

8.3.2 Published instructions

For products designed to be flushed out prior to using the system for drinking water, the manufacturer's product data sheet shall contain instructions for proper flushing and draining before placing a system back into service. A product that qualifies under this section for a specific and limited use shall be clearly identified in the manufacturer's product data sheet. Polyacrylamide-containing well-drilling additives shall be identified in the manufacturer's product data sheet to indicate that these products are not acceptable for use in constructing wells in highly porous formations such as cavernous limestone.

8.4 Sample requirements

When required for evaluation, a sample of the product equivalent to that used in field applications shall be obtained.

8.5 Sample preparation

8.5.1 Analytical summary

An analytical summary shall be prepared for each product to be tested. The analytical summary shall consist of the product-specific analytes identified in Table 8.1 and any formulation-dependent analytes identified during the formulation review (see Section 3.2).

8.5.2 Selection of preparation method

When applicable, the test sample shall be prepared for analysis per the appropriate preparation method indicated in Table 8.1. For sealants / grouts that can be exposed as a solid mass, the manufacturer shall provide instructions for sample preparation.

8.6 Analysis

Following preparation (see Section 8.5.2), the sample solution shall be analyzed for the contaminants identified on the analytical summary per the methods referenced in Annex N-1, Section N-1.4.

8.7 Normalization of contaminant concentrations

8.7.1 General

The concentration of the product's active ingredient(s) and any contaminants detected in the analysis solution shall be adjusted to reflect the concentration in the finished drinking water when the product is used in accordance with the manufacturer's use instructions. When appropriate, the applicant shall provide data, which define the decay curve for removal of the product from the water supply system when the manufacturer's recommended flushing procedures are utilized.

The following equation shall be used to calculate contaminant concentrations for products other than those specified in Sections 8.7.2, 8.7.3, 8.7.4, and 8.7.5:

$$\frac{\text{[analysis result]}}{\text{lab solution (L)}} \times \frac{\text{[lab prep volume]}}{\text{product (mg)}} \times \frac{\text{[product dosage / residual]}}{\text{product (mg)}} = \frac{\text{[at-the-tap exposure]}}{\text{normalized contaminant (}\mu\text{g)}}$$

$$\frac{\text{contaminant (}\mu\text{g)}}{\text{lab solution (L)}} \times \frac{\text{lab solution (L)}}{\text{product (mg)}} \times \frac{\text{product (mg)}}{\text{drinking water (L)}} = \frac{\text{normalized contaminant (}\mu\text{g)}}{\text{drinking water (L)}}$$

8.7.2 Well-drilling additives

8.7.2.1 Turbid well-drilling additives

Ingredient and contaminant concentrations for turbid well-drilling additives shall be multiplied by the dilution factor required to reduce the analysis solution to a turbidity of 1 NTU.

8.7.2.2 Nonturbid well-drilling additives

Residual levels of ingredients or contaminants present in nonturbid well-drilling additives shall be calculated on the basis of the following assumptions:

- the aquifer contains 3.1×10^6 L (815,500 gal) of water, based on a 0.5 acre aquifer of 6.1 m depth (20 ft) and 25% porosity;
- the amount of well-drilling fluid used is 3780 L (1,000 gal), to which the drilling fluid additive has been added at the manufacturer's maximum recommended level;
- the bore hole is 61 m (200 ft) in total depth, the screen is 6.1 m (20 ft) in length, and the bore hole is 25.4 cm (10 in) in diameter; and
- the amount of well-drilling fluid removed from the well during construction is equal to the combined volumes of the casing, the screen, and the bore hole annulus around the casing and the screen, plus an additional amount removed through well disinfection and development (90% removed).

NOTE — Example calculation of a residual level is provided in Table 8.2.

8.7.3 Well-drilling foamers

8.7.3.1 Assumptions

Residual levels of ingredients or contaminants from well-drilling foamers shall be calculated based on the following assumptions:

- the aquifer contains 3.1×10^6 L (815,500 gal) of water, based on a 0.5 acre aquifer of 6.1 m (20 ft) depth and 25% porosity;
- the bore hole is 61 m (200 ft) in total depth and 25.4 cm (10 in) in diameter;
- after the bore hole has been blown free of foam, a foam layer of 6.40 mm (0.25 in) remains on the bore hole wall;
- all foamer ingredients and contaminants in the foam layer enter the aquifer; and
- the foamer addition rate percentage is calculated as the manufacturer's maximum recommended use rate of the foamer per unit volume of water (e.g., 0.946 L [0.25 gal] foamer per 158.987 L [42 gal] water equals 0.6%).

