

MONSANTO CHEMICAL COMPANY
W. G. KRUMMRICH PLANT LABORATORY
**STANDARD ANALYTICAL
METHOD**

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WRITTEN BY RFS	APPROVED BY GWM	
ATTACHMENTS		

PRODUCT

General Method No. 2

TEST

Color - APHA (Hazen)

THIS FORM

☐ SUPERSEDES METHOD
☒ REVISES INSTRUCTIONS

ISSUED ON 3/25/53

SCOPE

This method determines the color of liquid or molten materials in which the tints or hues are not very pronounced. The colors are estimated by comparison with APHA color standards contained in 50 ml. tall-form Nessler tubes.

EQUIPMENT

- Matched 50-ml. tall-form Nessler tubes (Sargent S-21035).
- Hollow polyethylene stoppers, 25 mm high, to fit Nessler tubes (Fisher Sci. Co., 14-645, size S-2).

REAGENTS

- Potassium Chloroplatinate (K_2PtCl_6), Purified (Fisher P-158).
- Cobaltous Chloride ($CoCl_2 \cdot 6H_2O$), A.R. (Mallinckrodt 4532).
- Hydrochloric Acid (HCl), A.R. (Mallinckrodt 2612).

Preparation of the APHA Stock Solution:

- Weigh accurately on an analytical balance 1.245 g. potassium chloroplatinate (an equivalent of 0.5 g. Platinum) and 1.000 g. cobaltous chloride ($CoCl_2 \cdot 6H_2O$) (an equivalent of 0.25 g. Cobalt).
- Transfer both components to a 1 liter volumetric flask containing about 300 ml. distilled H_2O .
- Add 100-ml. conc. HCl and swirl to dissolve.
- Make up to volume with distilled water, mix thoroughly, and store in a black-painted bottle. This is the APHA Stock Solution. It has a color of APHA 500.

NOTE: In the absence of a reliable supply of potassium chloroplatinate, chloroplatinic acid may be substituted. Prepare as follows:

- Dissolve 0.500 grams metallic platinum in aqua regia.

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2. Remove the HNO_3 by repeated evaporation to dryness after adding an excess of hydrochloric acid.
3. Dissolve this product with 1.000 g. $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ as directed above.

Preparation of the APHA Standards

1. To prepare standards, add the proper volume of the stock solution according to this chart, to a set of matched, tall-form, 50 ml. Nessler tubes.

<u>APHA Std.</u>	<u>ml. Stock Sol'n.</u>	<u>APHA Std.</u>	<u>ml. Stock Sol'n.</u>
3	0.3	30	3.0
5	0.5	40	4.0
8	0.8	50	5.0
10	1.0	60	6.0
15	1.5	80	8.0
20	2.0	100	10.0
25	2.5	200	20.0

NOTE: For every unit of APHA, 0.1 ml. of the Stock Solution is used.

2. Dilute the contents of each tube to the mark with distilled water.
3. Stopper each tube with a polyethylene stopper and mix by inverting several times.
4. The prepared standards are kept in a closed box stoppered with the polyethylene stoppers to prevent contamination and evaporation. APHA Standards should be prepared every month to insure accuracy.

DETERMINATION

1. Fill a standard 50 ml. tall-form Nessler tube to the mark with the material to be tested.
2. Remove the stopper from the standard tube which you estimate most nearly the color of the sample. The intensity of light passing through the sample is observed and compared with that of the standard.
3. Make the observation by looking downward through the tubes upon a white surface placed in such a position that non-glaring daylight is reflected through the columns of liquid. For night work, the regular daylight lamps can be used.

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4. Continue comparing until you locate the standard which most nearly matches the sample.
5. Interpret the comparison to the nearest APHA Standard.

Report the results to the nearest APHA Standard, or by interpolation between standards.

DISCUSSION

This method is good only up to a color intensity of about 100. The APHA suggests dilution to read the higher values. We have found, however, that not all materials can be treated in this manner. For values above 100, we report approximate colors as determined by comparison to 300, 400, and 500 APHA standards and interpolation between these standards.

Even a slight turbidity causes a higher apparent color. For samples which exhibit turbidity, it is suggested that they be centrifuged and the color of the supernatant determined by the preceding method.

REFERENCES

- a. "Standard Methods for the Examination of Water, Sewage, and Industrial Wastes", 10th Edition (1955), American Public Health Association, page 88 ff.
- b. "Procedure for Laboratory Service Section" W.G.K. Plant Laboratory, 6/21/56, page 71.