

Supporting information for:

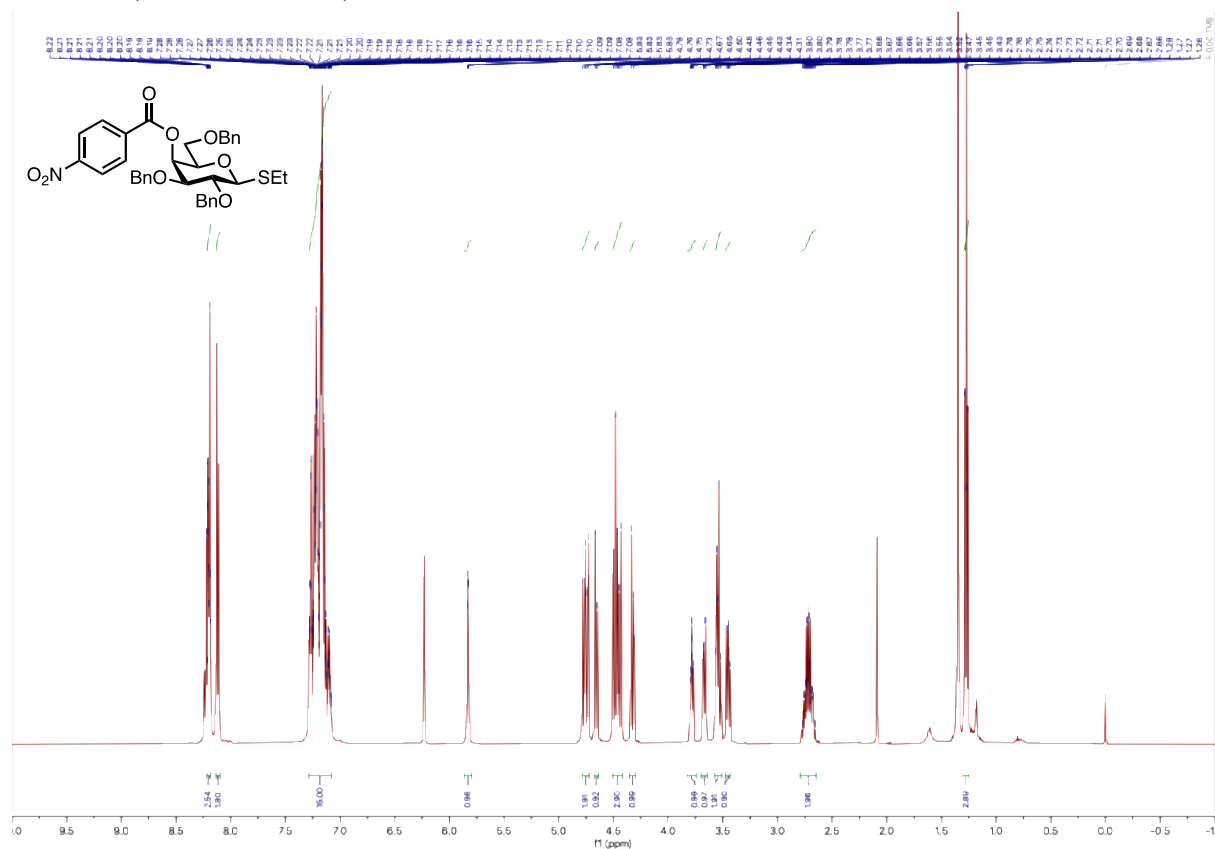
H-Bonding, not Remote Participation, explains the Influence of Remote Substituents on Stereoselectivity in Galactosylations

Kate E. Donaghy,^a Dionissia A. Pepe,^a Joseph J. Ruddy^a and Eoghan M. McGarrigle^{*,a}

