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COMPOSITION IN TABLET FORM FOR DETERMINING ALKALINE CONTENT BY TITRATION.

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The invention relates to a tablet composition for determining alkaline content of a solution by titration and is designed to furnish a simple, yet accurate, method of performing the operation.

The principle upon which the tablet composition, the invention herein, is based is as follows: An acid susbtance of known purity is mixed with an indicator, enough to be equivalent to one per cent by weight of sodium hydroixide (caustic) and is compressed into tablets.

The grainage of the tablets is so standardized that the average tablet is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali. This would represent one per cent of alkali calculated as sodium hydroxide.

The approximate alkaline strength of a ten cubic centimeter volume of the alkaline solution to be tested, may then be determined by the addition of the tablets. Since each tablet represents one per cent, i. e., contains exactly the correct amount of acid to neutralize an alkaline content of one per cent, the number of tablets required to neutralize the full alkaline content of the solution is an approximate index of the percentage of actual alkali in the solution when calculated as sodium hydroxide.

While other acids can be used, it was found that potassium bisulfate is particularly adaptable to the test. The results are more definite if the acid substance yields a strong acid in water. Potassium bisulfate yields sulfuric acid (H_2SO_4), which is a very strong acid. Weak acids would not do as the endpoint would not be very definite. Also, potassium bisulfate exists as a solid, and because of which it is possible to prepare it in such form that it may be molded into tablets by machine operation. Other satisfactory acids would, in all probability, be liquids.

Alkaline solutions, especially the solutions used for washing beverage and milk bottles, are usually yellow or brown and get very dirty from the accumulation of foreign substances. It is therefore necessary to use an indicator with sufficient difference between its neutral color and end point, and usual color of the solutions being tested, to make the changes in color easily discernable.

It is also necessary to use an indicator that will work in the presence of strong alkalies as well as weak. That is, it must indicate not only the presence of caustic, but also the presence of carbonates. It thereby gives total alkalinity, a feature which has been lacking in the kinds of tests previously devised.

The indicator tetra bromo phenol sulfon phthalein serves these purposes. Its color range is in the proper (H)-ion concentration range, and is very definite, because the yellow color usually found in the alkaline washing solution does not interfere. In other words, it gives in the solution for which it is particularly adaptable, a sharp endpoint.

The indicator which is mixed with the acid in the tablet, by a change of color in the solution, determines when a sufficient number of tablets have been added.

The composition of the acid tablet is as follows:

Potassium bisulfate is used as the acid constituent. Any suitable acid substance which gives a satisfactory end point and of which the purity is known, and which may be worked up in such a way that it may be moulded or compressed into tablets which will have a definite composition is satisfactory.

The indicator "brom phenol blue" (tetra bromo phenol sulfon phthalein) finely powdered is added to the preparation potassium bisulfate to the extent of one tenth of one per cent.

Ethyl alcohol is used to moisten the combination.

Five per cent of talc is added to remove moisture.

White oil (liquid paraffin) is added in the ratio of one half ounce to five pounds of prepared substance. This is for the purpose of preventing clogging and sticking in the machine in which the tablets are prepared.

As previously stated, the grainage of the tablets is so standardized that the everage tablet is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali, or its equivalent one per cent of alkali calculated as sodium hydroxide.

The purpose of "brom phenol blue" indicator is to show when the reaction of neutralization between the acid substance of the tablet and alkali of the washing solution is completed.

The procedure recommended for use of the tablets is as follows. Ten cubic centimeters of the solution to be tested are accurately meas-

ured and transferred to a clear glass tumbler. One tablet is added and dissolved in the solution. If the solution remains blue, it is evident that the strength in terms of alkali, calculated as sodium hydroxide, is greater than one per cent. If the solution turns yellow it is evident that the strength is less than one per cent. By addition of tablets until the yellow color is obtained the approximate strength of the solution is determined because of the fact that the total number of tablets necessary to cause the yellow color is numerically the same as the proportion of alkaline content bears to the whole solution in terms of percentage. That is, each tablet added until the yellow color is obtained represents a strength of one per cent of alkali calculated as sodium hydroxide.

The reaction illustrating the action of the potassium bisulfate is shown:

$$2KHSO_4 = K_2SO_4 + H_2SO_4.$$

The reaction shows that sulphuric acid is developed which will furnish the acid properties to such a solution. Such a tablet when dissolved in water would give an acid reaction to the water and consequently would neutralize the alkali.

While the composition has been described herein in detail for use in titrating a quantity of ten cubic centimeters of alkaline solution, it is to be understood that the grainage of the tablets may be so varied so as to be used in titrating greater or lesser quantities of alkaline solution without departing from the spirit of the invention or the scope of the subjoined claims.

