

USING *ETRAC LABORATORIES, INC.* EXTRACTIVE SCINTILLATORS

Although extractive scintillators are not light sensitive in the same way as photographic material, they may become yellow or brown when stored in bright room light at room temperature for periods of several months. This is particularly true of **THOREX™** and **URAEX™**. The color development is believed to be due to a photocatalyst oxidation. Thus, extractive scintillators should be stored in a cool, dark place for prolonged storage. A refrigerator is an excellent choice for long-term storage. We sparge our scintillators with argon and pack them under argon to maximize their stability during shipment so they arrive to you fresh and remain in good condition. **If the scintillators are not to be completely used after they are opened, the unused portion should be sparged with argon, or another inert gas, before being stored.**

If scintillators are stored in a refrigerator, naphthalene and the fluor will precipitate. Do not use the scintillator until all the solids are re-dissolved. Place the bottle containing the scintillator in warm water and shake the bottle occasionally until the solids re-dissolve, or set the bottle out of the refrigerator overnight before use.

PLEASE NOTE:

RADAEX™ and **STRONEX™** contain lipophilic acids and are shipped in the acid form because they are most stable in that form. *They must be converted to the desired salt form either immediately before use, or during the extraction of the sample, so the equilibrium sample aqueous phase pH will be 10 or greater both during and after sample extraction.* For pre-use conversion, equilibrate the desired quantity of acid-form extractive scintillator with an approximately equal volume of 0.3 to 0.4 M metal (usually sodium) nitrate containing 0.20 M metal hydroxide to convert the organic phase acid to the salt. The two-phase equilibrium is done in a vial or small separatory funnel with gentle hand agitation. If phase separation problems occur, centrifugation or the application of the spark from a Tesla coil to the outside of the equilibrium vessel will usually break the emulsion. Use the converted **RADAEX™** within the next hour or so. If several hours have elapsed since the **RADAEX™** was converted look carefully for a third phase between the aqueous and organic phases. This third phase contains most of the extracting reagent. Reagitation may allow successful use of the material.

Perhaps a safer plan when running only a few samples is to add (1) sufficient sodium hydroxide to each sample to convert the carboxylic acid to the sodium salt and to neutralize any acid in the sample, (2) a small excess of sodium hydroxide sufficient to make the aqueous phase pH 10 or greater, and (3) sufficient sodium nitrate to make the aqueous sample 0.2 to 0.4 M in sodium nitrate.

ALPHAEX™ also contains a lipophilic alkyl phosphoric acid but needs no pre-conversion since the extractions for which it is designed are from an acid aqueous solution.

POLEX™ contains a neutral coordinating extractant and needs no pre-equilibration.

URAEX™ and **THOREX™**, amine-containing extractive scintillators, are shipped as the sulfate salt because the sulfate salt of the amines is more stable than the free amine. These scintillators require no conversion or pre-equilibration for use as extractants from a sulfate aqueous system.

NONEX™ contains no extractant and is the most stable of all the scintillators. However, even this scintillator can become colored, due to oxidation of the fluor, if exposed to strong light and oxygen for several months.

RADONS™ is also a stable solution. It contains two neutral reagents that are superior extractants for radon. Except for protection from strong light for extended periods; it requires no special treatment. It is designed to be a highly efficient light-producer and to show excellent time (PSD) resolution.

The extractants may be obtained in solution in toluene without the scintillator components for use in separation procedures or analytical procedures. Extractant solutions of **high-molecular-weight tertiary amine** and **high-molecular-weight primary amine** are not converted to the sulfate salt form before shipping. If these solutions are to be used to extract uranium and thorium from sulfate solutions, they should first be equilibrated with an approximately equal volume of 1.0 M Na₂SO₄/0.5 M H₂SO₄ solution. If the **high-molecular-weight tertiary amine** solution is to be used for the preliminary extraction of plutonium in the ETRAC plutonium procedure, it must first be converted to the nitrate salt form by equilibration with 10% excess of an equivalent concentration of nitric acid.

Extractive scintillators are made from the purest and most color-free starting material currently available. The liquid extractants are molecularly (high-vacuum short-path) distilled or crystallized and reconstituted in our laboratory to be as pure and color-free as possible. Distilled-in-glass toluene is used, and naphthalene especially purified for liquid scintillation purposes is used. Our aim is to provide you with reagents designed to give you superior results with the PERALS® spectrometer and the associated chemical separations. To this end, we continue our research to improve reagents and procedures. Your comments and suggestions are both encouraged and welcome.

If you experience any difficulties with these reagents, please do not hesitate to contact us using the telephone number listed below. We will try to help you solve your problems at no charge. More complex problems, such as procedure development, requiring research (Library or Laboratory) can be arranged at \$100/hr. We wish you success in your use of the PERALS® system of alpha spectrometry.

Extractive scintillators are warranted to be free from defects and are warranted against color development for 90 days after shipment, provided the bottles have not been opened and are properly stored. No other warranty is included. Specifically, no warranty of merchantability or fitness for a particular purpose is implied. ETRAC's liability under this warranty is limited to replacing the defective product.

ETRAC Laboratories, Inc
1009 Alvin Weinberg Drive
Oak Ridge, TN 37830
Telephone: (865) 482-3427
Fax: (865) 483-8404