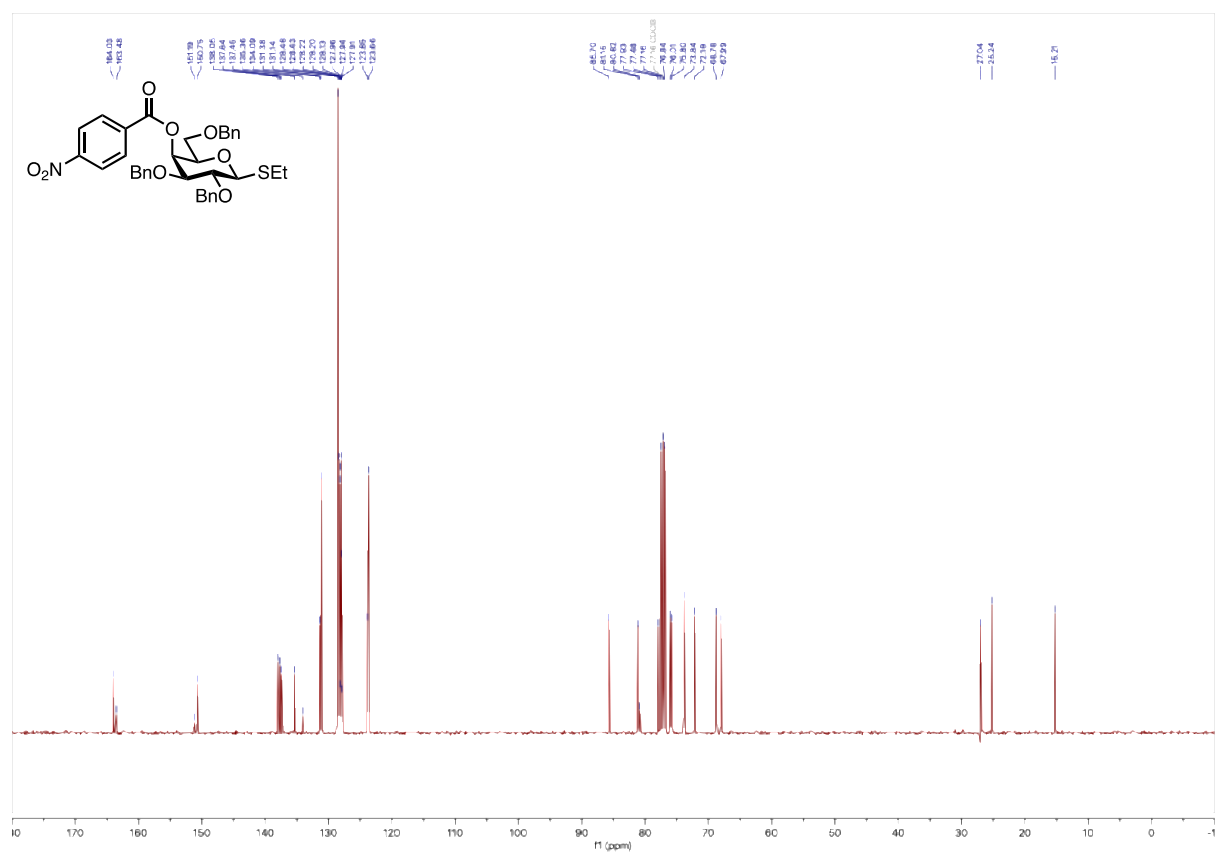
^a Centre for Synthesis & Chemical Biology, UCD School of Chemistry, University College Dublin, Belfield, Dublin 4, Ireland.

