to those of the conventional amfetamines, but differing in the speed of onset, duration of action and potency. In addition, designer amfetamines may act as hallucinogens.

Common substances

- Tenamfetamine (MDA)
- 3,4-methylenedioxymetamfetamine (MDMA)
- *N*-ethyl-3,4-methylenedioxyamfetamine (MDE)
- Brolamfetamine (DOB)

Common illicit forms

- white to light brown powder
- tablets and capsules in different shapes and colours

Certain common street names

3,4-methylenedioxymetamfetamine (MDMA):

- Adam	- Ecstasy	- Essence
- MDM	- MDMA	- XTC

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

N-ethyl tenamfetamine (MDE):

- Eve	- MDE	- MDEA

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

K. HALLUCINOGENS

Definition

Hallucinogens are a group of substances which produce altered states of consciousness with auditory and/or visual perceptions that are not shared by observers. Hallucinogens are also referred to as "psychedelics" (mind-revealing).

1. *D*-LYSERGIDE (LSD)

Definition

LSD is a semi-synthetic drug derived from lysergic acid, an alkaloid found in *Claviceps purpurea*, a fungus which grows on rye and other grains (ergot). It is also known as "lysergic acid diethylamine" and "LSD-25". LSD is a colourless, tasteless, odourless, crystalline substance which is soluble in water or alcohol.

Common illicit forms

- mini tablets and capsules
- gelatine sheets or blotting paper

Certain common street names

- A
- Acid
- Barrels
- Battery acid
- California sunshine
- D
- Dots
- Fields
- Ghost
- Hats
- L

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

2. PHENCYCLIDINE (PCP)

Definition

Phencyclidine is a synthetic drug with anaesthetic and hallucinogenic properties.
It is also manufactured in clandestine laboratories and is sometimes sold as "LSD", "THC" or "Mescaline".

Common illicit forms

- liquid preparations for injection
- tablets or capsules of various sizes and colours

Certain common street names

- Angel dust	- Busy bee	- Cadillac
- DOA (Dead on Arrival)	- Hoy	- Lovely
- Magic Dust	- New magic	- Ozone
- Peace Pills	- Rocket fuel	- Soma

(US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, "Drugs and Crime Data", January 1994)

3. MESCALINE/PEYOTE CACTUS

Definition

Mescaline is a hallucinogenic substance of the peyote cactus (*Lophophora williamsi*), a plant that has been used for centuries in traditional Indian rites by certain Central American tribes. It can also be produced synthetically.

Common illicit forms

- pieces of the cactus, dried, sliced and chopped in the form of a button (mescal button)
- ground button of the cactus in capsules
- mescaline powder in capsules or tablets

Certain common street names

Mescaline:

- Big Chief - Mesc

Mescal button:

- Peyote - Peyotl

4. PSILOCYBINE/PSILOCYBE MUSHROOMS

Definition

Psilocybine is a hallucinogenic substance of the psilocybe mushrooms (*Psilocybe mexicana* and others) which have been used for centuries in traditional Indian rites. When they are eaten, these "sacred" or "magic" mushrooms affect mood and perception similar to mescaline and LSD.

Common illicit forms

- crude mushroom preparation
- intact dried brown mushrooms
- powdered material in capsules

Certain common street names

- sacred mushrooms
- teonanacatl

L. KHAT

Definition

Khat are the young tender shoots or leaves of *Catha edulis Forsk.*, which is a flowering evergreen shrub or small tree. *Catha edulis* is 10 to 20 feet tall and grows in eastern Africa and southern Arabia - more specifically in Yemen, Ethiopia, Kenya, Madagascar, Somalia and Tanzania - at altitudes from 1,500 to 1,800 metres above sea level. The leaves and twigs can be harvested throughout the year.
Khat is collected daily in the morning and chewed. It has a stimulant effect due to its ephedrine-like components (cathinone and cathine).

Common illicit forms

- bundles of khat leaves/twigs wrapped in banana leaves, damp papers or plastics to preserve freshness

Certain common street names

- Abyssinian tea
- African tea
- Chat
- Kat
- Mandoma
- Miraa
- Musitate
- Qat
- Somali tea

III. PROCEDURES

Explanation: F Tests intended for field use

L Tests intended for laboratory use

F/L Tests intended for both field and laboratory use

Reagents: for detailed description see Annex.

A. NARCOTIC DRUGS AND PSYCHOTROPIC SUBSTANCES UNDER INTERNATIONAL CONTROL

1. OPIUM

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add three drops of water. Smear the sample against the spot plate with a glass rod or spatula.
3. Transfer a drop of the liquid to another depression of the spot plate.
4. Add one drop of reagent 1_A.
5. Add three drops of reagent 1_B.

Result

Purple to violet colour indicates the possible presence of opium.

Remarks

If the brown colour of the water extract obscures the colour expected from the test, repeat the test with a small amount of the suspected material.

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Auterhoff, H., Braun, D.. Arch.Pharm.(Weinheim), 306 (1973) 866.

B. Ferric Sulfate Test (Test 2) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add three drops of water. Smear the sample against the spot plate with a glass rod or spatula.
3. Transfer a drop of the liquid to another depression of the spot plate.
4. Add one drop of reagent 2.

Result

Brownish purple colour indicates the possible presence of opium.

Remarks

If the brown colour of the water extract obscures the colour expected from the test, repeat the test with a smaller amount of the suspected material.

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Hartke, K., Mutschler, E. (Editors). DAB 9 - Kommentar.
Wissenschaftliche Verlagsgesellschaft, Stuttgart (1987), p. 2603.

Roth, H.J., Eger, K., Torschuetz, R.. Pharmazeutische Chemie II - Arzneistoffanalyse, 2nd Edition.
Georg Thieme Verlag, Stuttgart, New York (1985), p. 517.

2. MORPHINE, CODEINE, HEROIN

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Violet to reddish-purple colour indicates the possible presence of morphine or codeine or heroin.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Auterhoff, H., Braun, D.. Arch.Pharm.(Weinheim), 306 (1973) 866

B. Mecke Test (Test 3) L

1. Place a small amount of the suspected material on a spot plate.

2. Add one drop of reagent 3.

Result

Blue to green colour indicates the possible presence of morphine or codeine or heroin.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs.

Reference:
Rehse, K.. Arch.Pharm.(Weinheim), 302 (1969) 487.

C. Nitric Acid Test (Test 4) L

1. Place a small amount of the suspected material on a spot plate.

2. Add one drop of reagent 4.

Result

Yellow colour slowly changing to light green indicates the possible presence of heroin.

Orange colour changing rapidly to red and then slowly to yellow indicates the possible presence of morphine.

Orange colour changing slowly to yellow indicates the possible presence of codeine.

Remarks

Similar or other colours may occur in the presence of other controlled or non-controlled drugs.

This reagent is useful as a differentiating test for morphine, codeine and heroin. It should not be used alone, but rather as a secondary test following test 1.

References:
Ditzel, P., Kovar, K.-A.. Rausch- und Suchtmittel.
Deutscher Apotheker Verlag, Stuttgart (1983).

Kovar, K.-A., Noy, M., Pieper, R.. Dtsch.Apoth.Ztg., 122 (1982) 3.

D. Ferric Sulfate Test (Test 2) F/L

1. Place a small amount of the suspected material on a spot plate.

2. Add two drops of reagent 2.

Result

Red colour indicates the possible presence of morphine.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Hartke, K., Mutschler, E. (Editors). DAB 9 - Kommentar.
Wissenschaftliche Verlagsgesellschaft, Stuttgart (1987), p. 2603.

Roth, H.J., Eger, K., Torschuetz, R.. Pharmazeutische Chemie II - Arzneistoffanalyse, 2nd Edition.
Georg Thieme Verlag, Stuttgart, New York (1985), p. 517.

