

## For Cocaine, Methamphetamine, Morphine, and THC

Part No. 6902039

English

### Intended Use

On-Site CupKit is an *in vitro* diagnostic test intended for professional use for the qualitative detection of drug or drug metabolite in urine.

On-Site CupKit simultaneously tests for the presence of multiple drugs or drug metabolites. The On-Site CupKit profile (cutoff) consists of cocaine metabolite (benzoylecgonine 300 ng/mL), methamphetamine (*d*-methamphetamine 500 ng/mL), morphine (morphine 300 ng/mL), and THC (11-nor- $\Delta^9$ -THC-9-carboxylic acid 50 ng/mL). The CupKit cut-offs are based on US federal mandatory guidelines for SAMHSA (Substance Abuse and Mental Health Services Administration) drugs with the exception of morphine which has a cutoff level of 300 ng/mL.

**On-Site CupKit provides only a preliminary analytical test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmation method.<sup>1</sup> Clinical consideration and professional judgment should be applied to any drug of abuse test result, particularly when preliminary positive results are used.**

### Summary

Drugs are usually administered via ingestion, inhalation, or injection.<sup>2</sup> After entering the bloodstream, they are rapidly metabolized by various pathways.<sup>3</sup> Many drugs and drug metabolites are excreted in the urine, availing them to detection by drug screening assays.

Historically, drug screening assays were performed by classical chemical methods, such as thin layer chromatography or liquid chromatography which, though accurate, are laborious procedures. More recent assays used for initial testing use immunologic principles. Examples of these methods are radioimmunoassay, enzyme immunoassay, kinetic interaction of microparticles in solution, and fluorescence immunoassay, all of which require sophisticated instrumentation. Classic drug screening technology, such as Abuscreen OnTrak, takes advantage of the accuracy of the immunologically based assays without the need for sophisticated instrumentation. However, although these assays do not require sophisticated instrumentation, they do entail handling laboratory reagents and urine specimens.

On-Site CupKit uses a competitive microparticle capture inhibition for the simultaneous detection of multiple drugs or drug metabolites in urine. This method provides the accuracy of an immunoassay without handling, or having contact with, laboratory reagents or urine specimens, or the need for expensive equipment.

Patented technology incorporated in the design of the CupKit device inhibits contamination of the urine by the reagent system. Confirmation tests are unaffected.

### Test Principle

On-Site CupKit assays are based on the principle of microparticle capture inhibition. The test relies on the competition between the drug, which may be present in the urine being tested, and drug conjugate immobilized on a membrane in the test chamber.

Urine is collected directly in the On-Site CupKit. The drug profile card is placed in the sample by inserting it into the lid holder, then securing the lid onto the cup. Urine is drawn into the profile card by capillary action and reacts with antibody-coated microparticles and drug conjugate present on the membrane. In the absence of drug, the antibody is free to interact with the drug conjugate, causing the formation of a blue band ("negative" sign).

When drug is present in the specimen, it binds to the antibody-coated microparticles. If sufficient drug is present, the microparticles are inhibited from binding the drug conjugate, and no blue band is formed. A preliminary positive ("non-negative") result is the absence of a blue band.

An additional antibody/antigen reaction occurs at the "VALID" area for all

assays. The "VALID" blue band forms when antibodies, which are imbedded in the reagent membrane, interact with and bind to the antigen on the blue-dyed microparticles.

### Reagents

Each On-Site CupKit contains individual test chambers for the detection of a specific drug or drug metabolite. The membrane in each respective test chamber contains:

1. Blue-dyed microparticles coated with mouse monoclonal anti-benzoylecgonine (cocaine metabolite), anti-methamphetamine, anti-morphine, or anti-cannabinoid and BSA in a buffered solution containing preservative and dried on a membrane.
2. Drug or drug analogue conjugates immobilized on a membrane.
3. Mouse monoclonal anti-BSA immobilized on a membrane.

### Precautions and Warnings

For *in vitro* diagnostic use. Exercise the normal precautions for handling all laboratory reagents. Disposal of all waste material should be in accordance with local guidelines.

### Storage and Stability

On-Site CupKit should be stored at room temperature (15 - 30 °C or 59 - 86 °F). If the foil pouch containing the CupKit profile card is damaged (e.g., a hole or tear), do not use that card. Do not use CupKit profile cards after the expiration date printed on the foil pouch.