Having described my invention, I claim:

1. A composition in tablet form comprising potassium bisulfate as the acid constituent, with an indicator, of such standardized grainage and proportions that each tablet is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic), for the purpose of determining by titration the alkaline content of any solution.

2. A composition in tablet form comprising potassium bisulfate as the acid constitutent, with tetra bromo phenol sulfron phthalein as the indicator, of such standardized grainage and proportions that each tablet is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic) for the purpose of determining by titration the alkaline content of any solution.

3. A composition in tablet form comprising potassium bisulfate as the acid constituent, with an indicator, of such standardized grainage and proportions that each tablet is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali, for the purpose of determining the alkaline content of any solution by titration.

4. A composition in tablet form comprising potassium bisulfate as the acid constituent, with tetra bromo phenol sulfon phthalein as the indicator, of such standardized grainage and proportions that each tablet is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali for the purpose of determining the alkaline content of any solution by titration.

5. A titration tablet comprising potassium bisulfate and a filler, of such standardized grainage and proportions that for titration purposes each tablet is equivalent to a fractional part of one percent of alkali in solution, said percentage being within the range of and including one tenth to one-half of one percent.

6. A titration tablet comprising potassium bisulfate and a filler, of such standardized grainage and proportions that for titration purposes each tablet is equivalent to a specified percentage of alkali in solution, said percentage being wthin the range of and including one-tenth percent to five percent.

7. A tablet consisting of potassium bisulfate and a filler, of such standardized grainage and proportions that each tablet is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali, for the purpose of determining by titration the alkaline content of any solution.

8. A composition comprising potassium bisulfate as the acid constituent with an indicator, of such standardized grainage and proportions that for titration purposes it is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic).

9. A composition comprising potassium bisulfate as the acid constituent, with tetra bromo phenol sulfon phthalein as the indicator, of such standardized grainage and proportions that for titration purposes it is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic).

10. A composition of matter for forming titration tablets, comprising potassium bisulfate, an indicator, talc, and white oil, substantially as set forth.

11. A composition of matter for forming titration tablets, comprising potassium bisulfate, tetra bromo phenol sulfon phthalein, talc, and white oil, substantially as set forth.

12. A composition of matter for forming titration tablets, comprising potassium bisulfate, tetra bromo sulfon phthalein, and a filler, substantially as set forth.

13. A composition of matter for forming titration tablets, comprisng potassium bisulfate, an indicator, and a filler, substantially as set forth.

14. A composition of matter for forming titration tablets, comprising 1 part potassium bisulfate, 1/1000 part tetra bromo phenol sulfon phthalein, 1/20 part talc, and 1/171 part white oil (liquid paraffin), substantially as set forth.

15. A process for determining the alkaline

content of any solution which consists of rendering visible the alkaline or acid condition of the solution and measuring the alkaline content thereof by means of tablets consisting of potassium bisulfate and tetra bromo phenol solfon phthalein, each tablet being of such standardized grainage and proportions that it is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali.

16. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution and measuring the alkaline content thereof by means of tablets consisting of potassium bisulfate and an indicator, each tablet being of such standardized grainage and proportions that it is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali.

17. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution and measuring the alkaline content thereof by means of tablets consisting of potassium bisulfate and tetra bromo phenol sulfon phthalein, each tablet being of such standardized grainage and proportions that it is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic).

18. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution and measuring the alkaline content thereof by means of tablets consisting of potassium bisulfate and an indicator, each tablet being of such standardized grainage and proportions that it is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic).

19. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution by means of an indicator, and measuring the alkaline content thereof by means of tablets of potassium bisulfate, each tablet being of such standardized grainage and proportions that it is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali.

20. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution by means of an indicator, and measuring the alkaline content thereof by means of tablets of potassium bisulfate, each tablet being of such standardized grainage and proportions that it is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic).

21. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution by means of tetra bromo phenol sulfon phthalein, and measuring the alkaline content thereof by means of tablets of potassium bisulfate, each tablet being of such standardized grainage and proportions that it is equivalent to ten cubic centimeters of twenty-five hundredths normal alkali.

22. A process for determining the alkaline content of any solution which consists of rendering visible the alkaline or acid condition of the solution by means of tetra bromo phenol sulfon phthalein, and measuring the alkaline content thereof by means of tablets of potassium bisulfate, each tablet being of such standardized grainage and proportions that it is equivalent to a predetermined proportion by weight of sodium hydroxide (caustic).

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