3. CANNABIS

A. Fast Blue B Salt Test (Test 5) F/L

1. Place a small amount of the suspected material in a test tube.
2. Add a small amount of reagent 5_A.
3. Add 25 drops of reagent 5_B and shake the test tube for one minute.
4. Add 25 drops of reagent 5_C and, again, shake for two minutes.

Result

Purple-red colour of the lower (chloroform) layer indicates the possible presence of cannabis.

Remarks

The colour of the upper layer should be ignored. Only a very few other plant materials give a similar reaction.

References:
Ditzel, P., Kovar, K.-A.. Rausch- und Suchtmittel.
Deutscher Apotheker Verlag, Stuttgart (1983).

Kovar, K.-A., Noy, M., Pieper, R.. Dtsch.Apoth.Ztg., 122 (1982) 3.

B. Duquenois-Levine Test (Test 6) F/L

1. Place a small amount of the suspected material in a test tube.
2. Add 2 ml (ca. 50 drops) of reagent 6_A and shake the test tube for one minute.
3. Add 2 ml of reagent 6_B, shake again for a few seconds and allow the mixture to stand for a few minutes.
4. If a colour develops within 2-3 minutes, add 2 ml of reagent 6_C and shake the mixture gently.

Result

Violet colour of the lower (chloroform) layer indicates the possible presence of cannabis.

Remarks

Only a very few other natural products give a similar reaction.

References:
Kovar, K.-A., Keck, M., Krieger, Th.. Sci.Pharm., 56 (1988) 29.

Kovar, K.-A., Keck, M., Krieger, Th.. Arch.Pharm.(Weinheim), 321 (1988) 249.

4. COCAINE

A. Cobalt Thiocyanate Test (Test 7) F/L

1. Place a small amount of the suspected material in a test tube.
2. Add one drop of reagent 7_A and shake the test tube for ten seconds.
3. Add one drop of reagent 7_B and, again, shake for ten seconds.

Result

Blue colour indicates the possible presence of cocaine, including illicit cocaine base preparations such as "crack".

Remarks

A similar colour may occur in the presence of other controlled (methaqualone, phencyclidine) and non-controlled drugs/precursors.

Reference:
Kovar, K.-A., Noy, M., Pieper, R.. Dtsch.Apoth.Ztg., 122 (1982) 3.

B. Modified Cobalt Thiocyanate Test (Scott Test) (Test 8) F/L

1. Place a small amount of the suspected material in a test tube.

2. Add five drops of reagent 8_A and shake the test tube for ten seconds.
   If cocaine is present a blue colour develops immediately.
   If no blue colour appears, add an addition amount of suspected material equal to the amount first used.
   If a blue colour still does not develop, the suspected material does not contain cocaine.

3. If the solution turned blue in step 2, add one drop of reagent 8_B and shake the mixture for a few seconds.
   The blue colour should now turn pink if cocaine is present.
   If the colour change is incomplete, add one additional drop of reagent 8_B.

4. If the solution turns completely to pink in step 3, add five drops of reagent 8_C and shake again to mix the liquids.
   The blue colour should reappear in the lower (chloroform) layer indicating the presence of cocaine.

Remarks

Only a very few non-controlled or controlled drugs will give a similar colour sequence.

Reference:
Kovar, K.-A., Laudszun, M.. Chemistry and Reaction Mechanisms of Rapid Tests for Drugs of Abuse and Precursor Chemicals.
United Nations - Scientific and Technical Notes, SCITEC/6, Vienna (1989), p.15.

C. Methyl Benzoate Test (Test 9) F/L

1. Place a small amount of the suspected material in a test tube.

2. Add approximately ten drops of reagent 9.

3. Shake the test tube for ten seconds.

4. Compare the smell with that of a reference methyl benzoate sample.

Result

If the smell of the sample is the same as that of a reference methyl benzoate sample, it indicates the possible presence of cocaine.

Remarks

Only a very few non-controlled drugs will give a similar odour with this test. It is recommended to smell the samples from a safe distance (ca. 15-20 cm) with a brief sniff.

Reference:
Grant, F.W., Martin, W.C., Quackenbush, R.W.. Bull.Narc., 27 No.2 (1975) 33.

D. Wagner Test (Test 10)

L

1. Place a small amount of the suspected material in a test tube.

2. Add five drops of water and shake the test tube for a few seconds.

3. Add two drops of reagent 10.

Result

A brown precipitate indicates the possible presence of cocaine hydrochloride. Cocaine base does not give a precipitate with this reagent.

Remarks

Many other controlled and non-controlled drugs/precursors give the same reaction.

This reagent is useful as a differentiating test for cocaine hydrochloride and cocaine base. It should not be used alone, but rather as a secondary test following tests 7, 8 and 9.

References:
Jungreis, E.. Spot Test Analysis - Clinical, Environmental, Forensic and Geochemical Applications. John Wiley & Sons, Inc., New York (1985), p. 77.

Butler, W.P.. Methods of Analysis - Alkaloids, Opiates, Marihuana, Barbiturates, and Miscellaneous Drugs.
Internal Revenue Service, Publication No. 341 (Rev. 6-67), p. 77.

5. AMFETAMINE/METAMFETAMINE AND OTHER AMFETAMINE DERIVATIVES

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add two drops of reagent 1_B.

Result

Orange colour changing to brown indicates the possible presence of amfetamine or metamfetamine.

Yellow to yellow brown colour indicates the possible presence of 2,5-dimethoxy-4-ethylamfetamine (DOET) or STP/DOM.

Yellow green to green colour indicates the possible presence of 2,5-dimethoxyamfetamine (DMA) or brolamfetamine (DOB).

Black colour indicates the possible presence of tenamfetamine (MDA) or 3,4-methylenedioxyamfetamine (MDMA) or *N*-ethyl tenamfetamine (MDE) or *N*-hydroxy tenamfetamine (N-OH MDA).

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Brieskorn, C.H., Reiners, W., Kiderlen, H.. Arch.Pharm.(Weinheim), 298 (1965) 505.

World Health Organization - Programme on Substance Abuse. Information Manual on Designer Drugs. WHO/PSA/90.5, Geneva (1991).

B. Sulfuric Acid Test (Test 11) L

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 11.

Result

No colour should appear with amfetamine and metamfetamine.

Remarks

This reagent is useful for differentiating between amfetamine/metamfetamine and other derivatives; amfetamine and metamfetamine give no colour with this reagent; many other amfetamine derivatives react to give various colours.

Reference:
Neuninger, H.. Sci.Pharm., 55 (1987) 1.

C. Simon Test (Test 12) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 12_A.
3. Add two drops of reagent 12_B.

Result

Blue colour indicates the possible presence of metamfetamine.

Remarks

Other metamfetamine derivatives (3,4-methylenedioxymetamfetamine (MDMA), 2,5-dimethoxymetamfetamine (DMMA), paramethoxymetamfetamine (PMMA)) and other *N*-substituted derivatives (etilamfetamine, *N*-ethyl tenamfetamine (MDE)) give the same reaction.

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Wiegrebe, W., Vilbig, M.. Ztg.Naturforsch., 36b (1981) 1297.

World Health Organization - Programme on Substance Abuse. Information Manual on Designer Drugs. WHO/PSA/90.5, Geneva (1991).

D. Simon Test with Acetone (Test 13) L

1. Place a small amount of the suspected material on a spot plate.

2. Add one drop of reagent 13_A.

3. Add one drop of reagent 13_B.

Result

Purple colour indicates the possible presence of amfetamine.

Remarks

Other amfetamine derivatives (brolamfetamine (DOB), 2,5-dimethoxy-amfetamine (DMA), 2,5-dimethoxy-4-ethylamfetamine (DOET), paramethoxyamfetamine (PMA), tenamfetamine (MDA), 3,4,5-trimethoxyamfetamine (TMA)) give the same reaction.