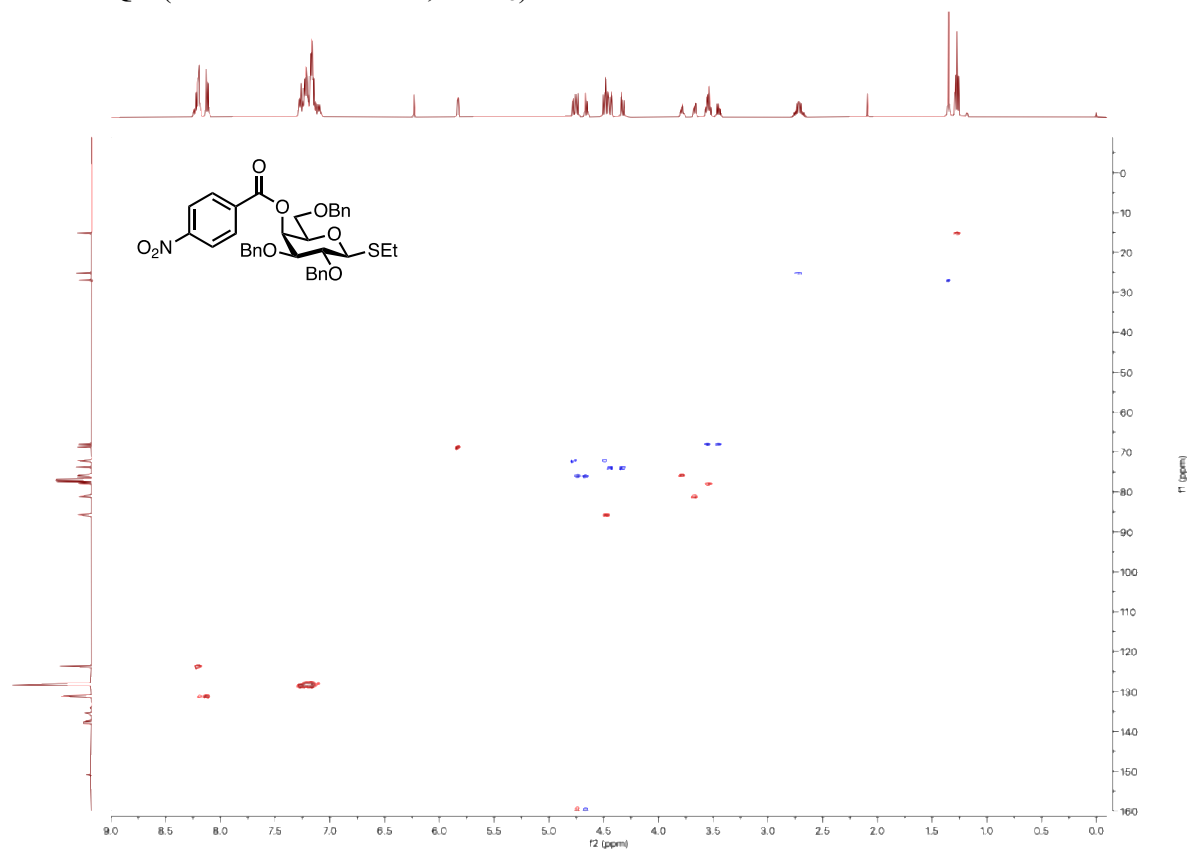
Part 2 – NMR Spectra

¹H NMR (500 MHz, CDCl₃): **4a**

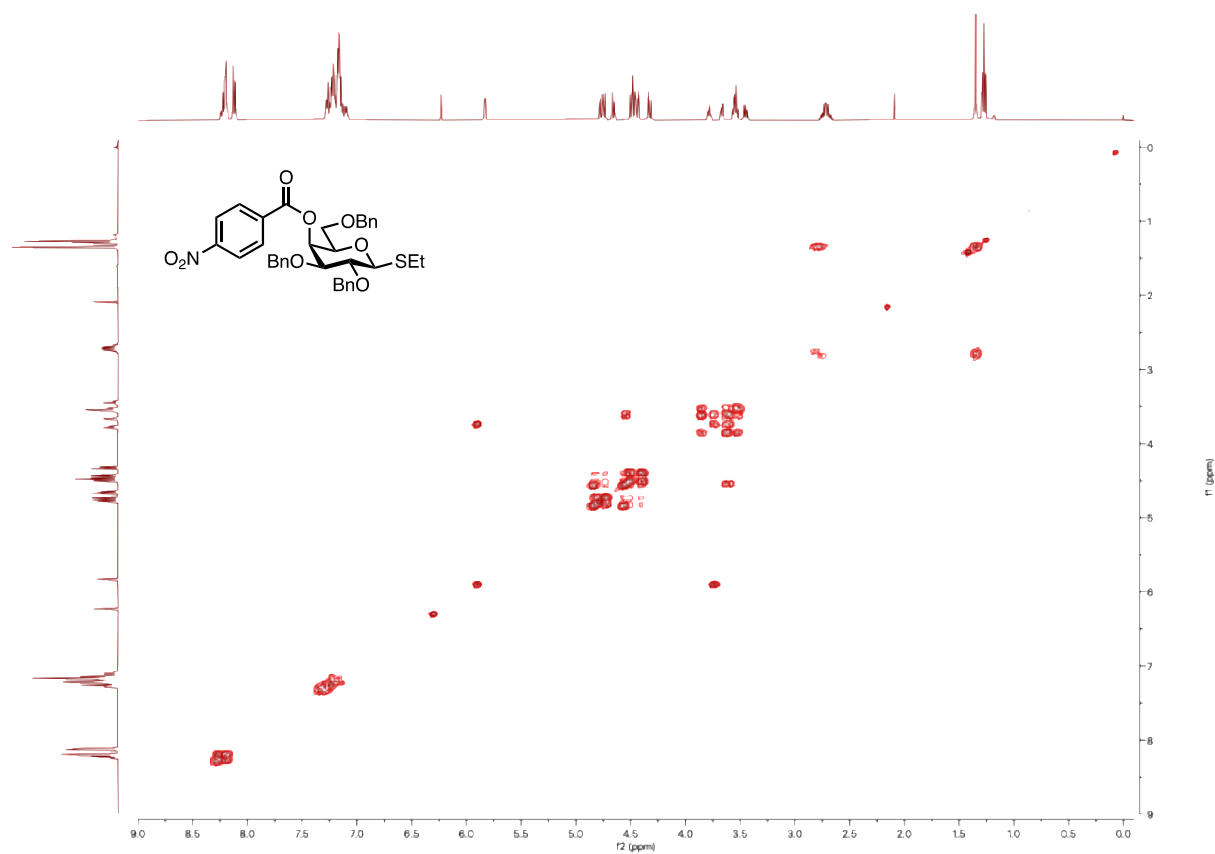


