Sodium Hydroxide, 0.01 mol/L

1000 mL of this solution contains 0.39997 g of sodium hydroxide (NaOH: 39.997).

Preparation—Before use, dilute 0.1 mol/L sodium hydroxide VS with freshly boiled and cooled water to make exactly 10 times the initial volume.

Sodium Lauryl Sulfate, 0.01 mol/L

1000 mL of this solution contains 2.8838 g of sodium lauryl sulfate ($C_{12}H_{25}NaO_4S$: 288.38).

Preparation—Dissolve 2.9 g of sodium lauryl sulfate in water to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh accurately about 0.3 g of papaverine for assay, previously dried, and dissolve in water to make exactly 100 mL. Pipet 10 mL of this solution into a glass-stoppered conical flask, add 5 mL each of water and dilute sulfuric acid and 60 mL of dichloromethane, then add 5 to 6 drops of a solution of methyl yellow in dichloromethane (1 in 500) as indicator, and titrate, while vigorously shaking, with 0.01 mol/L sodium lauryl sulfate VS, using a buret with a minimum graduation of 0.02 mL. End point is reached when the color of the dichloromethane layer changes from yellow to orange-red after dropwise addition of 0.01 mol/L sodium lauryl sulfate VS, vigorous shaking and standing for a while.

Each mL of 0.01 mol/L sodium lauryl sulfate VS
= 3.7585 mg of $C_{20}H_{21}NO_4.HCl$

Sodium Methoxide, 0.1 mol/L

1000 mL of this solution contains 5.402 g of sodium methoxide (CH_3ONa: 54.02).

Preparation—Add little by little 2.5 g of freshly cut sodium pieces to 150 mL of methanol cooled in ice-water. After the sodium has dissolved, add benzene to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh accurately about 0.3 g of benzoic acid, previously dried for 24 hours in a desiccator (silica gel), dissolve it in 80 mL of *N,N*-dimethylformamide, and add 3 drops of thymol blue-*N,N*-dimethylformamide TS. Titrate the solution with the prepared sodium methoxide solution until a blue color appears. Perform a blank determination. Calculate the molarity factor.

Each mL of 0.1 mol/L sodium methoxide VS
= 12.212 mg of C_6H_5COCH

Note: Store in a cold place, protected from moisture. Standardize before use.

Sodium Methoxide-Dioxane, 0.1 mol/L

See Sodium Methoxide-1,4-Dioxane, 0.1 mol/L.

Sodium Methoxide-1,4-Dioxane, 0.1 mol/L

1000 mL of this solution contains 5.402 g of sodium methoxide (CH_3ONa: 54.02).

Preparation—Add little by little 2.5 g of freshly cut sodium pieces to 150 mL of methanol cooled in ice-water. After the sodium has dissolved, add 1,4-dioxane to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh accurately about 0.3 g of benzoic acid, previously dried in a desiccator (silica gel) for 24 hours, dissove it in 80 mL of *N,N*-dimethylformamide, and add 3 drops of thymol blue-*N,N*-dimethylformamide TS. Titrate the solution with the prepared sodium methoxide-1,4-dioxane solution until a blue color appears. Perform a blank determination. Calculate the molarity factor.

Each mL of 0.1 mol/L sodium methoxide-1,4-dioxane VS
= 12.212 mg of C_6H_5COOH

Note: Store in a cold place, protected from moisture. Standardize before use.

Sodium Nitrite, 0.1 mol/L

1000 mL of this solution contains 6.900 g of sodium nitrite ($NaNO_2$: 69.00).

Preparation—Dissolve 7.2 g of sodium nitrite in water to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh accurately about 0.44 g of sulfanilamide for titration of diazotization, previously dried at 105°C for 3 hours and allowed to cool in a desiccator (silica gel), dissolve in 10 mL of hydrochloric acid, 40 mL of water and 10 mL of a solution of potassium bromide (3 in 10), cool below 15°C, and titrate with the prepared sodium nitrite solution as directed in the potentiometric titration or amperometric titration under the Endpoint Detection Methods in Titrimetry. Calculate the molarity factor.

Each mL of 0.1 mol/L sodium nitrite VS
= 17.221 mg of $H_2NC_6H_4SO_2NH_2$

Sodium Oxalate, 0.005 mol/L

1000 mL of this solution contains 0.6700 g of sodium oxalate ($Na_2C_2O_4$: 134.00).

Preparation—Weigh accurately about 0.6700 g of sodium oxalate (standard reagent), previously dried between 150°C and 200°C for 2 hours and allowed to cool in a desiccator (silica gel), dissolve it in water to make exactly 1000 mL, and calculate the molarity factor.

