SUBJECT DETERMINATION OF HYDROFLUORIC ACID
Process Specifications

The following procedure is standard for determining the concentration of hydrofluoric acid inside the Cathode-ray bulb washing machine.

DANGER

HYDROFLUORIC ACID HANDLING PRECAUTIONS: See 33-2-7A.

1. APPARATUS
   a. 50-ml burrette
   b. 250-ml. Erlenmeyer flask
   c. 1000-ml. beaker, 250-ml. beaker
   d. 100-ml. graduate cylinder and 15-ml. graduate
   e. 1-ml. pipette
   f. Iron stand with burrette holder
   g. Wax bottle

2. REAGENTS
   a. Standardized sodium hydroxide (0.1N) - standardized against $KHC_8H_4O_4$ (potassium hydrogen phthalate) - From Laboratory
   b. Saturated solution of potassium nitrate
   c. Phenolphthalein indicator

** DANGER

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

3. PROCEDURE
   a. Take out of the hydrofluoric acid tank of the washing machine about 50 cc. of acid using the wax bottle to collect the solution. Rinse the wax bottle and discard the solution.
   b. Take about 150 cc. of HF solution out of the tank making sure the solution is clear, collecting in the rinsed wax bottle.
   c. Pour approximately 20 cc. of this acid into a clean 100 cc. graduate cylinder and discard the washing.
   d. Add 100 cc. of HF solution out of the wax bottle into the rinsed graduate and immediately pipette 1 cc. HF and discard it. Then pipette a second 1 cc. of HF.
      Note: As soon as the 1 cc. HF is taken out of the graduate cylinder, return the HF in the graduate to the wax bottle and wash the cylinder thoroughly with water.
   e. Transfer the 1 cc. of HF pipetted into a clean 250 cc. Erlenmyer.
      Note: Rinse the pipette thoroughly with water immediately after emptying it into the flask.
   f. Add 5 cc. saturated solution of potassium nitrate to the flask.
   g. Add enough pieces of chipped ice (clean) to the solution in the flask to cool the temperature to about 0° C. This temperature must be maintained during the titration with sodium hydroxide, adding more ice, if necessary.
   h. Add three (3) drops of phenolphthalein indicator from the dropper bottle.
   i. Place flask under the burrette containing the standardized sodium hydroxide solution and titrate slowly by adding the sodium hydroxide with continuous shaking of the flask until the colorless solution just turns pink. This is the end point or point of neutralization of the acid with the base.

3. PROCEDURE (cont.)

j. Measure the amount of sodium hydroxide added making sure you read the bottom of the meniscus with the help of the meniscus reader.

k. Calculation:

$$\frac{\text{cc. (NaOH) x N (NaOH) x 0.02 (M.eq.HF)}}{\text{No. of cc. HF sample used}} = \text{g/cc. HF}$$

g/cc. x 100 = % HF in washing machine.

A simplified calculation, in case the normality of the sodium hydroxide is 0.1, is:

No. of cc. sodium hydroxide added x 0.2 = % HF

l. Empty the sodium hydroxide remaining in the burrette into the original bottle and rinse the burrette thoroughly with water.

m. Frequency of Sampling:
(1) Once every shift.
(2) Four hours after charging with new hydrofluoric acid.

STANDARDIZING SECTION
ENGINEERING DEPT.