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Wiegrebe, W., Vilbig, M.. Ztg.Naturforsch., 37b (1982) 490.

E. Gallic Acid Test (Test 14) L

1. Place a small amount of the suspected material in a test tube.

2. Add one drop of reagent 14.

Result

Bright to dark green colour indicates the possible presence of tenamfetamine (MDA) or 3,4-methylenedioxymetamfetamine (MDMA) or *N*-ethyl tenamfetamine (MDE) or *N*-hydroxy tenamfetamine (N-OH MDA) or 5-methoxy-3,4-methylenedioxyamfetamine (MMDA).

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
World Health Organization - Programme on Substance Abuse. Information Manual on Designer Drugs. WHO/PSA/90.5, Geneva (1991).

6. PEMOLINE

A. Zimmermann Test (Test 15) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 15_A.
3. Add one drop of reagent 15_B.

Result

Deep red colour indicates the possible presence of pemoline.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

B. Dinitrobenzene Tests (Test 16)

a) 1,2-Dinitrobenzene Test L

1. Place two drops of reagent 16_A on a spot plate.
2. Add a small amount of the suspected material.
3. Add two drops of reagent 16_B.

Result

Moderate purple colour indicates the possible presence of pemoline.

b) 1,3-Dinitrobenzene Test F/L

1. Place two drops of reagent 16_C on a spot plate.
2. Add a small amount of the suspected material.
3. Add two drops of reagent 16_B.

Result

Deep red colour indicates the possible presence of pemoline.

c) 1,4-Dinitrobenzene Test **F/L**

1. Place two drops of reagent 16_D on a spot plate.
2. Add a small amount of the suspected material.
3. Add two drops of reagent 16_B.

Result

Deep yellow colour indicates the possible presence of pemoline.

Remarks

Only two non-controlled substances - fenozolone and thozalinone - give similar colours with these three tests. Thozalinone can be distinguished from pemoline and fenozolone with the 1,4-Dinitrobenzene Test (thozalinone gives a deep purplish red colour).

Polyethylene glycol was chosen as solvent because its high boiling point facilitates the use of the test in hot climates, especially in Africa.

Reference:
Watanabe, K.. Report of the International Symposion of Forensic Science, Tokyo (1993), p.21-24.

7. BARBITURATES

A. Dille-Koppanyi Test (Test 17) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add three drops of reagent 17_A.
3. Add three drops of reagent 17_B.

Result

Reddish purple colour indicates the possible presence of barbiturates.

Remarks

Only very few other controlled or non-controlled drugs give a similar reaction.

References:
Koppanyi, T., Dille, J.M., Murphy, W.S., Krop, S.. Pharm.Assoc., 23 (1934) 1074.

Hartke, Mutschler, E. (Editors). DAB 9 - Kommentar.
Wissenschaftliche Verlagsgesellschaft, Stuttgart (1987), p.97.

8. DIAZEPAM AND OTHER BENZODIAZEPINE DERIVATIVES

A. Zimmermann Test (Test 15) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 15_A.
3. Add one drop of reagent 15_B.

Result

Reddish-purple or pink colour indicates the possible presence of diazepam or some related benzodiazepine derivatives.

Remarks

Some benzodiazepine derivatives (lorazepam, oxazepam, oxazolam, clorazepate, chlordiazepoxide, midazolam,...) do not give a colour with this test.

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Kovar, K.-A., Biegert, B.. Arch.Pharm.(Weinheim), 309 (1976) 522.

Kovar, K.-A., Linden, D.. Pharm.Acta Helv., 58 (1983) 66.

Kovar, K.-A., Kaiser, C.. Pharm.Acta Helv., 61 (1986) 42.

Kouidri, C., Sackda, S.. The Identification and Analysis of Benzodiazepines under International Control.
United Nations - Scientific and Technical Notes, SCITEC/1, Vienna (1987).

B. Hydrochloric Acid Test (Test 18) F/L

1. Place a small amount of the suspected material on a spot plate.

2. Add two drops of reagent 18.

Result

Yellow colour indicates the possible presence of diazepam or other benzodiazepine derivatives.

Remarks

Many non-controlled drugs may give similar colours.

Reference:
Kovar, K.-A., Linden, D.. Pharm.Acta Helv., 58 (1983) 66.

C. Vitali-Morin Test (Test 19) L

1. Place a small amount of the suspected material in a small porcelain dish.

2. Add 0.5 ml of reagent 19_A and heat over a water bath to dryness.

3. Add 5 ml of reagent 19_B.

4. Add 1 ml of reagent 19_C.

Result

Yellow orange colour indicates the possible presence of diazepam or some related benzodiazepine derivatives.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs.

Reference:
Kovar, K.-A., Laudszun, M.. Chemistry and Reaction Mechanisms of Rapid Tests for Drugs of Abuse and Precursor Chemicals.
United Nations - Scientific and Technical Notes, SCITEC/6, Vienna (1989), p.14.

9. METHAQUALONE

A. Cobalt Thiocyanate Test (Test 7) F/L

1. Place a small amount of the suspected material in a test tube.

2. Add one drop of reagent 7_A and shake the test tube for ten seconds.

3. Add one drop of reagent 7_B and, again, shake for ten seconds.

Result

Blue colour indicates the possible presence of methaqualone.

Remarks

A similar colour may occur in the presence of other controlled (cocaine, phencyclidine) and non-controlled drugs/precursors.

Reference:
Kovar, K.-A., Laudszun, M.. Chemistry and Reaction Mechanisms of Rapid Tests for Drugs of Abuse and Precursor Chemicals.
United Nations - Scientific and Technical Notes, SCITEC/6, Vienna (1989), p. 16.

10. LYSERGIDE (LSD)

A. Ehrlich Test (Test 20) F/L

1. Place a small amount of the suspected material on a spot plate.

2. Add two drops of reagent 20.

Result

Violet colour within a few minutes indicates the possible presence of lysergide (LSD).

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

For suspected LSD impregnated on paper, remove only one dosage form together with paper, place it on a spot plate and proceed with the test.

Reference:
Pindur, U.. Pharm.Unserer Zeit, 11 (1982) 74.

11. MESCALINE

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add two drops of reagent 1_B.

Result

Orange colour indicates the possible presence of mescaline.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Moffat, A.C. (Editor). Clarke's Isolation and Identification of Drugs, 2nd Edition. The Pharmaceutical Press, London (1986), p. 737.

B. Liebermann Test (Test 21) L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 21.

Result

Black colour indicates the possible presence of mescaline.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Moffat, A.C. (Editor). Clarke's Isolation and Identification of Drugs, 2nd Edition. The Pharmaceutical Press, London (1986), p. 737.

12. PSILOCYBINE

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add two drops of reagent 1_B.

Result

Orange colour indicates the possible presence of psilocybine.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Moffat, A.C. (Editor). Clarke's Isolation and Identification of Drugs, 2nd Edition. The Pharmaceutical Press, London (1986), p. 946.

B. Ehrlich Test (Test 20) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 20.

Result

Violet colour indicates the possible presence of psilocybine.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
United Nations. Recommended Methods for Testing Peyote Cactus (Mescal Buttons)/Mescaline and Psilocybe Mushrooms/Psilocybin.
ST/NAR/19, New York (1989), p. 33.

13. PHENCYCLIDINE (PCP)

A. Cobalt Thiocyanate Test (Test 7) F/L

1. Place a small amount of the suspected material in a test tube.
2. Add one drop of reagent 7_A and shake the test tube for ten seconds.
3. Add one drop of reagent 7_B and, again, shake for ten seconds.

Result

Blue colour indicates the possible presence of phencyclidine (PCP).