NOTE — The volume of the foam layer on the bore hole wall is determined by subtracting the volume of a cylinder with a diameter equal to the inside diameter of the foam layer (2787 L [736 gal]) from the volume of a cylinder with a diameter equal to the bore hole diameter (3088 L [816 gal]). For the well specified, the foam layer volume is 301 L (66 gal).

8.7.3.2 Foam factor

The following test shall be used to determine the foam factor for the well-drilling foamer:

- a) Prepare 100 mL of foamer solution at the manufacturer's recommended foamer usage rate using tap water.

- b) Carefully decant the foamer solution in a graduated Waring¹⁴ blender jar or equivalent. Cover and blend at high speed for 60 s.
- c) Turn blender off and immediately measure and record the foam volume in mL.
- d) Calculate the foam factor by dividing the foam volume by 100 mL.

8.7.3.3 Normalization equation

The following equation shall be used to calculate the normalized ingredient and contaminant exposure(s) from well-drilling foamers:

$$\text{laboratory concentration of ingredient or contaminant} \times \frac{\text{foam volume (301 L)}}{\text{foam factor}} \times \frac{\% \text{ foamer addition rate}}{3.1 \times 10^6 \text{ L}} = \text{normalized concentration}$$

8.7.4 Bore hole sealants

8.7.4.1 Assumptions

Residual levels of ingredients and contaminants from bore hole sealants shall be based on the following assumptions:

- the aquifer contains 3.1×10^6 L (815,500 gal) of water, based on a 0.5 acre aquifer of 6.1 m (20 ft) depth and 25% porosity;
- the bore hole is 61 m (200 ft) in total depth, the screen is 6.1 m (20 ft) in length, and the bore hole diameter is 25.4 cm (10 in);
- a 10.2 cm (4 in) diameter casing is used;
- the surface area of the sealant / grout exposed to the aquifer is 11 m² (118 ft²), based on 25% of the sealant / grout column being in direct contact with water from the aquifer; and
- the volume of sealant / grout exposed to the aquifer is 583 L (154 US gal), based on 25% of the sealant / grout column being in direct contact with water from the aquifer.

NOTE — The surface area and volume exposure assumptions are based on a worst-case that 25% of the sealant / grout column is in direct contact with the aquifer. The surface area of 11 m² (118 ft²) is 25% of the surface area of a cylinder 25.4 cm (10 in) in diameter and 54.9 m (180 ft) in length. The volume of 583 L (154 gal) is 25% of the volume of the annular space formed by a bore hole 25.4 cm (10 in) in diameter and 54.9 m (180 ft) in length that contains a well casing of 10.2 cm (4 in) diameter.

8.7.4.2 Normalization options for sealants / grouts

The following options shall be selected based on the sample preparation and exposure method used.

8.7.4.2.1 For sealants or grouts, which have been exposed as a solid mass, the following equation shall be used to calculate the normalized ingredient and contaminant concentrations:

$$\text{laboratory concentration of ingredient or contaminant} \times \frac{SA_F}{SA_L} \times \frac{V_L}{3.1 \times 10^6 \text{ L}} = \text{normalized concentration of ingredient or contaminant}$$

¹⁴ Waring Products, Division of Conair Corp. 1 Crystal Dr, McConnellsburg, PA 17233. <www.waringcommercialproducts.com>

Where:

SA_F = surface area of sealant / grout exposed in the field (assumed to be 11 m² [118 ft²])
 SA_L = surface area of sealant / grout exposed in the laboratory
 V_L = volume of extraction water used in the laboratory

8.7.4.2.2 Ingredient and contaminant concentrations for solid swelling well sealants which have been prepared using Method G (see Annex N-1, Section N-1.3.8) shall be multiplied by the dilution factor required to reduce the analysis solution to a turbidity of 1 NTU.

8.7.4.2.3 For sealants / grouts that cannot be exposed in the laboratory as a solid mass, or for ingredients or contaminants for which an adequately sensitive analytical method is not available, the following alternate calculation procedure shall be used:

- a) Calculate the mass (in mg) of the ingredient or contaminant in 583 L (154 gal) of sealant / grout based on the manufacturer's preparation instructions.
- b) Divide this mass by the aquifer volume (3.1×10^6 L) to calculate the normalized exposure to the ingredient or contaminant.

