



# Technical Data Sheet

## Phenols

### 4-Aminoantipyrine Method

**Applications and Industries:** Domestic and industrial wastewater, surface water, drinking water, saline water, disinfection solutions; Wastewater treatment plants, citrus fruit disinfection

**References:** APHA Standard Methods, 14<sup>th</sup> ed., Method 510 C (1975). ASTM D 1783-01, Phenolic Compounds in Water, Test Method B. USEPA Methods for Chemical Analysis of Water and Wastes, Method 420.1 (1983).

**Chemistry:** In an alkaline solution, phenol and other phenolic compounds react with 4-aminoantipyrine to produce a red colored complex. The color forming reaction is initiated by potassium ferricyanide (ampoule tip coating). This chemistry detects ortho- and meta-substituted phenols. Under certain pH conditions, phenols substituted in the para- position with a carboxyl, halogen, hydroxyl, methoxyl, or sulfonic acid group will possibly be detected. Parasubstituted phenols which are substituted with an alkyl, aryl, nitro, benzoyl, nitroso, or aldehyde group (e.g. paracresol) do not typically develop color with this chemistry. Results are expressed in ppm (mg/L) "equivalent phenol" as C<sub>6</sub>H<sub>5</sub>OH. Because substituted phenols react with 4-aminoantipyrine with less sensitivity than does phenol itself, test results represent the minimum concentration of phenolic compounds in the sample.

#### Interference Information:

Although the ideal sample pH is 7-9, sample pHs between 4 and 10 are well tolerated. Sample pHs below 3 may cause the reagent to precipitate and may overcome the buffering capacity of the reagent, causing low test results. Ferrous iron interferes, often causing a blue precipitate to form in the sample after the ampoule tip coating is dissolved, or by resulting in a blue-green color development.

Calcium may cause the reagent to precipitate. Addition of a few drops of 1% EDTA solution to the sample can minimize interferences from iron and calcium.

Sulfide at concentrations >100 ppm may interfere, sometimes causing a yellow turbidity.

Sulfur dioxide and other reducing agents may interfere.

Hydrogen peroxide at up to 0.5% does not interfere.

Permanganate and chlorine interfere.

Unexpectedly high test results can be caused by contaminated labware, including a sample cup that was previously used with a highly contaminated sample. In order to remove this contamination, labware can be rinsed with a dilute sulfuric acid solution followed by several rinses with distilled water.

A chemical zero can be used during instrumental analysis to minimize interferences from sample color or turbidity. To generate a chemical zero, completely remove the tip coating from an ampoule by dissolving it in water; discard the water. Snap this ampoule in sample and wait 1 minute, then use this ampoule to zero the photometer.

Highly contaminated wastewaters may require distillation to separate phenols from non-volatile impurities.

**Safety Information:** Safety Data Sheets (SDS) are available upon request and at [www.chemetrics.com](http://www.chemetrics.com). Read SDS before using these products. Breaking the tip of an ampoule in air rather than water may cause the glass ampoule to shatter. Wear safety glasses and protective gloves.

**Available Analysis Systems:** Visual colorimetric: CHEMets®, VACUettes®. Instrumental colorimetric: Vacu-vials®.

**Storage Requirements:** Products should be stored in the dark, at room temperature, and in a low-humidity environment.

**Shelf Life:** *When stored in the dark, at room temperature, and in a low-humidity environment:* Visual colorimetric: The CHEMets and VACUettes refills have shelf lives of 4 years. The color comparators have 2-year shelf lives. Instrumental colorimetric: The Vacu-vials kits have shelf lives of 4 years.

**Accuracy:** CHEMets and VACUettes kits: ± 1 color standard increment

Vacu-vials kits: **K-8003:** ± 10% error at 6.00 ppm, ± 20% error at 2.00 ppm, ± 30% error at 0.40 ppm

**K-8023:** ± 10% error at 15.0 ppm, ± 20% error at 5.0 ppm, ± 30% error at 1.0 ppm