Remarks

A similar colour may occur in the presence of other controlled (cocaine, methaqualone) and non-controlled drugs/precursors.

Reference:
Kovar, K.-A., Laudszun, M.. Chemistry and Reaction Mechanisms of Rapid Tests for Drugs of Abuse and Precursor Chemicals.
United Nations - Scientific and Technical Notes, SCITEC/6, Vienna (1989), p. 16.

B. Mecke Test (Test 3) L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 3.

Result

Pink colour indicates the possible presence of phencyclidine (PCP).

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs.

Reference:
Kovar, K.-A., Laudszun, M.. Chemistry and Reaction Mechanisms of Rapid Tests for Drugs of Abuse and Precursor Chemicals.
United Nations - Scientific and Technical Notes, SCITEC/6, Vienna (1989), p. 16.

14. FENTANYL/*alpha*-METHYLFENTANYL

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Orange colour indicates the possible presence of fentanyl or *alpha*-methylfentanyl.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Allen, A.C. et al.. Microgram, 14 (1981) 26-32.

Moffat, A.C. (Editor). Clarke's Isolation and Identification of Drugs, 2nd Edition.
The Pharmaceutical Press, London (1986), p. 617.

World Health Organization - Programme on Substance Abuse. Information Manual on Designer Drugs.
WHO/PSA/90.5, Geneva (1991).

15. METHADONE

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Pink colour developing slowly and changing to violet indicates the possible presence of methadone.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Brieskorn, C.H., Reiners, W., Kiderlen, H.. Arch.Pharm.(Weinheim), 298 (1965) 505.

B. Nitric Acid-Sulfuric Acid Test (Test 22) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 22.

Result

Orange colour developing slowly and changing to red indicates the possible presence of methadone.

Reference:
Demonceau, J.. J.Pharm.Belg., 7 (1952) 36.

16. PETHIDINE

A. Marquis Test (Test 1) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Orange colour indicates the possible presence of pethidine.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Moffat, A.C. (Editor). Clarke's Isolation and Identification of Drugs, 2nd Edition. The Pharmaceutical Press, London (1986), p. 867.

World Health Organization - Programme on Substance Abuse. Information Manual on Designer Drugs. WHO/PSA/90.5, Geneva (1991).

B. Liebermann Test (Test 21) L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 21.

Result

Red orange colour indicates the possible presence of pethidine.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled substances.

References:
Moffat, A.C. (Editor). Clarke's Isolation and Identification of Drugs, 2nd Edition. The Pharmaceutical Press, London (1986), p. 867.

17. KHAT/CATHINONE/CATHINE

The laboratory of the United Nations International Drug Control Programme/Technical Services Branch is currently investigating possible field tests for khat and its major active components, cathinone and cathine, as well as for methcathinone (= ephedrone), a synthetic derivative of cathinone.

Cathine (= (+)-norpseudoephedrine) gives a positive result with Chen-Kao Test for ephedrines (see page 70).

B. PRECURSORS AND ESSENTIAL CHEMICALS

!!!! GENERAL SAFETY WARNING !!!!

Within the group of controlled precursors and essential chemicals, there are HIGHLY FLAMMABLE AND EXPLOSIVE as well as HIGHLY CORROSIVE substances.

Therefore,

- **When handling suspected material:**

  - **DO NOT SMOKE;**
  - **keep away from sources of ignition and heat (e.g. motors, lighters, direct sun light, hot plates);**
  - **wear safety goggles and gloves;**
  - **handle the material at a well ventilated place;**
  - **take special care when transporting the material, follow the guidelines recommended for the transport of hazardous chemicals.**

- **In case of an accident:**

  - **immediately take off contaminated clothing;**
  - **in case of contact with skin and/or eyes, rinse immediately with plenty of water and seek medical advice;**
  - **in case of spillage of larger amounts, stop smoking, evacuate the area and inform the fire brigade.**

- **Store the suspected material in a separate room which should be well ventilated, cool, dry and fireproof. Store the material in well closed containers. Follow the more detailed guidelines for storage given below.**

- **Do not dispose of suspected materials by pouring them into the canalization system or by throwing them to the household garbage, but forward them to a company/organization authorized for the collection and the disposal of hazardous waste.**

1. ACETIC ANHYDRIDE

CHARACTERISTICS

Mobile, colourless liquid with a penetrating, choking, characteristic odour, closely related to that of acetic acid.

!!!!! SAFETY WARNING !!!!!

- ***corrosive***
- ***vapour irritating to eyes, nose and throat***
- ***can react vigorously with oxidizing materials***
- ***reacts violently on contact with water or steam***

STORAGE/HANDLING

- ***Store in containers lined with stainless steel or polyethylene.***
- ***Separate from oxidants, strong bases and alcohols.***

IDENTIFICATION

A. Ferric Hydroxamate Test (Test 23) F/L

1. Place one drop of the suspected material on a spot plate.
2. Add one drop of reagent 23_A.
3. Add three drops of reagent 23_B.
4. Add one drop of water.

Result

Reddish to bluish purple colour indicates the possible presence of acetic anhydride.

Remarks

Other colours may occur in the presence of other anhydrides of carboxylic acids.

References:
Feigl, F.. Spot Tests in Organic Analysis, 7th Edition.
Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York (1966), p. 217.

Heinisch, G., Frank, H.. Arzneistoff-Identifizierung.
Georg Thieme Verlag, Stuttgart, New York (1986), p. 19.

2. ACETONE

CHARACTERISTICS

Colourless, volatile liquid with a sweetish, characteristic odour.

!!!!! SAFETY WARNING !!!!!

- ***highly flammable***
- ***skin and severe eye irritant***
- ***inhalation and ingestion produce headaches, dizziness and vomiting***

STORAGE/HANDLING

- ***Store in closed containers, at a temperature not exceeding 15°C.***
- ***Keep containers in a well-ventilated place, away from heat, sparks and flames.***
- ***Separate from oxidants.***

IDENTIFICATION

A. Sodium Nitroprusside Test (Test 24) F/L

1. Place a small drop of the suspected material on a spot plate.
2. Add two drops of reagent 24_A.
3. Add two drops of reagent 24_B.

Result

Orange red colour indicates the possible presence of acetone.

Remarks

Similar colours occur in the presence of other methyl ketones.

References:
Feigl, F.. Spot Tests in Organic Analysis, 7th Edition.
Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York (1966), p. 208.

Deutsches Arzneibuch, 9. Ausgabe.
Deutscher Apotheker Verlag, Stuttgart (1986), p. 488.

B. Zimmermann Test (Test 15) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 15_A.
3. Add one drop of reagent 15_B.

Result

Reddish purple to red colour indicates the possible presence of acetone.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Feigl, F.. Spot Tests in Organic Analysis, 7th Edition.
Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York (1966), p. 206.

Deutsches Arzneibuch, 9. Ausgabe.
Deutscher Apotheker Verlag, Stuttgart (1986), p. 488.

3. *N*-ACETYLANTHRANILIC ACID

CHARACTERISTICS

Fine white or off-white crystalline powder.

!!!!! SAFETY WARNING !!!!!

- Harmful if swallowed

STORAGE/HANDLING

- Store in tightly closed containers in a cool, dry area.

IDENTIFICATION

A. Ehrlich Test (Test 20) **F/L**

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 20.

Result

Lemon yellow colour indicates the possible presence of *N*-acetylanthranilic acid.

Remarks

As the colour of reagent 20 is also yellow, the resulting colour of the test for *N*-acetylanthranilic acid should always be compared to the colour of the reagent ("blind test"):

- Place one drop of reagent 20 on another, clean depression of the spot plate.
- Compare the resulting colour of the test for *N*-acetylanthranilic acid with the colour of reagent 20.

The test for *N*-acetylanthranilic acid should only be considered positive if the resulting colour differs clearly from the colour of reagent 20.

