L-Threonine (4-\(^{13}\)C; 2,3-D\(_2\))

L-Threonine (4-\(^{13}\)C, 97%; 2,3-D\(_2\), 96-98%) (CIL catalog no. CDLM-9307) has joined the ranks of isoleucine, leucine, valine, methionine and alanine as a useful methyl probe for the NMR study of structure and dynamics of large proteins and protein complexes. Primarily intended for sample labeling in a perdeuterated background, such as in samples of large proteins and their complexes, L-threonine (4-\(^{13}\)C; 2,3-D\(_2\)) is particularly useful in conjunction with methyl-TROSY-based NMR experiments.

Threonine, unlike isoleucine, leucine and valine, is more often found in the exterior rather than in the interior of most proteins. A reason for this is that threonine has hydrogen bonding functionality on its sidechain, which makes it unique among the other methyl-containing amino acids. Threonine can be found at protein-nucleic acid interfaces and protein-carbohydrate interfaces. Threonine residues can play critically important roles in protein function, such as is the case for the proteasome, a threonine protease.

Shown below are HMQC spectra of the 670 kDa \(T.\ acidophilum\) proteasome that are perdeuterated in both the \(\alpha\) and \(\beta\) subunits. Panel A is sample labeled with U-\(^{13}\)C L-threonine and L-isoleucine (5-\(^{13}\)CH\(_3\)) in the \(\beta\) subunit. Panel B is sample labeled with L-threonine (4-\(^{13}\)C; 2,3-D\(_2\)) and L-isoleucine (5-\(^{13}\)CH\(_3\)) in the \(\beta\) subunit. The HMQC spectra were recorded in D\(_2\)O buffer at 70°C at 800 MHz. Parentheses indicate ambiguous assignments in panel B; circle in both panels indicates unfolded protein which slowly accumulates in the sample at high temperature.

Reference

Cambridge Isotope Laboratories, Inc.
North America: 1.800.322.1174  cilsales@isotope.com | International: +1.978.749.8000  intlsales@isotope.com | fax: 1.978.749.2768  isotope.com