¹³C NMR (101 MHz, CDCl₃): **4a**

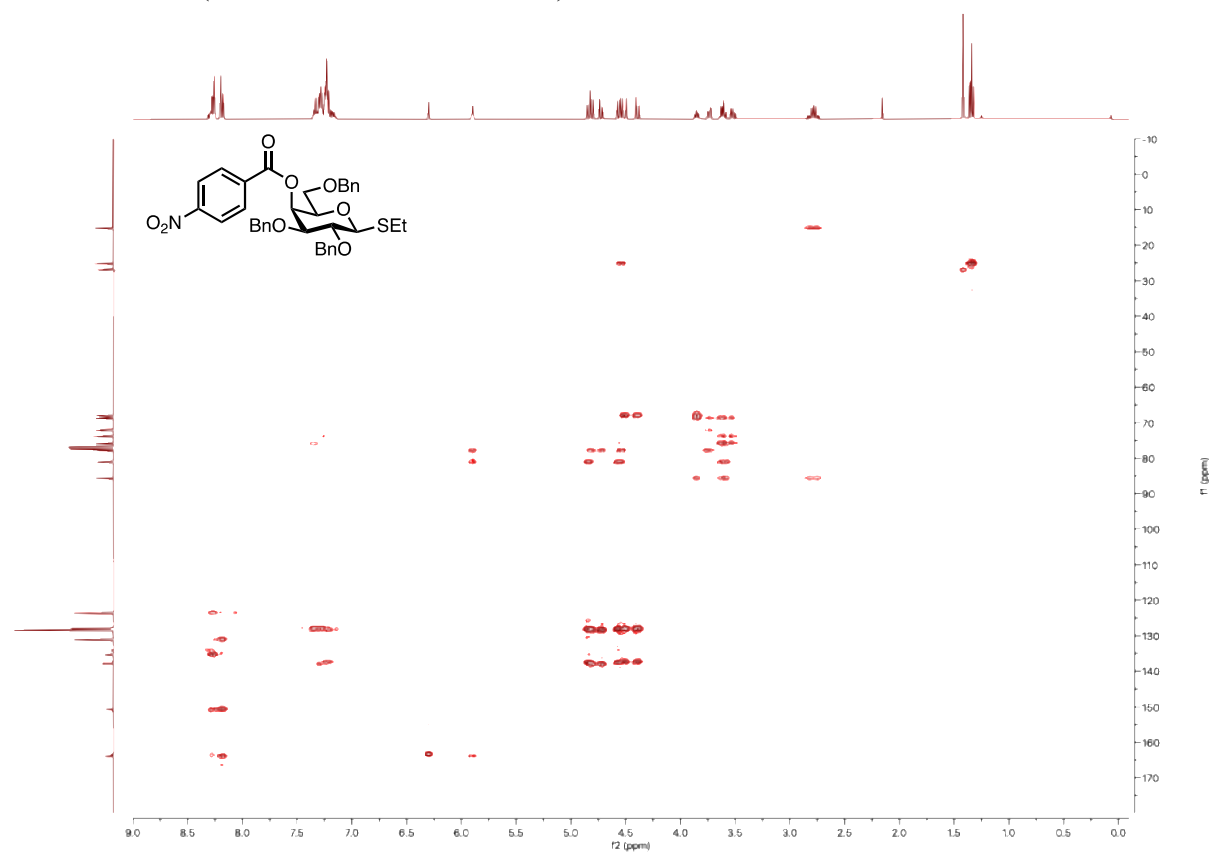


$^{13}\text{C } ^1\text{H HSQC (500 MHz} \times 101 \text{ MHz, CDCl}_3\text{): 4a}$ 