8.7.5 Separation process chemicals

8.7.5.1 Reverse osmosis chemicals

For chemicals of greater than 500 molecular weight, normalized concentrations of ingredients and contaminants shall be calculated based on a carryover of 0.5 weight percent of the concentration in the feedwater when the product is dosed at the manufacturer's recommended use level:

$$\text{feedwater concentration of the active ingredient or contaminant} \times 0.5\% = \text{normalized concentration of the active ingredient or contaminant}$$

For chemicals of less than 500 molecular weight, the manufacturer shall provide data to justify the use of the 0.5 weight percent feedwater concentration normalization factor or to establish an alternate normalization factor. In the absence of data to justify otherwise, a 100% carryover shall be assumed for ingredients and contaminants of less than 500 molecular weight.

8.7.5.2 Other membrane separation process chemicals

For other chemicals used in other membrane separation processes (e.g., microfiltration, nanofiltration, ultrafiltration, and electrodialysis / electrodialysis reversal), the manufacturer shall provide data regarding the anticipated carryover of product ingredients and contaminants. These data shall be specific for use of the chemical in the separation process(es) for which evaluation has been requested. These data shall be used to calculate an appropriate carryover factor to estimate the normalized concentration(s) of the product ingredients and contaminants. In the absence of data to justify otherwise, a 100% carryover shall be assumed for ingredients and contaminants from these membrane separation process chemicals.

8.7.5.3 Evaporation process chemicals

Normalized concentrations of nonvolatile, high boiling point ingredients and contaminants shall be calculated based on a carryover of 0.1 weight percent of the concentration in the feedwater when the product is dosed at the manufacturer's recommended use level.

$$\text{feedwater concentration of the active ingredient or contaminant} \times 0.1\% = \text{normalized concentration of the active ingredient or contaminant}$$

In the absence of data to justify otherwise, a 100% carryover shall be assumed for ingredients and contaminants which are volatile or which have boiling points close to that of water.

8.7.6 Backfill materials for cathodic protection or electrical installations

The following equation shall be used to calculate the normalized contaminant exposure(s) from backfill materials for cathodic protection or electrical installations:

$$\text{laboratory concentration of ingredient or contaminants} \times \frac{M_F}{M_L} \times \frac{V_L}{V_F} = \text{normalized concentration of ingredient or contaminant}$$

Where:

M_F = mass (g) of the backfill material required for an installation of the maximum recommended diameter and for an aquifer of 6.1 m (20 ft) depth

M_L = mass (g) of the backfill material exposed during the laboratory test

V_L = volume of water used for laboratory exposure

V_F = volume of water in the aquifer assumed to be in contact with contaminants from the backfill material 1.1×10^6 L (293,760 gal)

NOTE — The assumed volume of water is based on a 0.5 acre aquifer of 25% porosity and 6.1 m (20 ft) depth. The well and the backfill installation are located a minimum of 30.5 m (100 ft) apart within the defined aquifer. The extractants from the backfill material are assumed to be within the volume of water defined by a circle of 30.5 m (100 ft) diameter of the same depth and porosity as the aquifer.

8.8 Evaluation of contaminant concentrations

The normalized concentration of each ingredient or contaminant shall be no greater than the SPAC determined in accordance with the requirements of NSF/ANSI/CAN 600 (previously Annex A). For residential well application products, calculation of the SPAC for a specific contaminant under Section 8 shall consider such factors as the more limited number of materials in contact with the drinking water distribution system in a well installation.

The short term exposure limit (STEL) shall be used to evaluate the normalized concentration of ingredients and contaminants for well development / rehabilitation materials.

NOTE — These applications typically occur at a frequency less than every 12 months, warranting the use of a Short Term Evaluation Level. Additionally, these products are used within the bore hole and flushed from the well screen pack

The following table is a generic listing of some of the types of products covered in this section of the standard. The chemicals described in this table can be fed continuously, applied intermittently, or flushed from the water supply system prior to its return to use. Products incorporated in this table include regenerants and well-drilling aids. This table is not intended to be a complete list of all products used for miscellaneous water supply applications. Inclusion of a product does not indicate either a use endorsement of the product or an automatic acceptance under the provisions of this Standard. Annex I-3, Table I-3.1 includes a cross-reference index of the various chemicals (and the more common synonyms) contained in this table.

