RDX EXPLOSIVES TEST KIT INSTRUCTION GUIDE

TK-1005-1

Phone: (800) 544-8881

IMPORTANT

Read all instructions and handling procedures before using this kit. For assistance call the TECHNICAL SERVICE HOT LINE Phone: (800) 544-8881

INTENDED USE

The D TECH™ RDX on-site and laboratory test kit is designed to provide quick, semiquantitative, and reliable test results for making environmental decisions.

The D TECH RDX Explosives Test Kit can be used on-site for identifying "hot spots", site mapping, monitoring of remediation processes and selecting site samples for laboratory analysis.

In the laboratory, the D TECH RDX Explosives Test can screen highly contaminated samples that require pre-dilution prior to instrumental analysis.

PRINCIPLE

The D TECH system for analyzing trace amounts of explosives is based on immunoassay technology.

An antibody specific for RDX compounds has been linked to solid particles which are collected on the membrane of the cup assembly.

A color developing solution added to the surface of the cup assembly develops a color inversely proportional to the concentration of RDX Equivalents in the sample (less color indicates more RDX present in sample).

RDX Equivalents are measured at parts per million (ppm) in soil and parts per billion (ppb) in water samples.

TEST KIT DESCRIPTION

The D TECH RDX Explosives Test Kit, Item #TK-1005-1, contains sufficient materials to perform four tests.

This kit can test water samples or be used with the D TECH TNT/RDX Soil Extraction Pac, Item #TK-1001S-1, to test soil samples.

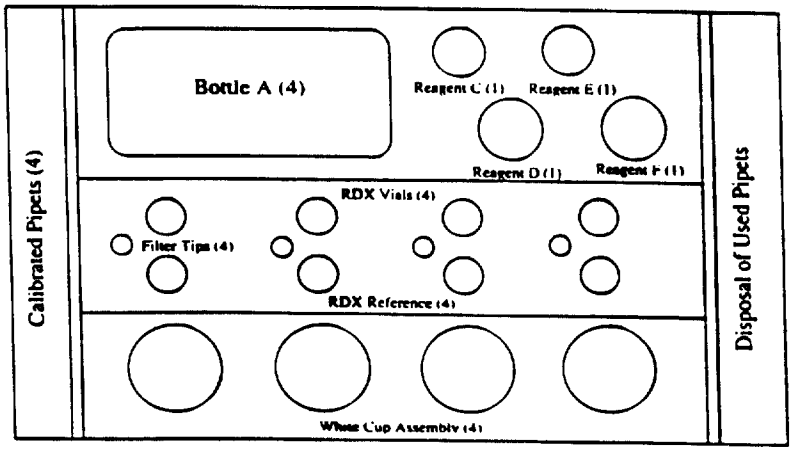
The TNT/RDX Soil Extraction Pac contains only the materials needed to extract RDX from soil for semiquantitation with this D TECH RDX Explosives Test Kit. The results can be obtained by using the enclosed Color Card or the DTECHTOR Meter, Item #TK-1001M-1.

STORAGE AND STABILITY

This kit has excellent stability at room temperature and under refrigeration. For expiration dating under these conditions, see the package label.

MATERIALS PROVIDED

See tray diagram below. This diagram includes the kit component names and quantity of each item.



Not shown in diagram

Used Kit Label (1)

Instruction Guide (1)

Color Card (1)

Data Labels (4) for Cup Assembly

Red Dot Labels (4) for identifying used Bottle A components

ACCESSORIES SUPPLIED BY USER

Timing Device (minutes)

D TECH TNT/RDX Soil Extraction Pac, Item #TK-1001S-1 (if testing soil samples)

the DTECHTOR Meter, Item #TK-1001M-1 (optional)

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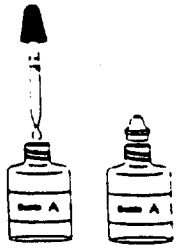
This package is designed to serve as a WORK STATION. At the conclusion of the test, the components can be left in the package for proper disposal.

Important: Read all Health/Safety Comments on page 4 prior to use.

Step 1: Choose corresponding sample source to determine the first step.

WATER SAMPLE: Using a new calibrated pipet, transfer **1 ml** of sample to **Bottle A**. Snap filter up on **Bottle A**. Gently mix.

SOIL SAMPLE: Using a new calibrated pipet, transfer **1 ml** of **Bottle 2** solution from D TECH TNT/RDX Soil Extraction Pac, (Item #TK-1001S-1) to **Bottle A**; snap filter up on **Bottle A**. Gently mix. Re-cap **Bottle 2** and set aside.