When one drop of reagent 24_A is added to the substance before adding reagent 20, the test results in an orange-red colour (due to formation of anthranilic acid).

Reference:
Kakác, B., Vejdelek, Z.J. (Editors). Handbuch der photometrischen Analyse organischer Verbindungen, Band 2. Verlag Chemie, Weinheim (1974), p. 499.

4. ANTHRANILIC ACID

CHARACTERISTICS

White or pale yellow crystals or powder.

!!!!! SAFETY WARNING !!!!!

- Harmful if swallowed

STORAGE/HANDLING

- Store in tightly closed containers and in a cool, dry area.

IDENTIFICATION

A. Ehrlich Test (Test 20) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 20.

Result

Red colour indicates the possible presence of anthranilic acid.

Remarks

Similar or other colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Kakác, B., Vejdelek, Z.J. (Editors). Handbuch der photometrischen Analyse organischer Verbindungen, Band 2. Verlag Chemie, Weinheim (1974), p. 499.

B. Simon Test (Test 12) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 12_A.
3. Add two drops of reagent 12_B.

Result

Yellow colour turning to yellowish green indicates the possible presence of anthranilic acid.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

5. EPHEDRINE/PSEUDOEPHEDRINE

CHARACTERISTICS

EPHEDRINE:

Base:	Waxy solid crystals or granules with soapy feel. Soluble in water, alcohol, ethyl ether, chloroform, oils.
Hydrochloride:	White crystals. Soluble in water, very soluble in alcohol, practically insoluble in ethyl ether.
Sulfate:	White or slightly reddish yellow crystals (orthorhombic needles). Soluble in water, partly soluble in alcohol.

PSEUDOEPHEDRINE:

Base:	White crystals. Sparingly soluble in water, freely soluble in alcohol or ethyl ether.
Hydrochloride:	White needles. Soluble in water, alcohol and chloroform.
Sulfate:	White odourless crystals or crystalline powder. Freely soluble in alcohol.

!!!!! SAFETY WARNING !!!!!

- ***Harmful if swallowed***
- ***Do not breathe dust!***
- ***Avoid contact with skin and eyes!***

STORAGE/HANDLING

- ***Keep in well-closed containers, protected from light.***

IDENTIFICATION

A. Chen-Kao Test (Test 25) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 25_A.
3. Add two drops of reagent 25_B.
4. Add two drops of reagent 25_C.

Result

Violet colour indicates the possible presence of ephedrine or pseudoephedrine.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Hartke, K., Mutschler,E. (Editors). DAB 9 - Kommentar.
Wissenschaftliche Verlagsgesellschaft, Stuttgart (1987), p. 1550.

6. ERGOMETRINE

CHARACTERISTICS

Base:	Tends to form solvated colourless crystals. Freely soluble in lower alcohols, ethyl acetate, acetone, slightly soluble in water and chloroform.
Hydrochloride:	Needles. Partly soluble in water.
Maleate:	White or yellowish, odourless, crystalline powder. Slightly soluble in water, scarcely soluble in ethanol, almost insoluble in chloroform and ethyl ether.
Tartrate:	White crystalline powder (darkens and decomposes on exposure to light). Soluble in water and ethanol, slightly soluble in chloroform and ethyl ether.

!!!!! SAFETY WARNING !!!!!

- ***highly toxic***
- ***Ingestion results in vomiting, diarrhoea, unquenchable thirst, confusion and unconsciousness.***
- ***Chronic poisoning arises from ingestion of grain contaminated with ergot.***

STORAGE/HANDLING

- ***Store in tightly closed amber-coloured containers in cool, dry areas and at a temperature of 2°C to 8°C.***

IDENTIFICATION

A. Ehrlich Test (Test 20) F/L

1. Place a small amount of the suspected material on a spot plate.

2. Add two drops of reagent 20.

Result

Violet colour indicates the possible presence of ergometrine.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Pindur, U.. Pharm.Unserer Zeit, 11 (1982) 74.

7. ERGOTAMINE

CHARACTERISTICS

Base: Tends to form solvated colourless crystals.
Freely soluble in chloroform, pyridine and glacial acetic acid, moderately soluble in ethyl acetate, slightly in benzene and ethanol, almost insoluble in water and petroleum ether.

Hydrochloride: Plates.
Soluble in water-alcohol mixtures, sparingly soluble in water or alcohol.

Tartrate: Colourless, odourless crystals or a white or yellowish white crystalline powder.
Slightly soluble in water and alcohol, almost insoluble in ethyl ether and chloroform.

!!!!! SAFETY WARNING !!!!!

- ***highly toxic***
- ***Ingestion results in vomiting, diarrhoea, unquenchable thirst, confusion and unconsciousness.***
- ***Chronic poisoning arises from ingestion of grain contaminated with ergot.***

STORAGE/HANDLING

- ***Store in tightly closed amber-coloured containers in cool, dry areas and at a temperature of 2°C to 8°C.***

IDENTIFICATION

A. Ehrlich Test (Test 20) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add two drops of reagent 20.

Result

Violet colour indicates the possible presence of ergotamine.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Pindur, U.. Pharm.Unserer Zeit, 11 (1982) 74.

8. ETHYL ETHER

CHARACTERISTICS

Colourless, mobile, volatile liquid with a sweet, pungent odour.

!!!!! SAFETY WARNING !!!!!

- ***EXTREMELY FLAMMABLE***
- ***May form explosive peroxides.***
- ***mildly toxic by inhalation, moderately toxic by ingestion***
- ***skin and severe eye irritant***

STORAGE/HANDLING

- ***Store in well-closed containers at a well-ventilated place.***
- ***Keep away from sources of ignition - NO SMOKING.***
- ***Do not empty into drains.***
- ***Take precautionary measures against static discharges.***

IDENTIFICATION

For security and safety reasons, no field test is recommended for ethyl ether.

Any material suspected to be ethyl ether should be handled with special caution and submitted to a laboratory for analysis.

9. HYDROCHLORIC ACID

CHARACTERISTICS

Clear, colourless to light yellow fuming liquid with a pungent odour.

!!!!! SAFETY WARNING !!!!!

- ***strongly corrosive***
- ***vapours irritant to the mucous membranes, to the eyes and respiratory tract***
- ***More severe exposures result in pulmonary edema.***

STORAGE/HANDLING

- ***Store below 30°C in airtight containers of glass or other inert material.***
- ***Separate from oxidants and strong bases.***

IDENTIFICATION

A. Acidity Test (Test 26) F/L

1. Put five drops of water into a test tube.
2. Carefully add one drop of the suspected material.
3. Transfer one small drop of this solution (using a pipette) onto neutral litmus paper.

Result

The colour of the indicator paper turning to red indicates the presence of an acid.

Remarks

Also other pH-indicator papers or sticks (covering pH 0-14) may be used.
Please follow the instructions given on the packages.

B. Chloride Test (Test 27) F/L

1. Put five drops of water into a test tube.
2. Carefully add one drop of the suspected material.
3. Add one drop of reagent 27.

Result

A white, flaky precipitate indicates the possible presence of hydrochloric acid.

Remarks

The same reaction occurs in the presence of chloride salts.

Reference:
Deutsches Arzneibuch, 9. Ausgabe.
Deutscher Apotheker Verlag, Stuttgart (1986), p. 63.

10. ISOSAFROLE

CHARACTERISTICS

Colourless, viscous liquid with a sweet, anise-like odour.

!!!!! SAFETY WARNING !!!!!