Sodium Tetraphenylborate, 0.02 mol/L

1000 mL of this solution contains 6.844 g of sodium tetraphenylborate [$NaB(C_6H_5)_4$: 342.22].

Preparation—Dissolve 7.0 g of sodium tetraphenylborate in water to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh 0.5 g of potassium hydrogen phthalate (standard reagent), dissolve it in 100 mL of water, add 2 mL of acetic acid (31), and warm to 50°C in a water bath. Add slowly 50 mL of the prepared sodium tetraphenylborate solution under stirring from a buret, then cool the mixture quickly, and allow to stand for 1 hour at room temperature. Transfer the precipitate to a tared glass filter (G4), wash with three 5 mL portions of potassium tetraphenylborate TS, dry at 105°C for 1 hour, and weigh accurately the glass filter. Calculate the molarity factor from the mass of potassium tetraphenylborate [$KB(C_6H_5)_4$: 358.33].

Each mL of 0.02 mol/L sodium tetraphenylborate VS
= 7.167 mg of $KB(C_6H_5)_4$

Note: Prepare before use.

Sodium Tetraphenylboron, 0.02 mol/L

See Sodium Tetraphenylborate, 0.02 mol/L.

Sodium Thiosulfate, 0.1 mol/L

1000 mL of this solution contains 24.819 g of sodium thiosulfate ($Na_2S_2O_3.5H_2O$: 248.19).

Preparation—Dissolve 25 g of sodium thiosulfate and 0.2 g of anhydrous sodium carbonate in freshly boiled and cooled water to make 1000 mL, allow to stand for 24 hours, and standardize the solution as follows:

Standardization—Weigh accurately about 0.05 g of potassium iodate (standard reagent), previously dried between 120°C and 140°C for 1.5 to 2 hours and allowed to cool in a desiccator (silica gel), and transfer to an iodine flask. Dissolve it in 25 mL of water, add 2 g of potassium iodide and 10 mL of dilute sulfuric acid, and stopper the flask. After allowing the mixture to stand for 10 minutes, add 100 mL of water, and titrate the liberated iodine with the prepared sodium thiosulfate solution (Indicator method; or potentiometric titration: platinum electrode). In the indicator method, when the solution assumes a pale yellow color as the end point is approached, add 3 mL of starch TS. Continue the titration, until the blue color disappears. Perform a blank determination. Calculate the molarity factor.

Each mL of 0.1 mol/L sodium thiosulfate VS
= 3.5667 mg of KIO_3

Note: This solution, if stored for a long period, should be restandardized.

Sodium Thiosulfate, 0.05 mol/L

1000 mL of this solution contains 12.409 g of sodium thiosulfate ($Na_2S_2O_3.5H_2O$: 248.19).

Preparation—Before use, dilute 0.1 mol/L sodium thiosulfate VS with freshly boiled and cooled water to make exactly 2 times the initial volume.

Sodium Thiosulfate, 0.02 mol/L

1000 mL of this solution contains 4.964 g of sodium thiosulfate ($Na_2S_2O_3.5H_2O$: 248.19).

Preparation—Before use, dilute 0.1 mol/L sodium thiosulfate VS with freshly boiled and cooled water to make exactly 5 times the initial volume.

Sodium Thiosulfate, 0.01 mol/L

1000 mL of this solution contains 2.4819 g of sodium thiosulfate ($Na_2S_2O_3.5H_2O$: 248.19).

Preparation—Before use, dilute 0.1 mol/L sodium thiosulfate VS with freshly boiled and cooled water to make exactly 10 times the initial volume.

Sodium Thiosulfate, 0.005 mol/L

1000 mL of this solution contains 1.2409 g of sodium thiosulfate ($Na_2S_2O_3.5H_2O$: 248.19).

Preparation—Before use, dilute 0.1 mol/L sodium thiosulfate VS with freshly boiled and cooled water to make exactly 20 times the initial volume.

Sulfuric Acid, 0.5 mol/L

1000 mL of this solution contains 49.04 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Add slowly, under stirring, 30 mL of sulfuric acid to 1000 mL of water, allow to cool, and standardize the solution as follows:

Standardization—Weigh accurately about 0.8 g of sodium carbonate (standard reagent), previously heated between 500°C and 650°C for 40 to 50 minutes and allowed to cool in a desiccator (silica gel). Dissolve it in 50 mL of water, and titrate the solution with the prepared sulfuric acid (Indicator method: 3 drops of methyl red TS; or potentiometric titration). In the indicator method, when the end point is approached, boil the solution carefully, stopper the flask loosely, allow to cool, and continue the titration, until the color of the solution changes to persistent orange to orange-red. Calculate the molarity factor. In the potentiometric titration, titrate with vigorous stirring without boiling.