### Specimen Collection and Preparation

On-Site CupKit is a test device for detection of drug or drug metabolite, as well as a urine collection and storage container. Fresh urine specimens should be collected directly into the cup and do not require any special handling or pretreatment. No additives or preservatives are required. Freshly voided, unadulterated specimens usually are in the temperature range of 32 - 37 °C (90 - 99 °F). The temperature strip on the On-Site CupKit can be used as an aid in assessing sample integrity.

It is recommended that specimens be tested shortly after collection. However, samples may be stored in the On-Site CupKit at room temperature (15 - 30 °C or 59 - 86 °F) and tested within eight hours of collection. For prolonged storage after the specimen is tested, freezing of the specimen in the On-Site CupKit is recommended. Preliminary positive samples may be sent to a laboratory in the On-Site CupKit cup for confirmatory testing. The profile card does not have to be removed prior to storage or shipping.

Specimens containing human-sourced materials should be handled as if potentially infectious. Use safe laboratory procedures such as those outlined in *Biosafety in Microbiological and Biomedical Laboratories* (HHS Publication Number [CDC] 93-8395).

### Test Procedure

#### Materials provided

- 50 On-Site CupKit cups
- 50 individually packaged On-Site CupKit profile cards
- 50 lids with profile card holders
- 5 biohazard specimen bags
- 50 patient ID labels

#### Ancillary materials

	US Part No.	Quantity
Evidence Tape	42212	100 strips/pkg.
Latex Gloves	42210	50 pairs
Adulteration Strips	3111407	25 strips

Contact Customer Technical Support for information regarding commercially available control material.

### Assay

On-Site CupKit profile cards are ready for use directly from the foil pouch and must be used within eight hours after removal from the pouch. This time frame may be shorter in high humidity climates. Specimens should be between room temperature and body temperature (15 - 37 °C or 59 - 99 °F). If the specimen was refrigerated, allow it to reach room temperature before testing. To ensure a sufficient quantity of sample for confirmation testing (as necessary), collect a minimum of 30 mL of sample. The test can be run successfully with as little as 15 mL or as much as 50 mL (as indicated by the minimum and maximum volume markings on the On-Site CupKit cup).

1. Collect the specimen directly in the On-Site CupKit cup. Check the temperature strip to ensure integrity of the sample.
2. The donor's name or ID number can be documented in the "ID" area of the card. Then, insert the profile card into the holder in the lid. To properly orient the card, use the black arrows on the profile card as a guide: line them up with the arrows on the plastic holder (see photo).
3. Place the lid onto the cup with the card facing the flat panel of the cup; firmly secure the lid onto the cup.
4. Allow the test to proceed undisturbed until a blue band is observed in the "VALID" area of each test strip.

Read and record each result. The CupKit cup can be used to transport sample for confirmation; the profile card does not have to be removed. Prior to shipping, make sure that the lid is firmly secured. Follow appropriate Chain of Custody procedures. It is advised that a photocopy of the results be taken before shipping the cup. The profile card does not have to be removed to do this.

### Quality Control

Quality control testing at regular intervals is good laboratory practice and may be required by federal, state, or local guidelines. Always check with the appropriate licensing or accrediting bodies to ensure your quality control program meets the established standards.

**Internal control:** Each On-Site CupKit has built-in process controls. The test "VALID" band is an internal POSITIVE process control. A blue test "VALID" band should always appear if an adequate sample volume is used, the sample and reagent are wicking on the membrane, and the reagents in the test "VALID" band and the conjugate-color indicator are working. In addition, the background in the result window should become clear and provide a distinct result. If smears of color appear in the background, nonspecific binding of the antibody may be occurring, making the test result difficult to interpret. The clearing of the result window background may be considered an internal NEGATIVE process control. If the test "VALID" band does not appear in the test area, or the background does not clear, then the test is not valid and a new test must be performed.

**External control:** The use of external positive and negative controls is recommended to test each shipment of product or when a new lot is used. Contact Customer Technical Support for information regarding commercially available control material. The controls should produce the expected results. If expected results are not obtained, do not run test specimens, and contact Customer Technical Support. Follow the appropriate federal, state and local guidelines when running external controls.

### Results

Once a blue band is formed in each drug's test "VALID" area (in approximately five minutes), interpret results as either preliminary positive or negative. Results may be interpreted for up to two hours after the test "VALID" bands form. A partial or incomplete blue band indicates a VALID test.

A negative result is the presence of a blue band anywhere in the test result area. The intensity of the blue bands in the Test Valid or Results areas may vary between the different tests on On-Site CupKit. A negative sample may give a faint or incomplete blue band; these indicate a negative result.

A preliminary positive result (drug present at or above the cutoff) is the lack of a blue band in the test result area.

