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CHEMICAL TITRATION METHOD

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6 Claims. (Cl. 23—230)

This invention relates to an improvement in the tablet titration method involving the use of barium chloride, potassium-acid-sulphate and the indicator sodium-indigodisulfonate. It is primarily adapted, as an operating procedure in food processing plants, to the testing for caustic content of alkaline solutions being used at high temperatures for sterilizing bottles and removing foreign matter from them.

The principles upon which the invention is based are the precipitation of the carbonates and phosphates from the alkaline test solution (these precipitates remain insoluble and do not interfere with the determination described below), combined with the use of an indicator which is not significantly affected by the presence of milder alkalies, such as silicates and aluminates.

The aluminates which have been found to interfere seriously with previous titration methods employing other indicators did not interfere with the indicator, sodium-indigodisulfonate, employed herein, because the point (pH) at which this indicator changes color is sufficiently high (over pH 12) so that aluminates do not cause any appreciable error when used in the presence of barium chloride and yet, under these conditions, all of the caustic is determined.

The test is carried out in the following manner:

A definite quantity of the solution to be tested (10 cc.) is placed in a small glass container and cooled to a temperature below 100° F. To this solution is now added a tablet of barium chloride for the purpose of precipitating the carbonates and phosphates and controlling the effect of other non-caustic alkalies. The indicator employed, sodium-indigodisulfonate, may be added separately as a solution. Our preferred method is to use it as an ingredient of the barium chloride tablet in a concentration of approximately 2% by weight of the barium chloride but if desired it may be incorporated in the acid substance containing tablet hereinafter referred to. The mixture is then titrated by adding tablets consisting of solid potassium-acid-sulphate, each of these tablets being capable of neutralizing ½% caustic (NaOH) in the 10 cc. of test solution. By the use of the indicator sodium indigodisulfonate in the presence of barium chloride only the caustic (sodium hydroxide) alkalinity is shown since such other alkalies as might not have been precipitated by the barium chloride or which tend to go into solution in the process of titration do not interfere with the determination and evaluation of caustic alkalinity. The novelty in using sodium-indigodisulphonate is further indicated by the fact that substantially accurate results may be secured through its use in combination with the acid potassium bisulfate and without the use of barium chloride as a preliminary step.

Tests formerly employed for the determination of caustic alkalinity are inoperative when salts of aluminum are present but the test herein described gives a correct indication of the caustic alkalinity in a solution notwithstanding the presence of aluminum compounds.

After having added the tablet of barium chloride containing the indicator sodium-indigodisulfonate, the solution will be colored green.

One of the acid tablets is then dropped into the solution and pulverized against the bottom of the glass container. When dissolved, if the caustic strength is less than ½%, the color of the solution will become blue. If, however, the caustic is more than ½% the color will remain green and additional acid tablets must be added. These potassium-acid-sulphate tablets are added one at a time and thoroughly crushed and mixed with the solution. When a considerable portion of the causticity has been neutralized by the acid, the color of the mixture changes to a greenish grey. This is not the end point. Additional tablets must be added until the color becomes distinctly blue throughout the solution. The number of tablets of potassium-acid-sulphate employed to produce the characteristic blue color throughout the solution multiplied by ½ gives the per cent caustic in the test solution. Smaller portions than whole tablets, such as half, or even quarter tablets, can, of course, be used so that the concentration of caustic may be determined to ¼% or ⅛%. This accuracy is sufficient for all of the purposes for which this titration method is recommended.

Having described our invention, we claim:

1. A method of titration to determine the caustic strength of solutions containing caustic, carbonates, phosphates silicates, and aluminates, singly or in combination, comprising precipitation of the interfering non-caustic alkalies with barium chloride as barium carbonate, barium phosphate and barium silicate, rendering visible the caustic condition of the resultant solution by the indicator sodium-indigodisulfonate and measuring the causticity by adding portions of solid potassium bisulfate to said solution, each of the said portions of bisulfate being equivalent to a predetermined proportion by weight of sodium hydroxide.

2. A method of titration to determine the caustic strength of a solution containing caustic al-

kali, carbonates, phosphates, silicates, and aluminates comprising precipitation of the interfering alkalies with barium chloride containing the indicator sodium-indigodisulphonate and measuring the causticity of the resultant solution by adding portions of solid potassium bisulfate, each of said portions being equivalent to a predetermined proportion by weight of sodium hydroxide.

3. A method of titration to determine caustic strength of a solution such as is commonly used at high temperature for sterilizing bottles and removing foreign matter, containing caustic alkali, carbonates, phosphates, silicates and aluminates comprising cooling of said solution to a temperature below 100° F., precipitation of the interfering non-caustic alkalies with barium chloride, rendering visible the caustic condition of the resultant solution by the indicator sodium-indigodisulphonate and measuring this causticity by adding portions of solid potassium bisulfate each of said portions being equivalent to a predetermined proportion by weight of sodium hydroxide.

4. A method of titration to determine the caustic strength of a solution such as is commonly used at high temperature for sterilizing bottles and removing foreign matter, containing caustic alkali, carbonates, phosphates, silicates and aluminates comprising the process of cooling the solution to a temperature below 100° F., precipitation of interfering non-caustic alkalies with barium chloride containing the indicator sodium-indigodisulphonate and determining the causticity of the resultant solution by adding portions of solid potassium bisulfate, each of said portions of bisulfate being equivalent to a predetermined proportion by weight of sodium hydroxide.

5. A method of titration to determine the caustic strength of solutions containing caustic and aluminates, comprising rendering visible the caustic condition of said solution by the indicator, sodium-indigodisulphonate, and measuring the causticity by adding portions of solid potassium bisulfate, each of said portions being equivalent to a predetermined proportion by weight of sodium hydroxide.

6. A method of titration to determine the caustic strength of solutions containing caustic, and aluminates, comprising rendering visible the caustic condition of said solution by the indicator sodium-indigodisulphonate, and measuring the causticity by adding portions of solid potassium bisulfate, each of said portions being equivalent to a predetermined proportion by weight of sodium hydroxide.

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