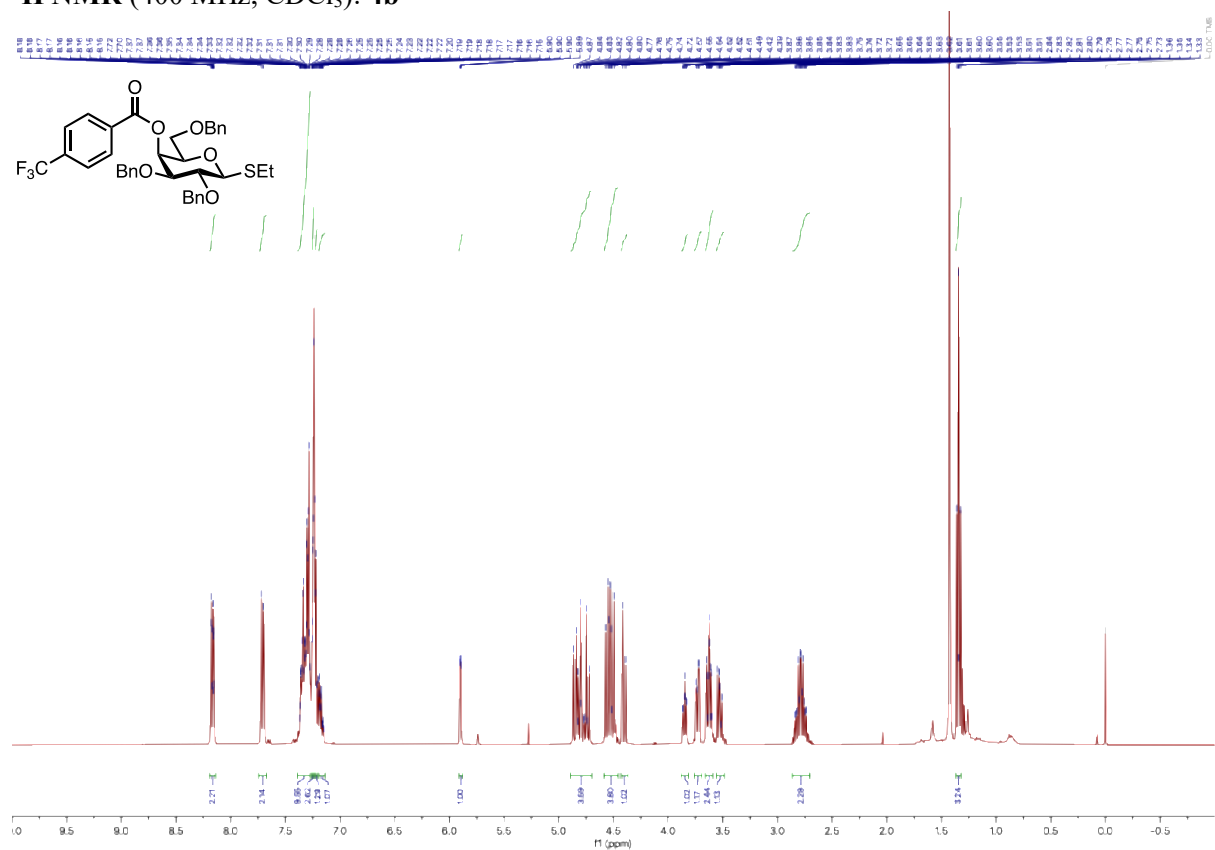
¹H, ¹H COSY (500 MHz, CDCl₃): 4a



