



SUBJECT COPPER DETERMINATION IN SOLUTIONS
Process Specifications

SUPERSEDED DATE 4/8/49

Initially for Solutions & Distilled water for Bulb
Settling.

Determination of Copper by reduced phenolphthalein, (KASTEL-MYER REAGENT)

A. EQUIPMENT

1. Glass-covered Erlenmyer flask, for use as a container for the reduced phenolphthalein solution.
2. Tightly stoppered bottle and dropper for 3% hydrogen peroxide solution.
3. Test tube rack and test tubes with 10 ml. level marked.
4. Graduate cylinder (50 ml. or 100 ml.)
5. Volumetric flasks (3-100 ml. and 1-1000 ml.)
6. Pipette (5 ml.)

B. MATERIALS

1. Two grams P67 phenolphthalein and 20 grams P68 potassium hydroxide dissolved in 100 cc. of copper-free distilled water. Solution to be completely decolorized by boiling with 10 grams of Z619 zinc dust. Keep in glass covered Erlenmeyer flask and bring to boil whenever solution turns pink.
2. 3% hydrogen peroxide solution.
3. Standard copper solutions (made with copper-free distilled water)
 - a. 1/million (master solution)
 - b. 1/25 million (Standard)
 - c. 1/50 million (Standard)
 - d. 1/100 million (Standard)
4. Copper-free distilled water.
5. Nitric or hydrochloric acid for cleaning glassware.

DANGER

POTASSIUM HYDROXIDE HANDLING PRECAUTIONS: See S.N. 33-2-8A

HYDROGEN PEROXIDE HANDLING PRECAUTIONS: See S.N. 33-2-8A

**** NITRIC & HYDROCHLORIC ACID HANDLING PRECAUTIONS: See S.N. 33-2-7C**

C. PROCEDURE

(This process derived from "Colorimetric Methods of Analysis" by Snell, p. 176).

To 10 cc. of the sample add 4 drops of the reduced phenolphthalein reagent. Mix well and add one drop of 3% hydrogen peroxide solution.

Comparison of resulting color should be made with a series of standards. A solution containing one-millionth part of copper immediately gives a rose tint, changing to red in a few seconds. With dilutions of one in ten million, the rose tint appears after 15 seconds. With a dilution of one in one hundred million, only a very pale coloration appears at the end of several minutes.

D. EVALUATION OF RESULTS

A maximum limit of one part in fifty million of copper has been established for the solutions and distilled water used in the mixing and settling rooms. Any test showing a higher concentration should be immediately repeated and if this confirms the first test, the settling room foreman must be immediately notified.

SUBJECT COPPER DETERMINATION IN SOLUTIONS
 AND DISTILLED WATER USED FOR BULB SETTLING.

SUPERSEDED DATE

D. EVALUATION OF RESULTS (cont.)

The following table of equivalents is to be used for preparing standard solutions and reporting results:

<u>Dilution</u>	<u>Equivalents</u>	<u>Parts/million</u>
1 mg./1ml. (gram)	1 : 1,000	
.001 mg./1 ml.	1 : 1,000,000	1
.00004 mg./1 ml.	1 : 25,000,000	.04
.00002 mg./1 ml.	1 : 50,000,000	.02
.000013 mg./1 ml.	1 : 75,000,000	.013
.00001 mg./1 ml.	1 : 100,000,000	.01

Precaution

Between tests, all glassware should be washed with either nitric or hydrochloric acid to remove residual copper contamination, followed by a double rinsing with copper-free distilled water.

STANDARDIZING SECTION
 ENGINEERING DEPT.