

Date: 11/17/43
By: HOH:DBH
Ref:

Material: Aroclor
Test: Dielectric Constant

Method No. 10,119-43
Int: B No. 246-012
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1. Clean the electrodes scrupulously as follows before each sample is tested, being careful not to touch any part except the contact terminals. (When the electrodes lose their high polish, deliver to the chief analytical chemist, who will consider having them replated.)
 - a. Scrub thoroughly with hot tap water and trisodium phosphate using the brush reserved exclusively for the purpose.
 - b. Rinse thoroughly with hot tap water.
 - c. Next rinse thoroughly with distilled water.
 - d. Dry the electrodes in the special oven at 120°C for 1 hr. standing erect on a clean sheet of lintless paper.
2. Clean a 1000-ml. beaker, the glass electrode spacer, and a -10 to 220°C. thermometer as follows before each sample is tested:
 - a. Scrub thoroughly with hot tap water and trisodium phosphate using the brush reserved exclusively for the purpose.

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- b. Rinse thoroughly with hot tap water.
 - c. Place the spacer and the thermometer in the beaker, fill with chromic acid cleaning solution (ca. 60°C.), and allow to stand 15 min. Discard the cleaning solution after it becomes green.
 - d. Rinse thoroughly with hot tap water.
 - e. Finally rinse thoroughly with distilled water and drain well.
 - f. Dry the ~~electrodes~~ in the special oven at 120°C. for 1 hr. standing erect on a clean sheet of lintless paper.
3. Remove the apparatus from the oven. Immediately place the spacer in the bottom of the beaker, put the two electrodes in the spacer grooves, and the thermometer outside the outer electrode.
 4. Place the beaker in the electric heater which has also been preheated.
 5. Balance the dielectric constant apparatus as follows:

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- a. Allow electrode leads to hang free.
- b. Close double-pole, single-throw switch.
- c. Turn toggle switch on amplifier to "On" position.
- d. Turn frequency dial to "1000 ~".
- e. Turn amplifier volume dial to give a volume of sound as experience dictates.
- f. Adjust precision condenser to 1600 mmf.
- g. Adjust variable condenser to a null point, using the resistance box if necessary.
6. Connect the red lead of the dielectric constant set to the inner electrode and the black to the outer electrode.
7. Adjust the precision condenser to a second null point and read (± 0.5 mmf.).
8. Pour a sufficient quantity of preheated sample ($97 \pm 2^\circ\text{C.}$) to

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cover the electrodes 1/2 in.

9. Stir slowly. When the sample reaches $100.0 \pm 0.5^{\circ}\text{C.}$, remove the thermometer and check the electrodes to see that they are properly spaced.
10. Immediately rebalance the precision condenser to a null point and read ($\pm 0.5 \text{ mmf.}$).
11. Next determine resistivity (Method No. 10,120-43) if required.

Calculations:

- 1) From the following chart convert the precision condenser readings to micromicrofarads:

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CALIBRATION DATA
GENERAL RADIO COMPANY
TYPE 222 L PRECISION CONDENSER
(SERIAL NO. 1189)

<u>Scale Reading</u> <u>Divisions</u>	<u>Capacitance</u> <u>MMF.</u>	<u>Scale Reading</u> <u>Divisions</u>	<u>Capacitance</u> <u>MMF.</u>
0	49	1300	755 60
100	57 8	1400	815 60
200	101 43	1500	875 60
300	159 48	1600	935 60
400	218 59	1700	995 60
500	277 59	1800	1055 60
600	335 58	1900	1116 61
700	396 59	2000	1176 60
800	455 59	2100	1237 61
900	515 60	2200	1297 60
1000	575 60	2300	1358 61
1100	635 60	2400	1418 60
1200	695 60	2500	1468 50

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2) Dielectric Constant = $\frac{935 - \text{capacity with sample}}{935 - \text{capacity with air}}$

The method is accurate to ± 0.05 .

Report the result to the nearest 0.01.

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