- ***moderately toxic by ingestion***
- ***poisonous by parenteral routes***
- ***experimental carcinogen and tumorigen***
- ***skin irritant***
- ***When heated to decomposition, isosafrole emits acrid smoke and fumes.***

STORAGE/HANDLING

- ***Keep in cool place protected from light.***

IDENTIFICATION

A. Marquis Test (Test 1) F/L

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Dark purple colour indicates the possible presence of isosafrole.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

B. Gallic Acid Test (Test 14) L

1. Place one drop of the suspected material in a test tube.

2. Add one drop of reagent 14.

Result

Red to reddish brown colour indicates the possible presence of isosafrole.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

11. LYSERGIC ACID

CHARACTERISTICS

White crystals, sparingly soluble in water, soluble in alkalis.

!!!!! SAFETY WARNING !!!!!

- ***highly toxic***
- ***Ingestion results in vomiting, diarrhoea, unquenchable thirst, confusion and unconsciousness.***

STORAGE/HANDLING

- ***Store in tightly closed containers in a cool place, protected from light.***

IDENTIFICATION

A. Ehrlich Test (Test 20) F/L

1. Place a small amount of suspected material on a spot plate.

2. Add two drops of reagent 20.

Result

Violet colour indicates the possible presence of lysergic acid.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Pindur, U.. Pharm.Unserer Zeit, 11 (1982) 74.

12. 3,4-METHYLENEDIOXYPHENYL-2-PROPANONE (MD-P_2P)

CHARACTERISTICS

Viscous liquid with a anise-like odour.

!!!!! SAFETY WARNING !!!!!

- irritating to skin and eyes

STORAGE/HANDLING

- Store in stainless steel or containers with a thin lining for long-term storage.
- For short term storage and transportation carbon steel containers are suitable.

IDENTIFICATION

A. Marquis Test (Test 1) F/L

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Orange-brown colour indicates the possible presence of 3,4-methylenedioxy-phenyl-2-propanone (MD-P_2P).

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

B. Gallic Acid Test (Test 14) L

1. Place one drop of the suspected material in a test tube.
2. Add one drop of reagent 14.

Result

Brown colour indicates the possible presence of 3,4-methylenedioxyphenyl--2-propanone (MD-P_2P).

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

13. METHYL ETHYL KETONE

CHARACTERISTICS

Colourless liquid, with a fragrant mint-like moderately sharp odour.

!!!!! SAFETY WARNING !!!!!

- ***highly flammable***
- ***skin and severe eye irritant***
- ***inhalation and ingestion produce headaches, dizziness and vomiting (less toxic than acetone)***

STORAGE/HANDLING

- ***Store in closed containers, at a temperature not exceeding 15°C.***
- ***Keep containers in a well-ventilated place, away from heat, sparks and flames.***
- ***Separate from oxidants.***

IDENTIFICATION

A. Sodium Nitroprusside Test (Test 24) F/L

1. Place a small drop of the suspected material on a spot plate.
2. Add two drops of reagent 24_A.
3. Add two drops of reagent 24_B.

Result

Orange red colour indicates the possible presence of methyl ethyl ketone.

Remarks

Similar colours occur in the presence of other methyl ketones.

References:
Feigl, F. Spot Tests in Organic Analysis, 7th Edition.
Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York (1966), p. 208.

Deutsches Arzneibuch, 9. Ausgabe.
Deutscher Apotheker Verlag, Stuttgart (1986), p. 488.

B. Zimmermann Test (Test 15) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 15_A.
3. Add one drop of reagent 15_B.

Result

Pink colour indicates the possible presence of methyl ethyl ketone.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

References:
Feigl, F.. Spot Tests in Organic Analysis, 7th Edition.
Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York (1966), p. 206.

Deutsches Arzneibuch, 9. Ausgabe.
Deutscher Apotheker Verlag, Stuttgart (1986), p. 488.

14. PHENYLACETIC ACID

CHARACTERISTICS

White powder with a very disagreeable pungent odour.

!!!!! SAFETY WARNING !!!!!

- ***moderately toxic by ingestion, subcutaneous, and intraperitoneal routes***
- ***experimental teratogen***
- ***combustible when exposed to heat or flame***
- ***When heated to decomposition it emits acrid smoke and irritating fumes.***

STORAGE/HANDLING

- ***Store in dark bottles in a cool, dry area.***

IDENTIFICATION

A. Marquis Test (Test 1) F/L

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Yellow colour turning to olive green indicates the possible presence of phenylacetic acid.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

15. 1-PHENYL-2-PROPANONE (P_2P)

CHARACTERISTICS

Colourless or yellowish liquid; characteristic odour; immiscible with water, soluble in organic solvents.

!!!!! SAFETY WARNING !!!!!

- ***flammable***
- ***irritating to skin and eyes.***

STORAGE/HANDLING

- ***Store in tightly closed containers in cool, dry areas.***

IDENTIFICATION

A. Marquis Test (Test 1) **F/L**

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Orange-yellow colour indicates the possible presence of 1-phenyl--2-propanone (P_2P).

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

16. PIPERIDINE

CHARACTERISTICS

Colourless liquid; soapy feel; intensive unpleasant odour; soluble in water and alcohol.

!!!!! SAFETY WARNING !!!!!

- ***highly flammable***
- ***corrosive***
- ***toxic by inhalation and in contact with skin***

STORAGE/HANDLING

- ***Store in tightly closed containers in a cool, dry area and fireproof place.***
- ***Separate from oxidants and acids.***

IDENTIFICATION

A. Simon Test (Test 12) **F/L**

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 12_A.

Result

Deep blue colour indicates the possible presence of piperidine.

Remarks

A similar colour may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Wiegrebe, W., Vilbig, M.. Ztg.Naturforsch., 36b (1981) 1297.

17. PIPERONAL

CHARACTERISTICS

Colourless, lustrous needle-shaped crystals, heliotrope odour.

!!!!! SAFETY WARNING !!!!!

- ***moderately toxic by ingestion and intraperitoneal routes***
- ***can cause central nervous system depression***
- ***irritant to skin***
- ***combustible when exposed to heat or flame***
- ***can react with oxidizing materials***

STORAGE/HANDLING

- ***Store at a cool place protected from light.***

IDENTIFICATION

A. Marquis Test (Test 1) **F/L**

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Lemon yellow colour indicates the possible presence of piperonal.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

B. Sulfuric Acid Test (Test 11) L

1. Place one drop of the suspected material in a test tube.

2. Add one drop of reagent 11.

Result

Lemon yellow colour indicates the possible presence of piperonal.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

18. POTASSIUM PERMANGANATE

CHARACTERISTICS

Dark purple or bronze-like, odourless crystals. Almost opaque by transmitted light and of a blue metallic luster by reflected light. Stable in air.

!!!!! SAFETY WARNING !!!!!

- ***Explosions may occur in case of contact with organic or other oxidizable substances, in solution or in the dry state.***

STORAGE/HANDLING

- ***Store in well closed containers (bottles and drums) at ambient temperature with open vents.***
- ***Avoid contact with organic substances.***

IDENTIFICATION

A. Permanganate Test (Test 28) F/L

1. Place a small amount of the suspected material on a spot plate.
2. Add one drop of reagent 28_A.
3. Add one drop of reagent 28_B.

Result

Pink colour changing to dark green indicates the possible presence of potassium permanganate.

Remarks

The same colours occur in the presence of other permanganate salts.

Reference:
British Pharmacopœia 1988.
Her Majesty's Stationary Office, London (1988), p. 455.

19. SAFROLE

CHARACTERISTICS

Colourless or slightly yellow liquid or crystals; sassafras odour.

!!!!! SAFETY WARNING !!!!!

- ***moderately toxic by ingestion***
- ***poisonous by parenteral routes***
- ***experimental carcinogen and neoplastigen***
- ***irritant to skin***
- ***combustible when exposed to heat or flame***
- ***When heated to decomposition it emits acrid smoke and irritating fumes.***

STORAGE/HANDLING

- Keep in a cool place protected from light.