Each mL of 0.5 mol/L sulfuric acid VS
= 52.99 mg of Na_2CO_3

Sulfuric Acid, 0.25 mol/L

1000 mL of this solution contains 24.520 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Add slowly, under stirring, 15 mL of sulfuric acid to 1000 mL of water, allow to cool, and standardize the solution as follows:

Standardization—Proceed as directed for standardization under 0.5 mol/L sulfuric acid VS, but weigh accurately about 0.4 g of sodium carbonate (standard reagent), and dissolve in 50 mL of water.

Each mL of 0.25 mol/L sulfuric acid VS
= 26.497 mg of Na_2CO_3

Sulfuric Acid, 0.1 mol/L

1000 mL of this solution contains 9.808 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Add slowly, under stirring, 6 mL of sulfuric acid to 1000 mL of water, allow to cool, and standardize the solution as follows:

Standardization—Proceed as directed for standardization under 0.5 mol/L sulfuric acid VS, but weigh accurately about 0.15 g of sodium carbonate (standard reagent), and dissolve in 50 mL of water.

Each mL of 0.1 mol/L sulfuric acid VS
= 10.599 mg of Na_2CO_3

Sulfuric Acid, 0.05 mol/L

1000 mL of this solution contains 4.904 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Add slowly, under stirring, 3 mL of sulfuric acid to 1000 mL of water, allow to cool, and standardize the solution as follows:

Standardization—Proceed as directed for standardization under 0.5 mol/L sulfuric acid VS, but weigh accuretely about 0.08 g of sodium carbonate (standard reagent), and dissolve in 30 mL of water.

Each mL of 0.05 mol/L sulfuric acid VS
= 5.299 mg of Na_2CO_3

Sulfuric Acid, 0.025 mol/L

1000 mL of this solution contains 2.4520 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Before use, dilute 0.05 mol/L sulfuric acid VS with water to make exactly twice the initial volume.

Sulfuric Acid, 0.01 mol/L

1000 mL of this solution contains 0.9808 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Before use, dilute 0.05 mol/L sulfuric acid VS with water to make exactly 5 times the initial volume.

Sulfuric Acid, 0.005 mol/L

1000 mL of this solution contains 0.4904 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Before use, dilute 0.05 mol/L sulfuric acid VS with water to make exactly 10 times the initial volume.

Surfuric Acid, 0.0005 mol/L

1000 mL of this solution contains 0.04904 g of sulfuric acid (H_2SO_4: 98.08).

Preparation—Before use, dilute 0.05 mol/L sulfuric acid VS with water to make exactly 100 times the initial volume.

Tetrabutyl Ammonium Hydroxide, 0.1 mol/L

1000 mL of this solution contains 25.948 g of tetrabutyl ammonium hydroxide [$(C_4H_9)_4NOH$: 259.48].

Preparation—Before use, dilute a volume of 10% tetrabutyl ammonium hydroxide-methanol TS, equivalent to 26.0 g of tetrabutyl ammonium hydroxide, with isopropanol to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh accurately about 0.3 g of benzoic acid, previously dried in a desiccator (silica gel) for 24 hours, dissolve it in 50 mL of acetone, and titrate the solution with the prepared tetrabutyl ammonium hydroxide solution (potentiometric titration). Perform a blank determination in the same manner.

Each mL of 0.1 mol/L tetrabutyl ammonium hydroxide VS
= 12.212 mg of C_6H_5COOH

Note: Store in tightly stoppered bottles. This solution, if stored for a long period, should be restandardized.

Tetramethyl Ammonium Hydroxide, 0.2 mol/L

1000 mL of this solution contains 18.231 g of tetramethyl ammonium hydroxide [$(CH_3)_4NOH$: 91.15].

Preparation—Before use, dilute a volume of tetramethyl ammonium hydroxide-methanol TS, equivalent to 18.4 g of tetramethyl ammonium hydroxide, with water to make 1000 mL, and standardize the solution as follows:

Standardization—Weigh accurately about 0.4 g of benzoic acid, previously dried in a desiccator (silica gel) for 24 hours, dissolve it in 60 mL of *N,N*-dimethylformamide, and titrate the solution with the prepared 0.2 mol/L tetramethyl ammonium hydroxide solution (Indicator method: 3 drops of thymol blue-*N,N*-dimethylformamide TS; or potentiometric titration). In the indicator method, titrate until a blue color is produced. Perform a blank determination in the same manner. Calculate the molarity factor.