Table 8.1
Miscellaneous water supply products – Product identification and evaluation (limited contact)

Product	Product –Specific analyses	Preparation method
antifoamers	formulation dependent	Method I, Annex N-1, Section N-1.3.10
distribution system rehabilitation materials	formulation dependent	—
backfill materials for cathodic protection or electrical installations	formulation dependent	Method G, Annex N-1, Section N-1.3.8
scale inhibitors	formulation dependent	Method H, Annex N-1, Section N-1.3.9
Well development / rehabilitation materials		
acids	formulation dependent	Method D, Annex N-1, Section N-1.3.5
bases (caustics)	formulation dependent	Method B, Annex N-1, Section N-1.3.3
disinfectants	formulation dependent	see Section 6
flocculants	formulation dependent	see Section 4
frac sand	formulation dependent	Method G, Annex N-1, Section N-1.3.8
organic acid (citric acid)	regulated metals	Method A, Annex N-1, Section N-1.3.2
scale removers	formulation dependent	Method H, Annex N-1, Section N-1.3.9
Separation process cleaners		
organic acid (citric acid)	regulated metals	Method A, Annex N-1, Section N-1.3.2
Drilling additives		
bentonite-based drilling additives	regulated metals, radionuclides, pesticides / herbicides, and other formulation dependent impurities	Method F, Annex N-1, Section N-1.3.7
biocides	formulation dependent	—
clay thinners	formulation dependent	—
defoamers	formulation dependent	—
filtration control	formulation dependent	—
foamers	formulation dependent	Method I; Annex N-1, Section N-1.3.10
loss circulation materials	formulation dependent	—
lubricants (e.g., grease)	formulation dependent	—
oxygen scavengers	formulation dependent	—
polymer-based drilling additives	formulation dependent	Method J, Annex N-1, Section N-1.3.11
regenerants	formulation dependent	—
viscosifiers	formulation dependent	—
weighting agents	formulation dependent	—

Table 8.1
Miscellaneous water supply products – Product identification and evaluation (limited contact)

Product	Product –Specific analyses	Preparation method
well pump lubricating oils	formulation dependent	Method I, Annex N-1, Section N-1.3.10
Bore hole sealants		
bentonite-based grouts	regulated metals, radionuclides, herbicides / pesticides, and other formulation dependent impurities	Method F, Annex N-1, Section N-1.3.7 or per manufacturer's instructions
cements	regulated metals, radionuclides, and other formulation dependent impurities	per manufacturer's instructions

Table 8.2
Example calculation of a residual contaminant level from a well-drilling additive

residual contaminant	monomer from an organic polymer (0.05% monomer in polymer)
assumed well casing diameter	4 in
weight of monomer in 14.2 L (3.75 gal) of polymer – manufacturer's recommended use level	$14.2 \text{ L of polymer} \times 0.0005 = 7.1 \times 10^{-3} \text{ L of monomer}$ $= 7.1 \text{ mL of monomer}$ $7.1 \text{ mL of monomer} = 8.0 \text{ g monomer}$ (density of monomer is 1.122 g/mL)
percent removal of the drilling fluid	90%
weight of monomer remaining in aquifer after installation	$8.0 \text{ g} \times 10\% = 0.8 \text{ g monomer remaining in the aquifer}$ (90% removed during construction)
concentration of monomer remaining in aquifer	$\frac{0.8 \text{ g monomer}}{3.1 \times 10^6 \text{ L water}} = \frac{0.25 \text{ } \mu\text{g monomer}}{\text{L water}}$ 0.25 ppb is concentration of monomer remaining in the aquifer

Normative Annex 1 (previously Annex B) **Sampling, preparation, and analysis of samples**

N-1.1 General

Samples of products to be analyzed for impurities shall be prepared and analyzed as detailed in this section:

- coagulation and flocculation chemicals (also see Section 4, Table 4.1);
- corrosion and scale control, softening, precipitation, sequestering, and pH adjustment chemicals (also see Section 5, Table 5.1);
- disinfection and oxidation chemicals (also see Section 6, Table 6.1);
- miscellaneous treatment applications (also see Section 7, Table 7.1); and
- miscellaneous water supply products (also see Section 8, Table 8.1).