### Limitations

There is the possibility that other substances and/or factors may interfere

with the test and cause erroneous results (e.g., technical or procedural errors). The On-Site CupKit device was not evaluated in point-of-care sites.

A preliminary positive result with this assay indicates the presence of drug or drug metabolites in urine but does not reflect the degree of intoxication.

Adulteration of the sample with oxidizing agents and/or acidic or alkaline agents can cause erroneous results. If adulteration is suspected, another sample should be collected using a new On-Site CupKit. For information on how adulterants may affect the performance of this assay, contact Customer Technical Support.

Ingestion of food containing poppy seeds may cause positive test results due to the natural content of opiates in poppy seeds.<sup>4</sup> When present in sufficient quantity, this "poppy seed morphine" can be detected by all chemical and immunological assays for morphine.

It has been reported that positive THC test results may be obtained from a nonuser after exposure to extremely high concentrations of marijuana smoke in small, unventilated areas. These extreme exposure conditions are not typical of the usual situations in which the drug is used.<sup>5</sup> More recent reports indicate that urine cannabinoid concentrations resulting from passive inhalation are not likely to exceed 20 ng/mL.<sup>6,7</sup>

### Specific Performance Characteristics

#### Accuracy

CupKit was evaluated in a SAMHSA certified laboratory using clinical specimens. The clinical negative samples were screened negative by an automated immunoassay and reported as negative according to SAMHSA guidelines. Clinical specimens screened positive by an automated immunoassay were subsequently analyzed by GC/MS. Some samples were diluted with negative human urine to achieve the appropriate test range. Results are summarized below.

CupKit Cocaine Cutoff = 300 ng/mL	Negative	GC/MS values (ng/mL)		
		Near Cutoff		>125% of cutoff
		75% - 100%	100% - 125%	
+	0	6	7	35
-	100	1	1	0

CupKit Methamphetamine Cutoff = 500 ng/mL	Negative	GC/MS values (ng/mL)		
		Near Cutoff		>125% of cutoff
		75% - 100%	100% - 125%	
+	0	3	5	48
-	100	2	0	0

CupKit THC Cutoff = 50 ng/mL	Negative	GC/MS values (ng/mL)		
		Near Cutoff		>125% of cutoff
		75% - 100%	100% - 125%	
+	0	13	6	31
-	100	0	0	0

CupKit Morphine Cutoff = 300 ng/mL	Negative	GC/MS values (ng/mL)		
		Near Cutoff		>125% of cutoff
		75% - 100%	100% - 125%	
+	0	7	8	46
-	100	0	0	0

### Comparison to Other OnTrak Products

All specimens were also tested by, and results compared to, OnTrak TesTcup and OnTrak TesTstik. Results are summarized below.

Cocaine Cutoff = 300 ng/mL		Predicate Device (TesTstik™ 2)	
		+	-
CupKit	+	48	0
	-	0	102

Overall percent agreement = 100%

Methamphetamine Cutoff = 500 ng/mL		Predicate Device (TesTcup® 5 <sub>01</sub> )	
		+	-
CupKit	+	56	0
	-	0	102

Overall percent agreement = 100%

THC Cutoff = 50 ng/mL		Predicate Device (TesTstik 2)	
		+	-
CupKit	+	47	3
	-	0	100

Overall percent agreement = 98%

Morphine Cutoff = 300 ng/mL		Predicate Device (TesTcup 5 <sub>01</sub> )	
		+	-
CupKit	+	61	0
	-	0	100

Overall percent agreement = 100%

### Precision

The precision of CupKit was determined by three operators across three different days, who tested 63 replicates on two lots using contrived specimens containing drugs or drug metabolites at various concentrations (756 tests in total). The drug or drug metabolites were spiked into a negative human urine pool and assayed by GC/MS. The results are summarized in the tables below.

All lots are required to minimally perform with a greater than 95% confidence level that negative results will be attained with drugs at 25% (1/4 X) of their respective cutoff concentrations, and a greater than 95% confidence level that positive results will be attained with drugs at 150% (1-1/2 X) of their respective cutoff concentrations.