Each mL of 0.2 mol/L tetramethyl ammonium hydroxide VS
= 24.425 mg of C_6H_5COOH

Note: Store in tightly stoppered bottles. This solution, if stored for a long period, should be restandardized.

Tetramethyl Ammonium Hydroxide, 0.1 mol/L

1000 mL of this solution contains 9.115 g of tetramethyl ammonium hydroxide [$(CH_3)_4NOH$: 91.15].

Preparation—Before use, dilute a volume of tetramethyl ammonium hydroxide-methanol TS, equivalent to 9.2 g of tetramethyl ammonium hydroxide, with water to make 1000 mL, and standardize the solution as follows:

Standardization—Proceed as directed for standardization under 0.2 mol/L tetramethyl ammonium hydroxide VS. Weigh accurately about 0.2 g of benzoic acid and titrate.

Each mL of 0.1 mol/L tetramethyl ammonium hydroxide VS
= 12.212 mg of C_6H_5COOH

Note: Store in tightly stoppered bottles. This solution, if stored for a long period, should be restandardized.

Tetramethyl Ammonium Hydroxide, 0.02 mol/L

1000 mL of this solution contains 1.8231 g of tetramethyl ammonium hydroxide [$(CH_3)_4NOH$: 91.15].

Preparation—Before use, dilute 0.1 mol/L tetramethyl ammonium hydroxide VS with freshly boiled and cooled water to make exactly 5 times the initial volume.

Tetramethyl Ammonium Hydroxide-Methanol, 0.1 mol/L

1000 mL of this solution contains 9.115 g of tetramethyl ammonium hydroxide [$(CH_3)_4NOH$: 91.15].

Preparation—Before use, dilute a volume of tetramethyl ammonium hydroxide-methanol TS, equivalent to 9.2 g of tetramethyl ammonium hydroxide, with methanol to make 1000 mL, and standardize the solution as follows:

Standardization—Proceed as directed for standardization under 0.1 mol/L tetramethyl ammonium hydroxide VS.

Note: Store in tightly stoppered bottles. This solution, if stored for a long period, should be restandardized.

Titanium (III) Chloride, 0.1 mol/L

1000 mL of this solution contains 15.424 g of titanium (III) chloride solution ($TiCl_3$: 154.24).

Preparation—Add 75 mL of hydrochloric acid to 75 mL of titanium (III) chloride solution, and dilute with freshly boiled and cooled water to make 1000 mL. Transfer the solution into a buret provided with a reservoir protected from light, replace the air with hydrogen, and allow to stand for 48 hours. Before use, standardize the solution as follows:

Standardization—Weigh 3 g of ammonium iron (II) sulfate hexahydrate in a wide-mouthed, 500 mL conical flask. Passing carbon dioxide through the flask, dissolve it in 50 mL of freshly boiled and cooled water, and add 25 mL of diluted sulfuric acid (27 in 100). Passing carbon dioxide through the flask, and rapidly add exactly 40 mL of 0.02 mol/L potassium permanganate VS to the mixture. Titrate with the prepared titanium (III) chloride solution until the calculated end point is approached, then add 5 g of ammonium thiocyanate immediately, and continue the titration with the prepared titanium (III) chloride solution until the color of the solution disappears. Perform a blank determination. Calculate the molarity factor.

Note: Store after the air has been displaced with hydrogen.

Titanium Trichloride, 0.1 mol/L

See Titanium (III) Chloride, 0.1 mol/L.

Zinc, 0.1 mol/L

1000 mL of this solution contains 6.539 g of zinc (Zn: 65.39).

Preparation—To 6.539 g of zinc (standard reagent), previ-

ously washed with dilute hydrochloric acid, with water and then acetone, and cooled in a desiccator (silica gel) after drying at 110°C for 5 minutes, add 80 mL of dilute hydrochloric acid and 2.5 mL of bromine TS, dissolve by gentle warming, evaporate excess bromine by boiling, and add water to make exactly 1000 mL.

Zinc Acetate, 0.05 mol/L

1000 mL of this solution contains 10.975 g of zinc acetate dihydrate [$Zn(CH_3COO)_2.2H_2O$: 219.51].

Preparation—Dissolve 11.1 g of zinc acetate dihydrate in 40 mL of water and 4 mL of dilute acetic acid, add water to make 1000 mL, and standardize the solution as follows:

Standardization—Measure exactly 20 mL of 0.05 mol/L disodium dihydrogen ethylenediamine tetraacetate VS, and add 50 mL of water, 3 mL of ammonia-ammonium chloride buffer solution, pH 10.7, and 0.04 g of eriochrome black T-sodium chloride reagent. Titrate the solution with the prepared zinc acetate solution, until the blue color changes to blue-purple. Calculate the molarity factor.

