

# ENVIRONMENTAL EXPRESS

## Simple Cyanide Distillation System: Frequently Asked Questions

### How does the system work?

In the boiling tube:

$\text{H}_2\text{SO}_4$  (Sulfuric acid) + CN (sample) + heat  $\Rightarrow$  HCN (gas travels up into collection trap)

In the disposable collection trap:

HCN (Hydrogen cyanide) + NaOH (Sodium hydroxide)  $\Rightarrow$  NaCN +  $\text{H}_2\text{O}$

### What is the basic procedure?

1. Add the sample to the boiling tube.
2. Screw on cap and insert funnel.
3. Add the base to the trap and attach it to the glassware and tubing.
4. Turn on the vacuum.
5. Add the acid through the funnel.
6. Turn on the HotBlock to 125°C and allow samples to reach temperature (~30 minutes).
7. Hold temperature at 125°C for 1 hour.
8. Turn off HotBlock and allow samples to cool. Leave on the vacuum while cooling.
9. After samples cooled, close all vacuum valves and turn off vacuum pump.
10. Remove the trap and pour the distilled sample into container for analysis.

### Why is there no chiller water system?

The system can run multiple samples simultaneously at 125°C. The distilled cyanide is collected in the trap and does not require the use of a chiller or any water lines. The 50mL sample solution boils in the boiling tube, and then the gas is collected in the collection trap (containing the NaOH solution). The sample is held in place in the trap by a frit which prevents it from traveling back into the boiling tube. The distilled cyanide is collected in the 25mL trap at 2x concentration and can then be poured out to be analyzed.

### Does this mean that the water (steam) can carry over to the collection tube together with the HCN gas during distillation?

No, the water does not carry over with the HCN gas because it will be blocked by the hydrophobic frit of the trap. The cyanide as hydrocyanic acid (HCN) is released from cyanide complexes and absorbed in a scrubber containing sodium hydroxide solution.

### How long does it take to distill a set of samples?

The complete procedure takes approximately 1.5 hours, 30 minutes for block to heat and 1 hour for distillation.

### What temperature is used for Cyanides?

The current method in SW846 9010C does not specify a temperature. It simply says to boil. In our studies, it has been proven that 120° C will get the job done well. Rapid boiling will cause analyte loss or block the hydrophobic frit.

### How are interferences from high sulfide concentrations in my samples addressed without relying on sparging?

Section 7.2.3 of method SW846 9010C dictates the addition of 5 mls of 0.062 M bismuth nitrate solution to 50 mls of sample to precipitate out the sulfides before distillation. The excess nitrates from the bismuth nitrate solution can then be counteracted with the addition of 5 mls of 0.4 N Sulfamic Acid.

490 Wando Park Blvd.  
Mt. Pleasant, South Carolina 29464  
Phone: 1.843.881.6560  
Toll Free: 1.800.343.5319  
FAX: 1.843.881.3964  
[www.environmentalexpress.com](http://www.environmentalexpress.com)



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### Can this unit be used for a soil matrix?

It is applicable for the determination of total cyanide in drinking, ground, surface, and saline waters, as well as, domestic and industrial wastes, and soils. If testing solid samples, weigh 1g (or less) to the nearest 0.01g, and dilute to 50mL. The standard range is typically 5 to 500µg/L.

### How long can the distilled cyanide samples be held?

Samples should be analyzed as soon as possible after collection. If storage is required, preserved samples are maintained at 4°C and may be held for up to 14 days.

### Is the Simple Cyanide EPA approved?

The Simple Cyanide uses the same chemistry as the current EPA Methods (334.2, 334.3, & 334.4) It employs the same reagents in the same molar concentrations as the approved methods. It is not a change in method merely a change in apparatus to achieve the distillation. All of the chemistry is in exact coordination with the EPA Methods.

### Can Phenols, Ammonias or Sulfides be distilled with the Simple Cyanide?

Some customers have successfully distilled ammonia and phenol with the Simple Cyanide by reducing the sample volume to 25mL. Currently, we do not promote the system for those distillations. Sulfides should not be attempted.

### What does the Simple Cyanide System include?

- Block and Manifold: Catalog # C6000 for \$5400 - Includes: 12-place Block, 12-place Manifold, 12 sets of boiling tubes, 12 closures, tubing, 12 tubing adaptors, 12 two-port inserts, tube rack, pack of disposable acid addition tubes and pack of collection traps.
- Manifold 18 place: Catalog # C6200 for \$2495 - Includes: 18-place Manifold, 18 sets of boiling tubes, 18 closures, tubing, 18 tubing adaptors, 18 two-port inserts, pack of disposable acid addition tubes and pack of collection traps.
- Manifold 12 place: Catalog # C6210 for \$1995 - Includes: 12-place Manifold, 12 sets of boiling tubes, 12 closures, tubing, 12 tubing adaptors, 12 two-port inserts, pack of disposable acid addition tubes and pack of collection traps.

### What parts of the system are consumables and how much do they cost?

The only true consumable which should be replaced with each sample is the collection trap C6100 and they are \$1.50 each. They come in a 100 pack for \$150 and you receive a free starter pack (100 traps) with the system. The lab may choose to replace the acid delivery tube every time as well, but other customers are reporting getting several uses from it. The inlet port cap and the cap o-ring should be replaced, but infrequently.

### What is the warranty of the system?

The system can be purchased from Environmental Express and is covered under a 1-year warranty. If the system fails to adequately perform specified laboratory distillations under normal laboratory use, then the item is fully covered for a period of one year from the date of shipment. This warranty extends to parts, labor, and any approved transportation charges.

### What are the specifications for the vacuum pump?

The system requires a standard vacuum pump to maintain ~15" Hg. This product can be added to the order and is Item #C5205.

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