



Radiochemical and Stable Isotope Synthesis

Equipment and Instrumentation

- Waters Empower 3 analytical high-performance liquid chromatography (HPLC) systems with photodiode array and radioflow detection (Laura software)
- Waters preparative HPLC
- Agilent liquid chromatography –mass spectrometry (LC/MS) (single quad)
- LabLogic Tri-Sorber® tritium manifold
- LabLogic Tri-Sorber deuterium manifold
- ^3H nuclear magnetic resonance (NMR)
- Penn Optical Mk 2 photoreactor
- ISCO flash purification systems
- Gas chromatography
- Temperature monitored -80°C , -20°C , and 4°C storage.

The Radiochemistry group at RTI International has expert capability in the synthesis, purification, and analysis of isotopically labeled compounds. Our staff members are highly experienced in isotope synthesis and can facilitate with designing an efficient route to the desired labeled compound. We have a suite of laboratories that are designated solely for radiosynthetic work containing dedicated purification and analytical instrumentation.

With our tritium manifold, we can routinely prepare tritium-labeled compounds at specific activities suitable for receptor-binding assays and are particularly adept at employing modern metal catalyzed hydrogen isotope exchange methods as an alternative to more traditional multistep approaches. Our group also specializes in the rapid preparation of tritium-labeled compounds for drug metabolism studies supporting early drug development and through use of ^3H NMR can precisely determine the sites of tritium incorporation. We assure quality of our synthesized compounds through analysis by a combination of HPLC with photodiode array and radioflow detection capability, LC/MS, and NMR.

Capabilities

Synthesis, purification, and analysis of isotopically labeled compounds

- Synthesis, purification, and analysis of ^3H -, ^{14}C -, and ^{35}S -labeled compounds
- Synthesis, purification, and analysis of ^2H -, ^{13}C -, and ^{15}N -labeled compounds
- Synthetic route design
- Rapid inventory re-purifications

Compliance

- Broad-Scope Radioactive materials license with the North Carolina Department of Environmental Quality
- Secure, dedicated suite of radiosynthesis laboratories
- Registered with the Drug Enforcement Administration for scheduled drug substances



Dr. David Hesk joined the RTI Radiochemistry group in August 2018 after spending nearly 28 years in the Radiochemistry and Labeled Compound Synthesis groups at Schering-Plough and Merck. During his time at these pharmaceutical companies, Dr. Hesk was responsible for the synthesis, purification, and analysis of isotopically labeled compounds in support of pharmaceutical research. He is an acknowledged expert in tritium chemistry and isotope synthesis in general, with more than 70 publications and presentations in the isotope field.

While at Merck, Dr. Hesk was involved in several academic collaborations. These collaborations included projects with the MacMillan and Chirik groups at Princeton University, the results of which led to publications in *Nature* and *Science*; Dr. Hesk also collaborated on an academic level with the Kerr group at the University of Strathclyde.

Dr. Hesk published the first example of the use of Crabtree's catalyst as a hydrogen isotope exchange catalyst, which has been widely adopted by the isotope community for tritium labeling.



LabLogic Tri-Sorber Tritiation Manifold

³H Synthesis

RTI has expert capability in the synthesis, purification, and analysis of tritium-labeled compounds, at high-specific activity for receptor binding work through utilization of our tritium gas manifold. The group also has expertise in the generation and use of high specific-activity tritiated water, in tritide reduction chemistry and in conducting high-specific activity methylations. Through use of our ³H NMR probe, we can precisely determine the location of tritium incorporation, which is particularly important when tritium-labeled compounds are used during in vivo drug metabolism studies.

¹⁴C Synthesis

We also specialize in conducting multistep ¹⁴C synthesis. In addition to using many of the commonly available ¹⁴C building blocks, we have the capability to conduct carbonylations with ¹⁴CO and ¹⁴CO₂. We routinely work on scales ranging from a few millicuries to curies.

Stable Isotope Synthesis

The RTI Isotope group also specializes in the custom synthesis of compounds labeled with the stable isotopes ²H, ¹³C, and ¹⁵N in high isotopic and chemical purity. Isotopic purity is confirmed with LC/MS analysis and NMR. Such compounds are prepared in designated laboratory space with instruments dedicated to stable isotope work. Synthetic quantities prepared have ranged from a few milligrams to multigram amounts.

More Information

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