Zinc Acetate, 0.02 mol/L

1000 mL of this solution contains 4.390 g of zinc acetate dihydrate [$Zn(CH_3COO)_2.2H_2O$: 219.51].

Preparation—Dissolve 4.43 g of zinc acetate dihydrate in 20 mL of water and 2 mL of dilute acetic acid, add water to make 1000 mL, and standardize the solution as follows:

Standardization—Proceed as directed for standardization under 0.05 mol/L zinc acetate VS, but measure exactly 20 mL of 0.02 mol/L disodium dihydrogen ethylenediamine tetraacetate VS.

Zinc Sulfate, 0.1 mol/L

1000 mL of this solution contains 28.756 g of zinc sulfate heptahydrate ($ZnSO_4.7H_2O$: 287.56).

Preparation—Dissolve 28.8 g of zinc sulfate for volumetric analysis in water to make 1000 mL, and standardize the solution as follows:

Standardization—Pipet 25 mL of the prepared zinc sulfate solution, add 5 mL of ammonia-ammonium chloride buffer solution, pH 10.7, and 0.04 g of eriochrome black T-sodium chloride indicator, and titrate with 0.1 mol/L disodium dihydrogen ethylenediamine tetraacetate VS until the color of the solution changes from red-purple to blue-purple. Calculate the molarity factor.

(4) Standard Solutions

Borate pH Standard Solution See the pH Determination.

Calcium Hydroxide pH Standard Solution See the pH Determination.

Carbonate pH Standard Solution See the pH Determination.

Oxalate pH Standard Solution See the pH Determination.

pH Standard Solution, Borate See the pH Determination.

pH Standard Solution, Calcium Hydroxide See the pH Determination.

pH Standard Solution, Carbonate See the pH Determination.

pH Standard Solution, Oxalate See the pH Determination.

pH Standard Solution, Phosphate See the pH Determination.

pH Standard Solution, Phthalate See the pH Determination.

Phosphate pH Standard Solution See the pH Determination.

Phthalate pH Standard Solution See the pH Determination.

Standard Aluminum Stock Solution Weigh 1.0 g of aluminum, add 60 mL of diluted hydrochloric acid (1 in 2), dissolve by heating, cool, add water to make 1000 mL. Pipet 10 mL of this solution, add 30 mL of water and 5 mL of acetic acid-ammonium acetate buffer solution, pH 3.0, and adjust the pH to about 3 with ammonia TS added dropwise. Then, add 0.5 mL of Cu-PAN TS, and titrate with 0.01 mol/L disodium dihydrogen ethylenediamine tetraacetate VS under boiling until the color of the solution changes from red to yellow lasting for more than 1 minute. Perform a brank determination.

Each mL of 0.01 mol/L disodium dihydrogen ethylenediamine tetraacetate VS
= 0.26982 mg of Al

Standard Ammonium Solution Dissolve 2.97 g of ammonium chloride, exactly weighed, in purified water for ammonium limit test to make exactly 1000 mL. Measure exactly 10 mL of this solution, and add purified water for ammonium limit test to make exactly 1000 mL: 1 mL of this solution contains 0.01 mg of ammonium (NH_4^+).

Standard Arsenic Stock Solution See the Arsenic Limit Test.

Standard Arsenic Solution See the Arsenic Limit Test.

Standard Boron Solution Weigh exactly 0.286 g of boric acid, previously dried in a desiccator (silica gel) to constant mass, and dissolve in water to make exactly 1000 mL. Pipet 10 mL of this solution, and add water to make exactly 1000 mL: 1 mL of this solution contains 0.5 μg of boron (B).

Standard Cadmium Stock Solution Dissolve 1.000 g of cadmium ground metal, exactly weighed, in 100 mL of dilute nitric acid by gentle heating, cool, and add dilute nitric acid to make exactly 1000 mL.

Standard Cadmium Solution Measure exactly 10 mL of Standard Cadmium Stock Solution, and add diluted nitric acid (1 in 3) to make exactly 1000 mL. Pipet 10 mL of this solution, and add diluted nitric acid (1 in 3) to make 100 mL: 1 mL of this solution contains 0.001 mg of cadmium (Cd). Prepare before use.

Standard Calcium Solution Weigh exactly 0.250 g of calcium carbonate, add 5 mL of dilute hydrochloric acid and 25 mL of water, and dissolve by heating. After cooling, add water to make exactly 1000 mL: 1 mL of this solution contains 0.1 mg of calcium (Ca).