

## FluxOR™ Assay General Safety - Frequently Asked Questions

This document is designed to provide information regarding safety guidelines when using the FluxOR™ Potassium Ion Channel Assay Kit (F10016 and F10017). The active components of the FluxOR™ assay are the FluxOR™ dye and thallium sulfate. This document will address some frequently asked questions regarding thallium waste. Thallium is toxic, but hazards can be minimized by using normal lab safety precautions. Thallium is generally less toxic than many organic chemicals and biological agents used in many labs. Classification and handling are generally governed by local and federal statutes. While many potassium surrogate flux assays are conducted using radioactive rubidium, cadmium is a metal with disposal limits more similar to thallium than Rb or Cs. Many ion channel labs routinely handle cadmium waste.

### Where can I find the MSDS for the FluxOR™ Potassium Ion Channel Assay Kit?

The MSDS is posted at: <http://probes.invitrogen.com/media/msds/10017.html>

### What do I do if I'm uncertain about what the MSDS information means for my lab?

Forward the MSDS to your local Environmental Health and Safety (EHS) group for specific questions about your lab.

### How much thallium is in the kits?

A ten microplate kit (F10016) has 20 mL of 50 mM aqueous thallium sulfate ( $Tl_2SO_4$ ) stock. This corresponds to 0.5 g of thallium sulfate. The 100 microplate kit (F10017) has 200 mL of a 50 mM aqueous  $Tl_2SO_4$  stock. This corresponds to 5 g of thallium sulfate.

### What are typical disposal regulations and procedures?

Local Environmental Health and Safety (EHS) regulations on disposal of thallium vary. However, the quantities used in our kits go into biohazard trash at most locations. Some users convert liquid to solid waste with kitty litter or dri-rite pellets. EHS regulations at some sites have requested a separate waste container for the plastics (microplates, etc) that come in contact with thallium solutions. The materials that typically come in contact are transfer pipettes, microplates, and the injector tips on the HTS machine. Rinses of these tips generate aqueous thallium waste well below legal sink limits. Bulk aqueous waste limits are what one pays attention to.

### How much thallium used in a typical assay?

The kit contains much more thallium sulfate stock than gets used for most applications. The limiting reagent in the kit is the dye (optimized for 10 and 100 microplates); the standard protocol calls for 1/5 of the amount of the supplied thallium solution. Final concentrations of liquid waste generated in this way are well below typical biowaste limits but you should check your local guidelines for disposal to be certain.

**Why do you provide more thallium than is needed?**

We package additional amounts of thallium because some applications with poorly expressing cells or models involving low potassium channel densities might require more TI+ (and extra chloride free buffer, which is also accommodated in the kit) to get a signal. All the K+ channels we have worked with (stables, native expressers, and transiently over-expressed using BacMam) give 2-3x dF signals with only 2 mM outside.

**Can thallium levels be modified?**

Yes, some customers have successfully used extracellular TI+ concentrations of only 1 mM extracellular TI+ for V gated and resting inward rectifier channels.

**What else can you tell me about the safety of this kit?**

Most institutions have practices in place to effectively address chemical and biological hazards, such as solvents, byproducts of organic syntheses, and human pathogens. For instance, the risks posed by thallium are lower than many organics. Contact your local departments to learn more about practices in place at your institution.

**Is thallium radioactive?**

No. While there exist thallium radioisotopes, our kit is not radioactive. The FluxOR™ assay is an alternative to one form of an established screening method for K+ channels using radioactive rubidium, which is highly radioactive and banned from many sites.