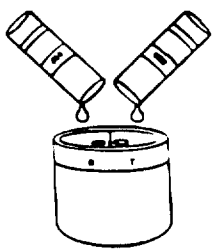


Note: The vials in the next two steps need to stand 5 minutes after dispensing the liquid. The solutions in these vials will remain hazy.

Step 2: Squeeze **Bottle A** filling the **RDX Vial** to a level between the two lines (approximately 13-14 drops). Gently mix.

Step 3: Squeeze the contents of **Reagent C** (white cap) to fill the **RDX Reference** vial to a level between the 2 lines. Gently mix.

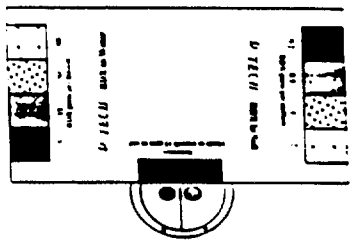
Step 4: After 5 minutes, pour contents of **RDX Vial** onto the **T** (test) side of the cup assembly. Pour the contents of the **Reference** vial onto the **R** side of the cup assembly. Allow liquid to drain completely through on both sides.



Step 5: Add approximately 8-12 drops of **Reagent D** solution (yellow cap) into each side of the cup assembly. Drain completely.

Step 6: Add approximately 5 drops of **Reagent E** solution (blue cap) to each side of the cup assembly. Be sure to add this solution immediately to the second well after addition to the first well. Drain completely.

Step 7: Read results when color of **R** (left) side of cup assembly matches the color of the reference bar of the **Color Card**. (The color development time is approximately 10 minutes at 70°F. More time is required at lower temperatures and less time is required at higher temperatures.)



COLOR CARD: Match the color on the **T** side of the cup assembly to the **Color Card**.

and/or

the DTECHTOR: Quantitate the result using *the* DTECHTOR Meter (see Instrument Operator's Guide for complete instructions).

See Interpretation of the Test section (page 3) to determine concentration of RDX Equivalents. Record result on a **Cup Assembly** label and apply to the cup.

*Note: To preserve the color for up to 4 hours (optional), add approximately 8 drops of **Reagent F** solution (red cap) into each side of the cup assembly. Drain completely.*

the DTECHTOR Meter Set Up

the DTECHTOR light sources must be calibrated whenever the meter is turned on. Calibrators are provided with the meter for this purpose. The **Calibrator** must be clean and white to insure valid results.

Step 1: Insert **Calibrator** into the **Meter Head** and hold firmly in place. (ZERO)

Step 2: Press the Square Button 1 time. When calibration is complete the meter will display..... (SET)

Step 3: Remove **Calibrator** and return it to its protective cannister. Display remains..... (SET)

Step 4: Press the Square Button 2 times to select meter program #2 (Program to be used for this D TECH test kit). (SET #2)

Step 5: Insert Cup Assembly (test) into the Meter Head and firmly hold in place. (TEST #2)

Note: The #2 in the upper right corner of the display window in Steps 4 & 5 corresponds to the program number being used to obtain the meter reading.

Step 6: Press the Square Button 1 time. (- - -)

Note: If the meter displays "WAIT", remove the Cup Assembly. Allow the reference color to develop further and try again.

Obtain the meter reading. For example..... (46%)
Use *the* DTECHTOR Table (see page 3) and the meter reading to determine the concentration of RDX.

Step 7: Record result then press Square Button 1 time while holding the **Cup Assembly** in place. (- - - -)

Step 8: Key in 4 digit Label. (Optional)

Step 9: Remove **Cup Assembly**. (SET #2)

Step 10: Insert next **Cup Assembly** (test) and repeat Steps 5 - 9.

PERFORMANCE CHARACTERISTICS

INTERPRETATION OF THE TEST The results from the D TECH RDX Explosives Test Kit can be interpreted using either the **Color Card** supplied with the kit or *the* DTECHTOR and the table provided below. If the color of the test does not exactly match a panel of the color card, user interpretation is required.