The analysis methods listed for a product are based on detecting impurities that may be present when established methods of production are used and the materials are derived from known sources. If the products are produced using alternate methods or originate from alternate sources, the analytical procedures may require modification. Alternate analytical procedures shall be described in detail, by the manufacturer, with appropriate literature references.

N-1.2 Sampling

A representative sample of the product / material shall be obtained in accordance with requirements outlined below at a point prior to shipment. No sample shall be taken from a broken or leaky container.

N-1.2.1 Liquid samples

N-1.2.1.1 Sampling from bulk

A specified quantity of sample shall be obtained from a bulk storage tank, or bulk shipping vessel, through normal connections. Where available on site, sampling from bulk shipping vessels is preferred, as it is representative of the final container of product being shipped to the customer. For hypochlorite, samples shall be taken from the oldest production lot that is on-site at the time.

N-1.2.1.2 Sampling from packages

Sufficient sample shall be collected from packaged inventory to fulfill the sample quantity requirements specified in the relevant subsection of Section N-1.3. For hypochlorite, samples shall be taken from the oldest production lot that is on-site at the time.

N-1.2.1.3 Sampling from production

Sufficient sample shall be collected from production to fulfill the requirements of the quantity needed for the product sample according to the relevant subsection of Section N-1.3.

N-1.2.1.4 Sampling from retains

Up to ten samples shall be collected, covering the length of the specified retain period or 6 mo, whichever is greater, but not to exceed 12 mo in the age of material sampled. A portion shall be collected from each retain, and the samples shall be mixed thoroughly to form a composite.

N-1.2.1.5 Sample for analysis

The sample obtained according to Sections N-1.2.1.1, N-1.2.1.2, N-1.2.1.3, or N-1.2.1.4, shall be mixed thoroughly. This sample shall be poured into two approximately 250 mL, airtight, moisture-proof glass containers, and sealed. If a glass container is not appropriate, the manufacturer shall recommend a type of sample container. Each sample container shall be clearly labeled with the product name, manufacturer's name, sampling date, production location, and lot number, and shall be signed by the person responsible for sampling.

One sample shall be used for analysis as described in Sections N-1.3 and N-1.4. The remaining sample shall be retained for reevaluation purposes (if necessary) for at least one year or until results are received by the certification agency.

N-1.2.2 Solid samples**N-1.2.2.1 Sampling from bulk**

Specified amount of sample shall be obtained from storage tank or bulk shipping vessel through normal connections. Where available on site, sampling from bulk shipping vessels is preferred, as it is representative of the final container of product being shipped to the customer.

N-1.2.2.2 Sampling from packages

Sufficient sample shall be collected from packaged inventory to fulfill the sample quantity requirements specified in the relevant subsection of Section N-1.3.

N-1.2.2.3 Sampling from production

Sufficient sample shall be collected from production to fulfill the sample quantity requirements specified in the relevant subsection of Section N-1.3.

N-1.2.2.4 Sampling from retains

Up to ten samples shall be collected, covering the length of the specified retain period or six months, whichever is greater, but not to exceed 12 mo in the age of material sampled. A portion shall be collected from each retain, and the samples shall be mixed thoroughly to form a composite.

N-1.2.2.5 Sample for analysis

The sample obtained per Sections N-1.2.2.1, N-1.2.2.2, N-1.2.2.3, or N-1.2.2.4, shall be mixed thoroughly. This sample shall be poured into two approximately 200 g, airtight, moisture-proof glass containers, and sealed. If a glass container is not appropriate, the manufacturer shall recommend a type of sample container. Each sample container shall be clearly labeled with the product name, manufacturer's name, sampling date, production location, and lot number, and shall be signed by the person responsible for sampling.

N-1.2.3 Gas samples

A representative sample shall be obtained using an appropriate gas-sampling cylinder. The sample shall be acquired in accordance with the manufacturer's specifications and precautions.

N-1.2.4 Blends and mixtures

Samples collected for analysis shall be verified as being identical to the product initially submitted.

N-1.3 Preparation of samples

The methods included in this section have been written for trained chemical laboratory personnel. Appropriate quality assurance procedures and safety precautions shall be followed.

N-1.3.1 General

Acid-washed glassware and equipment, organic-free deionized water for dilutions, trace metals grade acids, and reagent blanks, shall be used in all preparation methods referenced in this section.

N-1.3.1.1 Reagent blank

A reagent blank shall be prepared using the same reagents and in the same manner as a product sample, but no product sample shall be added.