Cocaine (ng/mL) Cutoff = 300 ng/mL	Precision Results (%)			
	Lot 1		Lot 2	
	+	-	+	-
0	0	100	0	100
75	0	100	0	100
150	55.6	44.4	19	81
225	100	0	93.7	6.3
375	100	0	100	0
450	100	0	100	0

Methamphetamine (ng/mL) Cutoff = 500 ng/mL	Precision Results (%)			
	Lot 1		Lot 2	
	+	-	+	-
0	0	100	0	100
125	0	100	0	100
250	6.3	93.7	0	100
375	79.4	20.6	66.7	33.3
625	100	0	100	0
750	100	0	100	0

Morphine (ng/mL) Cutoff = 300 ng/mL	Precision Results (%)			
	Lot 1		Lot 2	
	+	-	+	-
0	0	100	0	100
75	0	100	0	100
150	0	100	0	100
225	17.5	82.5	1.6	98.4
375	100	0	100	0
450	100	0	100	0

THC (ng/mL) Cutoff = 50 ng/mL	Precision Results (%)			
	Lot 1		Lot 2	
	+	-	+	-
0	0	100	0	100
12.5	0	100	0	100
25	0	100	0	100
37.5	0	100	9.5	90.5
62.5	96.8	3.2	100	0
75	100	0	100	0

### Specificity

The following structurally similar compounds for cocaine, methamphetamine, morphine, and THC were tested for cross-reactivity in CupKit. Each compound tested was prepared in normal human urine. The results are expressed as that amount of the compound capable of giving a result equivalent to the cutoff for that assay.

#### Cocaine-related compounds

Cocaine HCl

#### Minimum Concentration Required to give a positive result (ng/mL)

>100,000

#### Methamphetamine-related compounds

Propylhexedrine

*d,l*-Methamphetamine

3,4-Methylenedioxy-methamphetamine (MDMA)

*l*-Methamphetamine

Fenfluramine

*p*-Hydroxymethamphetamine

3,4-Methylenedioxy-N-ethylamphetamine (MDEA)

*d*-Amphetamine

*l*-Phenylephrine

*d,l*-Ephedrine

Ranitidine

$\beta$ -Phenethylamine

*d,l*-Amphetamine

3,4-Methylenedioxymphetamine (MDA)

*l*-Amphetamine

#### Minimum Concentration Required to give a positive result (ng/mL)

1000

2000

2000

3000

5000

5000

10,000

25,000

50,000

50,000

50,000

50,000

50,000

50,000

50,000

100,000

>100,000

#### Morphine-300-related compounds

Codeine

Ethyl morphine HCl

Dihydrocodeine bitartrate

6-Acetylmorphine

Hydrocodone bitartrate

Morphine-3-glucuronide

Hydromorphone HCl

Nalorphine

Thebaine

Levorphanol

Rifampin

N-Norcodeine HCl

Oxycodone

Meperidine

Atropine

#### Minimum Concentration Required to give a positive result (ng/mL)

250

250

500

500

500

500

1000

2000

3000

25,000

50,000

100,000

100,000

100,000

>100,000

#### THC-related compounds

11-hydroxy- $\Delta^9$  THC

#### Minimum Concentration Required to give a positive result (ng/mL)

50,000

#### Cross-Reactivity with Additional Drugs

The following compounds were tested at 100,000 ng/mL and found not to cross-react with the CupKit cocaine, methamphetamine, morphine and THC assays (except as noted).

Acetaminophen

Acetylsalicylic acid

6-Acetylmorphine (except morphine assay)

Alprazolam

7-Aminoflunitrazepam

7-Aminonitrazepam

*d,l*-Amphetamine (except methamphetamine assay)

*d*-Amphetamine (except methamphetamine assay)

*l*-Amphetamine (except methamphetamine assay)