IDENTIFICATION

A. Marquis Test (Test 1) F/L

1. Place a small drop of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Deep blue colour turning to dark purple indicates the possible presence of safrole.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

B. Gallic Acid Test (Test 14) L

1. Place one drop of the suspected material in a test tube.
2. Add one drop of reagent 14.

Result

Brown colour turning to dark brownish red indicates the possible presence of safrole.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

20. SULFURIC ACID

CHARACTERISTICS

Clear, colourless, odourless oily liquid, more viscous than water.

!!!!! SAFETY WARNING !!!!!

- ***extremely corrosive to all body tissues***
- ***Reacts with water or steam to produce heat.***

STORAGE/HANDLING

- ***Store in airtight containers of glass or other inert material (unbreakable packaging if possible).***
- ***Keep separate from combustible substances, reducing agents and bases***
- ***Ventilate at floor level.***
- ***UNDER NO CIRCUMSTANCES ADD WATER TO SULFURIC ACID. WHEN DILUTING ALWAYS ADD SULFURIC ACID TO WATER SLOWLY, STIRRING CONSTANTLY.***

IDENTIFICATION

A. Acidity Test (Test 26) **F/L**

1. Put five drops of water into a test tube.
2. Carefully add one drop of the suspected material.
3. Transfer one small drop of this solution (using a pipette) onto neutral litmus paper.

Result

The colour of the indicator paper turning to red indicates the presence of an acid.

Remarks

Also other pH-indicator papers or sticks (covering pH 0-14) may be used. Please follow the instructions given on the packages.

B. Sulfate Test (Test 29) F/L

1. Put five drops of water into a test tube.
2. Carefully add one drop of the suspected material.
3. Add one drop of reagent 29.

Result

A white precipitate indicates the possible presence of sulfuric acid.

Remarks

The same reaction occurs in the presence of sulfate salts.

Reference:
British Pharmacopœia 1988.
Her Majesty's Stationary Office, London (1988), p. 550.

21. TOLUENE

CHARACTERISTICS

Mobile, refractive, colourless, highly inflammable liquid with a benzene-like odour.

!!!!! SAFETY WARNING !!!!!

- ***highly flammable***
- ***moderately toxic by ingestion and inhalation***
- ***Inhalation of higher doses results in headache, nausea, impairment of coordination and reaction time.***
- ***skin and severe eye irritant***
- ***experimental teratogen, mutation data reported***
- ***incompatible with strong oxidants***

STORAGE/HANDLING

- ***Store in airtight containers at a fireproof place.***
- ***Separate from oxidants.***

IDENTIFICATION

A. Marquis Test (Test 1) F/L

1. Place two drops of the suspected material on a spot plate.
2. Add one drop of reagent 1_A.
3. Add three drops of reagent 1_B.

Result

Orange-red colour indicates the possible presence of toluene.

Remarks

Similar or other colours may occur in the presence of other controlled and non-controlled drugs/precursors.

Reference:
Feigl, F.. Spot Tests in Organic Analysis, 7th Edition.
Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York (1966), p. 137.

IV. PROPOSED TRAINING PROGRAMME FOR CHEMICAL FIELD TESTING

A. GENERAL

The appropriate use of rapid chemical field tests can save time and work for the law enforcement officer and makes it possible for an immediate action to be taken in the field even though the results of these tests represent only a presumptive identification of a suspected controlled drug.

Whichever type of field test is used, a certain amount of skill and experience is needed in order to use them effectively and to interpret the results correctly.

A training programme for the use of chemical field testing for drugs of abuse should be an integral part of the training of all the law enforcement officers, border police or customs officers who may encounter suspected illicit drug material. It is suggested that this training should be included in the training programme which covers the collection and preservation of drug evidence.

Field testing of drugs of abuse should be covered, if possible, by a periodic in-service training for law enforcement officers to update their knowledge on recent developments in this area.

Experience shows that any effective training on the proper use of field tests should be of adequate duration (minimum of 4 hours) and must include a practical exercise by the trainees, testing:

- samples of seized illicit drugs already analyzed and identified;

- reference samples (pure compounds).

The overall objective is to enable the trainee to understand the proper collection, handling, field testing and preservation of suspected drug evidence and proper submission to a forensic laboratory.

The selection of the instructor is vital to the success of the training programme. He/she should be a forensic chemist or a specially trained law enforcement officer well versed in evidence handling and field testing for drugs. The instructor should always keep in mind that the audience addressed (the trainees) consists of law enforcement officers, wishing to learn how to properly use a tool to assist them in their duties.

The instructor should have prior contact with the various agencies represented by the trainees to determine specific problems that should be covered or stressed during the training session. The instructor should have basic knowledge of the legal requirements regarding physical evidence handling for that country/region and the type of drugs most frequently encountered.

The training programme should, if possible, consist of the following subjects:

- Safety - precautions in handling suspected drug material and chemical reagents;

- Use of test kits - mechanical handling of the kits, the equipment they contain and precautions to take to prevent contamination of the equipment;

- Application of the tests to suspected material;

- Forensic laboratory - importance of interaction between law enforcement officers and laboratory personnel.

In addition, the following materials should be available:

- Training Aids: blackboard, flip chart, slide projector, handout material and evidence containers;

- Field Test Kits: no more than three officers per kit for practical work. Depending on the country/region, the kits should contain appropriate reagents for the material to be tested;

- Known and Unknown Drug Materials: these materials should be prepared preferably by a forensic laboratory in glass vials and should be coded either by numbers or letters with the key known only to the instructor.

In preparing for the practical exercises the instructor should:

- Ensure that enough table space is available for comfortable arrangement of the trainees. Crowded conditions are unsafe;

- Provide protection for the table used since the kits contain corrosive material, for example, acids.

B. TOPICS TO BE COVERED

The following is a suggested outline intended for instructors who may be involved in the training of law enforcement officers in the use of field tests and/or kits for drugs of abuse. The outline can be adapted as needed to the specific requirements of the law enforcement agency and for the types of illicit drugs that are most commonly seized in that geographical area.

1. General topics

- General statements on illegal drug situation in country/region;
- Review of evidence handling procedure;
- Role of the forensic laboratory;
- Presentation of evidence in court.

2. Safety aspects

- Cautious handling of suspected drug material; (it may be very potent or may contain poison);
- Cautious handling of test reagents, (many contain corrosive liquids such as acids);
- Testing of liquids or wet materials;
- Emphasis on not tasting or sniffing suspected drug material;
- Stress keeping hands away from face, especially from mouth and nose while performing the tests;
- Washing of hands thoroughly after handling suspected materials and reagents.

3. Available information on the suspected material

- Information from the suspect or an informant; other intelligence;
- Nature and other characteristics of packaging;
- Physical form (tablet, capsule, powder or plant material), colour, shape, consistency;
- What is the material suspected to be?

C. DISCUSSION ON FIELD TESTING

Chemical field tests are tools or techniques which when properly used can assist the law enforcement officers in making informed decisions regarding suspected drug materials so that immediate actions can be taken.

1. Presumptive nature of field testing

The fact that field tests or colour tests were never intended as a definitive method to identify drugs of abuse should be stressed. However, it should be pointed out that they are useful because they give the officer probable cause to make an arrest, obtain search warrants, arrest warrants. They may also be used as evidence in preliminary hearings and may assist the undercover officer in protecting expenditures of "buy" money. It should be made clear and emphasized why the evidence (sample of the suspected material) must be sent to a forensic laboratory for positive identification for use in a court of law.

2. False positives and false negatives

The colour(ed) reaction used for the detection of a given controlled substance is not specific for only that drug because the test reagent(s) usually react(s) with other materials to form similar colours. On the other hand, for reasons outlined on page 5 no reaction may occur in certain cases even though a controlled drug may be present. Examples of false positives and false negatives should be given by the instructor.

