INTRODUCTION
This method determines the buffer capacity of persulfate bleach in terms of volume of 85 percent phosphoric acid. The sample is adjusted to pH 1.60 with hydrochloric acid and titrated to pH 2.80 with standard sodium hydroxide. The volume of sodium hydroxide used is then related to a volume of 85 percent phosphoric acid necessary to maintain the desired buffer capacity.

This method requires handling potentially hazardous chemicals. Consult the Material Safety Data Sheet for each chemical before use. MSDS’s are available from your chemical supplier.

RELIABILITY
Based on 16 determinations by four analysts, the 95 percent confidence limits for an individual determination are ±0.33 mL/L 85 percent phosphoric acid.

SPECIAL APPARATUS
• pH Meter
• Reference Electrode, Ceramic Junction, Calomel, Corning No. 476002, Beckman No. 38423 or equivalent (Filled with 3.5 M potassium chloride solution)
• Indicator Electrode, glass (pH), Rugged Bulb, Corning No. 476024 or equivalent
• 25-mL Buret

Note: Use pipets and volumetric glassware meeting the “Class A” definition by the National Institute of Standards and Technology (NIST).

REAGENTS
Use ACS Reagent Grade reagents unless specified otherwise.
• 1 N Sodium Hydroxide, NaOH (standardized to 4 decimal places)
• 3.0 N Hydrochloric Acid, HCl

PROCEDURE


Titration
1. Pipet (wipe the pipet before leveling) 100.0 mL of sample into a 250-mL beaker containing a magnetic stirring bar.
2. Immerse the electrode assembly in the sample solution and stir without splashing.
3. Adjust the pH of the sample to approximately pH 1.5, using 3.0 N hydrochloric acid.
4. Add, from a pipet or buret, standardized 1 N sodium hydroxide to attain a pH of exactly 1.60. (This volume does not have to be measured.)

Caution
Stir the solution rapidly without splashing. Do not rinse the sides of the beaker with distilled water because dilution will affect the results.
5. Using a 25-mL buret, titrate the sample to exactly pH 2.80 with standardized 1 N sodium hydroxide. Record the volume of titrant used.

Note: If the titration exceeds pH 2.80, discard the sample and repeat the analysis.
6. Remove the sample and rinse the electrode assembly with distilled water. If rinsing does not completely remove sample deposits, wipe the assembly with a cleansing tissue and rerinse. Replace the assembly in pH 4.01 potassium acid phthalate buffer for storage.

Calculations
Buffer Capacity, mL/L = 1.415(N NaOH)(mL NaOH) – 4.52