N-1.3.1.2 Reagent water

All test samples shall be prepared using a reagent water produced through one or more of the following treatment processes: distillation, reverse osmosis, ion exchange, or other equivalent treatment processes. The reagent water shall have the following general water characteristics:

- electrical resistivity, minimum 18 MΩ-cm at 25 °C (77 °F); and
- total organic carbon (TOC) maximum 100 µg/L.

For each specific analyte of interest, the reagent water shall not contain the target analyte at a concentration greater than one-half the designated analytical report limit of that analyte.

N-1.3.2 Method A

This method shall be used for ammonium sulfate, calcium hypochlorite, copper ethanolamine, copper sulfate, copper triethanolamine, ethylenediaminetetraacetic acid, iodine, potassium tripolyphosphate, sodium acid pyrophosphate, sodium bisulfite, sodium calcium magnesium polyphosphate, sodium chlorate, sodium chlorite, sodium metabisulfite, sodium polyphosphate, sodium silicate, sodium sulfite, sodium trimetaphosphate, sodium tripolyphosphate, sodium zinc polyphosphate, sodium zinc potassium polyphosphate, tetrapotassium pyrophosphate, tetrasodium ethylenediaminetetraacetic acid, tetrasodium pyrophosphate, tripotassium orthophosphate, trisodium orthophosphate, and zinc orthophosphate.

NOTE — For bromate, chlorate, and perchlorate analysis of calcium hypochlorite, no preparation of the quenched sample is required. Bromate analysis can be performed on the sample as received.

The following procedure shall be followed for sample preparation to this method:

- a) Dilute the sample to a strength equivalent to 10× the maximum use dose of the chemical using organic-free deionized water^{15,16} and the following formula:

$$\begin{array}{ccccccc} \text{mg/L} & \times & 10 & \times & \text{required volume of} & = & \text{mg} \\ & & & & \text{sample solution (L)} & & \\ \text{[maximum} & & \text{[multiple} & & & & \text{[amount sample} \\ \text{use dose]} & & \text{factor]} & & & & \text{to be weighed]} \end{array}$$

- b) Preserve the sample according to the requirements of Table N-1.1¹⁷.

N-1.3.3 Method B

This method shall be used for ammonium hexafluorosilicate, ammonium hydroxide, blended phosphates, calcium fluoride, dipotassium orthophosphate, disodium orthophosphate, fluosilicic acid, magnesium silicofluoride, monopotassium orthophosphate, monosodium orthophosphate, potassium fluoride, potassium hydroxide, potassium permanganate, sodium bicarbonate, sodium bisulfate, sodium carbonate, sodium fluoride, sodium hydroxide, sodium hypochlorite, sodium sesquicarbonate, sodium silicofluoride, tricalcium phosphate, zinc chloride, and zinc sulfate.

NOTE — For bromate, chlorate and perchlorate analysis of sodium hypochlorite, no preparation of the quenched sample is required. Bromate, chlorate and perchlorate analysis can be performed on the sample as received.

The following procedure shall be followed for sample preparation to this method:

- a) Dilute the sample to a strength equivalent to 10× the maximum use dose of the chemical using organic-free deionized water^{14,15,18} and the following formula:

$$\begin{array}{ccccccc} \text{mg/L} & \times & 10 & \times & \text{required volume of} & = & \text{mg} \\ & & & & \text{sample solution (L)} & & \\ \text{[maximum} & & \text{[multiple} & & & & \text{[amount sample} \\ \text{use dose]} & & \text{factor]} & & & & \text{to be weighed]} \end{array}$$

- b) Acidify with concentrated hydrochloric acid (HCl) to pH < 2.¹⁶
- c) Quantitatively transfer to a volumetric flask of a size corresponding with the required volume of sample solution determined above and dilute to volume with organic-free deionized water.
- d) Preserve the sample according to the requirements of Table N-1.1.

N-1.3.4 Method C

This method shall be used for calcium carbonate, calcium hydroxide, calcium oxide, magnesium carbonate hydroxide, and magnesium oxide.

¹⁵ All sample weights are on a dry product mass basis.

¹⁶ Use polyethylene or PTFE beakers for fluoride chemicals.

¹⁷ If the sample does not dissolve completely into solution, heat gently until all sample is in solution (do not boil).

¹⁸ Tricalcium phosphate and other compounds will not dissolve until the addition of hydrochloric acid.