Colours formed by the test reagents should be compared with a colour reference chart if possible because colour evaluation by individuals is a subjective judgement and can lead to misinterpretation of results.

If there is strong indication that the suspected material may contain a controlled drug, sample should be submitted to the laboratory even though the field test was negative or inconclusive.

D. PRACTICAL EXERCISE

- Review of safety precautions; (this cannot be emphasized enough);

- Introduction of trainees to field test kit equipment and to its proper use. Caution trainees on contamination of equipment which will lead to false results; instruct on necessity and means for cleaning equipment;

- Advantages and disadvantages of various types of kits;

- Instructor demonstrates proper testings;

- Use of reference samples, illicit and licit drugs;

- During testing of the known compounds the instructor should point out factors such as sensitivity, time for colour formation, false positives, etc., for each test performed;

- Each trainee should test each of the known compounds selected for the exercises;

- Distribution to the trainees of pre-coded unknown materials and a worksheet, re-emphasizing safety aspects;

- Short discussion to answer questions before testing unknowns;

- All trainees should test unknowns and enter the results on the worksheet provided;

- Discussion of results; re-emphasize presumptive nature of tests and the need for experience in performing the tests;

- Clean-up; re-emphasize, once again, safety procedures and proper disposal of waste materials.

ANNEX

REAGENTS

Test 1: Marquis Test

Reagent 1_A: Add 8-10 drops (approx. 0.25 ml) of 37% formaldehyde solution to 10 ml of glacial acetic acid.

Reagent 1_B: Concentrated sulfuric acid

Test 2: Ferric Sulfate Test

Reagent 2: Dissolve 5 g of ferric sulfate in 100 ml of water.

Test 3: Mecke Test

Reagent 3: Dissolve 1 g of selenious acid in 100 ml of concentrated sulfuric acid.

Test 4: Nitric Acid Test

Reagent 4: Concentrated nitric acid

Test 5: Fast Blue Salt B Test

Reagent 5_A: Carefully mix 2.5 g of fast blue B salt with 100 g of anhydrous sodium sulfate.

Reagent 5_B: Chloroform

Reagent 5_C: Dissolve 0.4 g of sodium hydroxide in 100 ml of water.
(= 0.1N sodium hydroxide solution)

Test 6: Duquenois-Levine Test

Reagent 6_A: Dissolve 2 g of vanillin in 100 ml of 95% ethanol, then add 2.5 ml of acetaldehyde.

Reagent 6_B: Concentrated hydrochloric acid

Reagent 6_C: Chloroform
(same as reagent 5_B)

Test 7: Cobalt Thiocyanate Test

Reagent 7_A: 16% aqueous hydrochloric acid solution

Reagent 7_B: Dissolve 2.5 g of cobalt(II) thiocyanate in 100 ml of water.

Test 8: Modified Cobalt Thiocyanate Test (Scott Test)

Reagent 8_A: Dissolve 1 g of cobalt(II) thiocyanate in 50 ml of 10% (vol/vol) acetic acid, then add 50 ml of glycerine.

Reagent 8_B: Concentrated hydrochloric acid
(same as reagent 6_B)

Reagent 8_C: Chloroform
(same as reagent 5_B)

Test 9: Methyl Benzoate Test

Reagent 9: Dissolve 5 g of potassium hydroxide in 100 ml of absolute methanol.

Test 10: Wagner Test

Reagent 10: Mix 1.27 g of iodine and 2 g of potassium iodide, then dissolve the mixture in 100 ml of water.

Test 11: Sulfuric Acid Test

Reagent 11: Concentrated sulfuric acid
(same as reagent 1_B)

Test 12: Simon Test

Reagent 12_A: Dissolve 0.9 g of sodium nitroprusside in 90 ml of water, then add 10 ml of acetaldehyde.

Reagent 12_B: Dissolve 2 g of sodium carbonate in 100 ml of water.

Test 13: Simon Test with Acetone

Reagent 13_A: Dissolve 1 g of sodium nitroprusside in 100 ml of 5% (vol/vol) aqueous acetone.

Reagent 13_B: Dissolve 2 g of sodium carbonate in 100 ml of water. (same as reagent 11_B)

Test 14: Gallic Acid Test

Reagent 14: Dissolve 0.5 g of gallic acid in 100 ml of concentrated sulfuric acid.

Test 15: Zimmermann Test

Reagent 15_A: Dissolve 1 g of 1,3-dinitrobenzene in 100 ml of methanol.

Reagent 15_B: Dissolve 15 g of potassium hydroxide in 100 ml of water.

Test 16: Dinitrobenzene Tests

Reagent 16_A: Dissolve 1 g of 1,2-dinitrobenzene in 100 ml of polyethylene glycol.

Reagent 16_B: Dissolve 10 g of lithium hydroxide in 100 ml of water.

Reagent 16_C: Dissolve 1 g of 1,3-dinitrobenzene in 100 ml of polyethylene glycol.

Reagent 16_D: Dissolve 1 g of 1,4-dinitrobenzene in 100 ml of polyethylene glycol.

Test 17: Dille-Koppanyi Test

Reagent 17_A: Dissolve 0.1 g of cobalt(II) acetate tetrahydrate in 100 ml of absolute methanol, then add 0.2 ml of glacial acetic acid.

Reagent 17_B: Mix 5 ml of isopropylamine with 95 ml of absolute methanol.

Test 18: Hydrochloric Acid Test

Reagent 18: 2N hydrochloric acid (approx. 7.3%)

Test 19: Vitali-Morrin Test

Reagent 19_A: Concentrated nitric acid
(same as reagent 4)

Reagent 19_B: Acetone

Reagent 19_C: Dissolve 0.56 g of potassium hydroxide in 100 ml of ethanol.
(= 0.1N ethanolic potassium hydroxide solution)

Test 20: Ehrlich Test

Reagent 20: Dissolve 1 g of 4-dimethylamine benzaldehyde in 10 ml of methanol, then carefully add 10 ml of concentrated *ortho*-phosphoric acid.

Test 21: Liebermann Test

Reagent 21: Dissolve 1 g of sodium nitrite in 10 ml of concentrated sulfuric acid.

Test 22: Nitric Acid - Sulfuric Acid Test

Reagent 22: Add 10 (approx. 0.3 ml) drops of concentrated nitric acid to 10 ml of sulfuric acid.

Test 23: Ferric Hydroxamate Test

Reagent 23_A: Dissolve 10 g of hydroxylamine hydrochloride in 100 ml of methanol.

Reagent 23_B: Dissolve 0.5 g of ferric chloride in 100 ml of methanol.

Test 24: Sodium Nitroprusside Test

Reagent 24_A: Dissolve 8 g of sodium hydroxide in 100 ml of water.
(= 2N sodium hydroxide solution)

Reagent 24_B: Dissolve 1 g of sodium nitroprusside in 100 ml of water.

Test 25: Chen-Kao Test

Reagent 25_A: 1% (vol/vol) aqueous acetic acid solution

Reagent 25_B: Dissolve 1 g of copper(II) sulfate in 100 ml of water.

Reagent 25_C: Dissolve 8 g of sodium hydroxide in 100 ml of water.
(= 2N sodium hydroxide solution)
(same as reagent 23_A)

Test 26: Acidity Test

Reagent 26: Neutral litmus paper

Test 27: Chloride Test

Reagent 27: Dissolve 1.7 g of silver nitrate in 100 ml of water.

Test 28: Permanganate Test

Reagent 28_A: Dissolve 8 g of sodium hydroxide in 100 ml of water.
(= 2N sodium hydroxide solution)
(same as reagent 23_A)

Reagent 28_B: Absolute ethanol

Test 29: Sulfate Test

Reagent 29: Dissolve 5 g of barium chloride dihydrate in 100 ml of water.