Atropine

Benzocaine

Benzphetamine

Bromazepam

( $\pm$ ) Brompheniramine

Buprenorphine

Bupropion

Chlorazepate

Chlordiazepoxide  
Clonazepam  
Cocaine HCl (except Cocaine assay)  
Codeine (except morphine assay)  
Demoxepam  
Desmethylflunitrazepam  
Dextromethorphan  
Dextrorphan  
Diazepam  
Didesethylflurazepam  
Dihydrocodeine bitartrate (except morphine assay)  
Diphenhydramine  
*d,l*-Methamphetamine (except methamphetamine assay)  
Doxylamine  
*d,l*-Ephedrine (except methamphetamine assay)  
Ethyl morphine HCl (except morphine assay)  
Fenfluramine (except methamphetamine assay)  
Fenoprofen  
Flunitrazepam  
Flurazepam  
Gemfibrozil  
Hydrochlorothiazide  
Hydrocodone bitartrate (except morphine assay)  
Hydromorphone HCl (except morphine assay)  
 $\alpha$ -Hydroxyalprazolam  
Hydroxybupropion  
Hydroxyethylflurazepam  
*p*-Hydroxymethamphetamine (except methamphetamine assay)  
 $\alpha$ -Hydroxytriazolam  
Ibuprofen  
Ketamine  
Lansoprazole  
Levorphanol (except morphine assay)  
Lidocaine  
Lorazepam  
MDA (except methamphetamine assay)  
MDEA (except methamphetamine assay)  
MDMA (except methamphetamine assay)  
Meperidine (except morphine assay)  
*d*-Methamphetamine (except methamphetamine assay)  
*d,l*-Methamphetamine (except methamphetamine assay)  
*l*-Methamphetamine (except methamphetamine assay)  
Methylphenidate  
Morphine-3-glucuronide (except morphine assay)  
Nalorphine (except morphine assay)  
Naproxen  
N-Norcodeine HCl (except morphine assay)  
Nordiazepam  
Norfludiazepam  
Oxycodone (except morphine assay)  
 $\beta$ -Phenethylamine (except methamphetamine assay)  
*l*-Phenylephrine (except methamphetamine assay)  
*d,l*-Phenylpropanolamine  
Propylhexedrine (except methamphetamine assay)  
Quinidine  
Quinine  
Ranitidine (except methamphetamine assay)  
Rifampin (except morphine assay)  
Temazepam  
Thebaine (except morphine assay)  
11-hydroxy -  $\Delta^9$  THC (except THC assay)  
 $\Delta^9$  THC  
Triazolam

## References

1. Hawks RL, Chiang CN, eds. Urine testing for drugs of abuse. National Institute on Drug Abuse (NIDA) Research Monograph 73. 1986.
2. O'Brien CP. Drug Addiction and Drug Abuse. In: Hardman JG, Limbird LE, Molinoff PB, Ruddon RW, Goodman LS, Gilman A, eds. Goodman & Gilman's The Pharmacological Basis of Therapeutics. 9<sup>th</sup> ed. McGraw-Hill Co. Inc. 1996:557-577.
3. Karch SB. Drug Abuse Handbook. CRC Press LLC 1998.
4. El Sohly HN, El Sohly MA. Poppy seed ingestion and opiates urinalysis: A closer look. *J Anal Toxicol.* 1990;14:308-310.
5. Substance Abuse Testing Committee, Critical issues in urinalysis of abused substances: Report of the Substance Abuse Testing Committee. *Clin Chem.* 1988;34(3):621.
6. Perez-Reyes M, Di Guisepppe S, Mason AP, Davis KH. Passive inhalation of marijuana smoke and urinary excretion of cannabinoids. *Clin Pharmacol Ther.* 1983;34(1)36-41.
7. Mulé SJ, Lomax P, Gross SJ. Active and realistic passive marijuana exposure tested by three immunoassays and GC/MS in urine. *J Anal Toxicol.* 1988;12:113

## Step-by-Step Instructions:



**1.** Collect the specimen directly into the CupKit cup. Check the temperature strip to ensure integrity of the sample. A minimum sample size of 15 mL is required to run the test. Do not use more than 50 mL. Use the volume markings on the cup as a guide.



**2.** Open the foil pouch and remove the test profile card. The donor's name or ID number may be recorded in the ID area of the card.



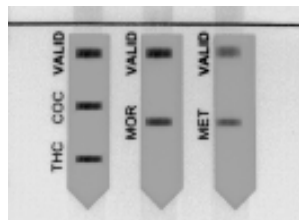
**4.** Place the lid onto the cup with the card facing the flat panel of the cup as shown. Make sure that the card is close to the flat panel and not caught behind either of the cup's two "positioning guides."

Firmly secure the lid onto the cup.

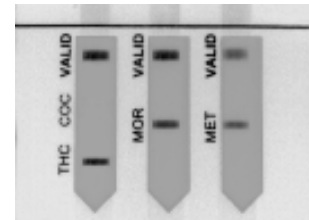
**5.** Allow the test to proceed until Test Valid bands appear. Interpret the results. A blue band indicates a negative result, while the lack of color should be considered a presumptive positive. Faint, broken or partial bands should be interpreted as negative.



**3.** Insert the profile card into the holder in the lid. To properly orient the card, use the black arrows on the card as a guide; line them up with the arrows on the plastic holder. The printed side of the card should be facing the small "half" of the lid.




*Valid bands appear; all drugs test negative.*




*Valid bands appear; cocaine is positive while all other drugs test negative.*

CupKit can be used to transport a sample to a lab for confirmation if necessary. The profile card does not have to be removed to do this. Prior to shipping, check to make sure that the lid is firmly tightened to the cup.



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### Technical Support

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