the DTECHTOR Table

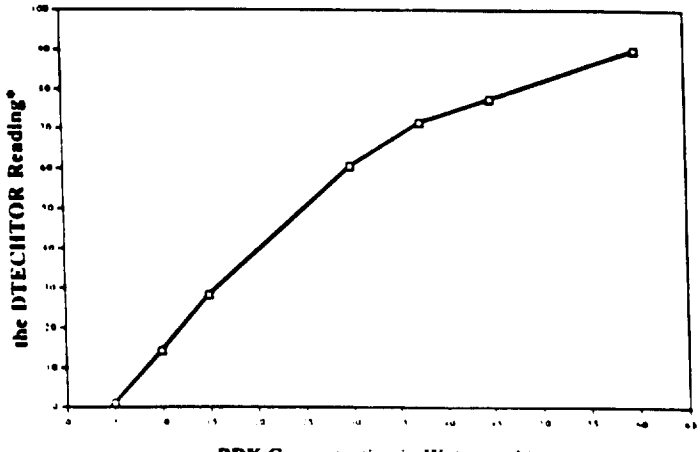
Sample	*the* DTECHTOR Reading	RDX Equivalents
		(ppb)
Water	LO	< 5
	1 - 30	5 - 15
	30 - 50	15 - 25
	50 - 80	25 - 45
	HI	> 45
		(ppm)
Soil	LO	< 0.5
	1 - 20	0.5 - 1.5
	20 - 45	1.5 - 2.5
	45 - 60	2.5 - 4.5
	60 - 80	4.6 - 6.0
	HI	> 6.0

SENSITIVITY The D TECH RDX Explosives Test Kit can be used to reliably measure RDX in the following ranges:

Sample	*the* DTECHTOR	Color Card
Water (ppb)	5 - 45	5 - 60
Soil (ppm)	0.5 - 6.0	0.5 - 6.0

The Minimum Detection Limit (MDL) of the test for RDX in a water sample is 5 ppb and in soil is 0.5 ppm. The graph below is a typical standard curve for the D TECH RDX Explosives Test Kit.

D TECH RDX Explosives Text Kit Standard Curve



*Percent Reflectance Relative to Reference

SPECIFICITY The D TECH RDX Explosives Test Kit has been tested for cross-reactivity with various explosives, including those found in EPA SW-846 Method 8330. The table below summarizes the cross-reactivity of these compounds in water samples using *the* DTECHTOR. A positive test result may be due to the presence of RDX, HMX or a mixture of these compounds (RDX Equivalents). Samples testing positive for RDX should be confirmed by standard methods. The D TECH RDX Explosives Test Kit has been designed to minimize the effect of environmental interferences. Sample pH, nitrate, nitrite and ammonium do not effect test results.

Compound	IC_{50}[a] (ppb)	MDL[b] (ppb)	Cross-reactivity[c]
RDX[d]	21	5	+
HMX[d]	>500	150	+
TNT[d]	>500	>500	-
Tetryl[d]	>500	>500	-
1,3,5-Trinitrobenzene	>500	>500	-
2-amino-4,6-dinitrotoluene	>500	>500	-
4-amino-2,6-dinitrotoluene	>500	>500	-
2,4-dinitrotoluene	>500	>500	-
2,6-diaminonitrotoluene	>500	>500	-
1,3-dinitrobenzene	>500	>500	-
Nitrobenzene	>500	>500	-
2-nitrotoluene	>500	>500	-
3-nitrotoluene	>500	>500	-
4-nitrotoluene	>500	>500	-
Nitroglycerin	>500	>500	-
PETN[d]	>500	>500	-

a The IC_{50} is defined as the concentration of compound required to produce a test response equivalent to 50% of the maximum response.

b The Minimum Detection Limit (MDL) is defined as the lowest concentration of compound that yields a positive test result.

c A compound is considered cross-reactive when a concentration 100 times the MDL of RDX (5 ppb) yields a positive test result.

d Chemical Names: RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine), HMX(octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine), TNT (trinitrotoluene) Tetryl (methyl-2,4,6-trinitrophenylnitramine), PETN (pentaerythritol tetranitrate).

TESTING HIGHER RDX CONCENTRATIONS

RDX concentrations greater than the upper limit of the test may be determined by diluting the extract with acetone. For example, an extract from a 100 ppm soil sample, processed using the D TECH TNT/RDX Soil Extraction Pac, may be diluted 1:25 in acetone and run in the D TECH RDX Explosives Test Kit. The concentration of the undiluted sample (100 ppm) is determined by multiplying the RDX concentration of the diluted sample (4.0 ppm) by the dilution factor (25). For further information, please call our technical service hot line 1-800-222-0342.

HEALTH/SAFETY

Material Safety Data Sheets (MSDS) have been supplied with the purchase of this product. The MSDS should be read before using this test. During the execution of the test, any excess RDX is absorbed into the **Cup Assembly** absorbant plug. It is not retained on the surface of the **Cup Assembly**.
When all kit components have been used, apply the warning label to seal the box and set it aside for proper disposal. In this section, we have emphasized health and safety precautions that should be followed when handling these solutions.

PROTECT EYES WITH SAFETY GLASSES
PROTECT SKIN WITH PROTECTIVE GLOVES

Associated Hazards
May be irritating to skin, eyes, and mucous membranes.

Symptoms of Exposure
May be irritating on contact with skin, eyes, and mucous membranes.

First Aid Measures
GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE

Skin:	Wash thoroughly with soap and water.
Eyes:	Immediately flush with water for at least 15 minutes.
Inhalation:	Remove to fresh air; give artificial respiration if breathing has stopped.
Ingestion:	Get immediate medical attention; if conscious, give water freely.

QUALITY CONTROL

All D TECH Test Kits are thoroughly quality controlled and manufactured at Strategic Diagnostics Incorporated's GMP facility. All products undergo extensive validation and field testing to assure accuracy and reliability. All lots of product are thoroughly quality controlled to consistently meet the published specification.

SDI

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DTECHTOR Meter with Added Program Feature
(red square operating button)

the DTECHTOR Meter can be used to "READ" the reference color development; instead of visually matching the reference color to the color card. This feature allows the user to more precisely determine when to read the results of the D TECH TNT, RDX, PCB, and PAH assays. The operating instructions included on this page are to be utilized with DTECHTOR meters possessing a red square operating button.

Step 1: Insert Calibrator into the Meter Head and hold firmly in place.
Display ZERO

Step 2: Press the Square Button 1 time. When the calibration is complete the meter will display
Display SET

Step 3: Remove Calibrator and return it to its protective canister.
Display remains..... SET

Step 4: **SELECT METER PROGRAM**

For TNT Test

Press the Square Button 1 time to select meter program !3
Display..... SET #1

or **For RDX, PCB or PAH Tests**

Press the Square Button 2 times to select meter program #2
Display..... SET #2

Step 5: **Insert Cup Assembly (test) into the Meter Head and firmly hold in place**
Display..... TEST #1 or TEST #2

Step 6: **READ the Reference Color**
Double-click (as you would with a computer "mouse") the Square Button
Display..... -- ..... then Reference Side Reading (i.e. 366)

If the user either "double-clicks" too slowly or inadvertently only presses the Square Button one time see Note #1.
For helpful hints on the monitoring more than one test at a time see Note #2.

Test should be read when the Reference Side Reading is in the target range listed below for the appropriate test. References Ranges are as follows:

TNT	**250-210**
RDX	**350-320**
PAH	**410-380**
PCB	**345-315**

If the reference side reading is above the target range; further color development time is needed.

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If the reference side reading is below the target range, color development has been allowed to proceed too long. If this situation occurs the test should be rerun. The greatest accuracy of result interpretation is achieved when the test is read when the reference side reading is within the target range.

IMMEDIATELY after the target reference range value has been reached:
Proceed to Step 7 to obtain an immediate result

Step 7: Obtain the test result
Press the Square Button 1 time.
Display..... — .....then Test Reading (i.e. 46%)
Use the DTECHTOR Table (see page 3 of the test kit instruction guide) and the percent relative reflectance meter reading to determine the concentration of analyte.

Step 8: Record result, then press Square Button 1 time.

Step 9: Key in 4 digit label. (Optional - see meter operator's guide)

Step 10: Remove Cup Assembly (test)
Display..... SET #1 (For TNT Test)
or SET #2 (For RDX, PCB, or PAH tests)

Step 11: Insert next Cup Assembly (test) and repeat procedure beginning at Step 4.

NOTE #1: If the user either "double-clicks" too slowly or inadvertently only presses the Square Button one time the meter will display.....—.....then Reading (i.e. 64%).
This inadvertently obtained result should be disregarded (considered erroneous). It must be noted, however that the meter will store this erroneous result into its memory. The user is returned to Step 4 by removing the cup assembly, and pressing the square button then the slide (on/off) switch.

NOTE #2: The reference color of a single cup assembly (test) can be monitored by leaving the cup assembly in the meter head and "double-clicking" the square button (repeating Step 6) whenever a reference reflectance value is desired. Multiple cup assemblies (tests) can be monitored simultaneously. Removing a cup assembly (test) when a reference reflectance value is being displayed returns the user the Step 4.

GENERAL NOTES:

The longer the color is allowed to develop, and the darker it becomes, the lower the reference side reading (reflectance unit number).

To stop color development/preserve results (up to 4 hours):
Remove the cup assembly from the meter head. Add approximately 8 drops (+/- 2 drops) of Reagent F solution (red cap) into each side of the cup assembly. Allow liquid to drain completely.

Questions should be directed to technical service or the product manager. Please call our technical service hotline