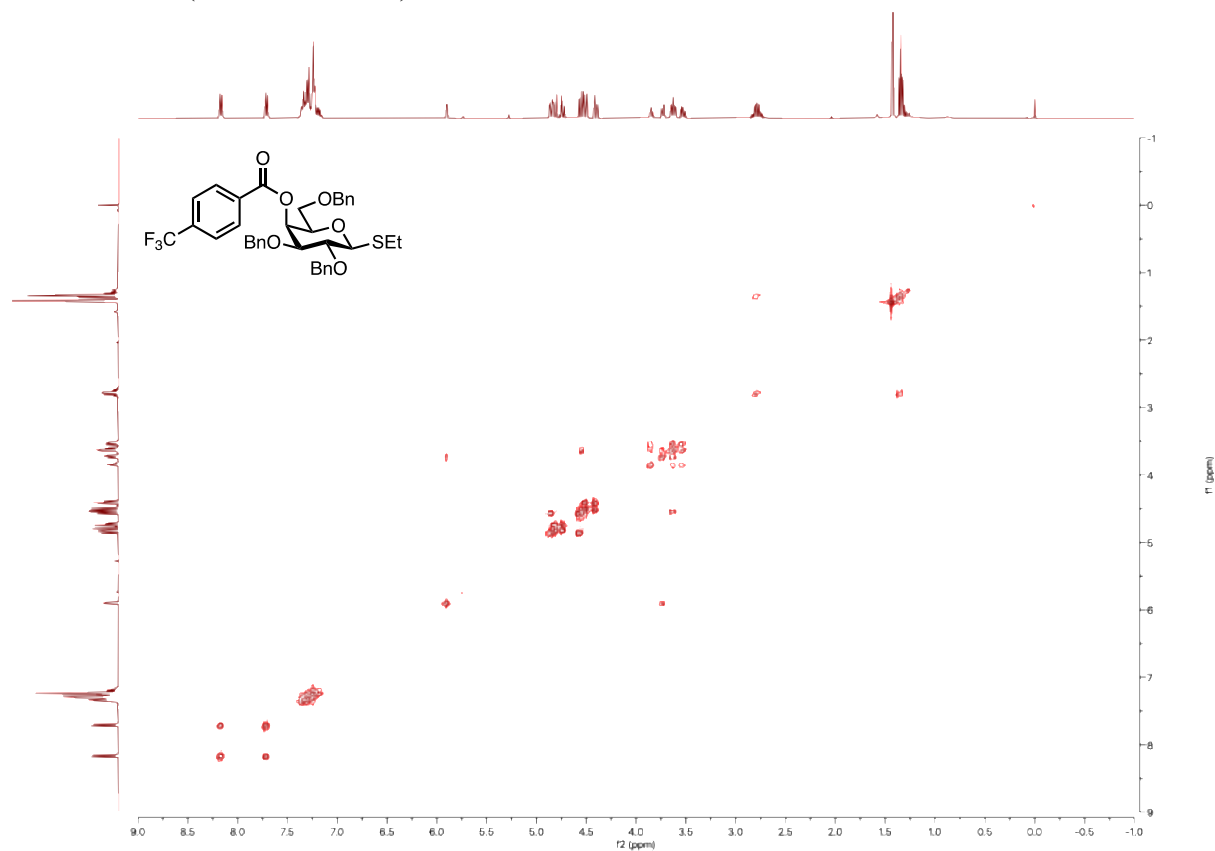
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): **4a**



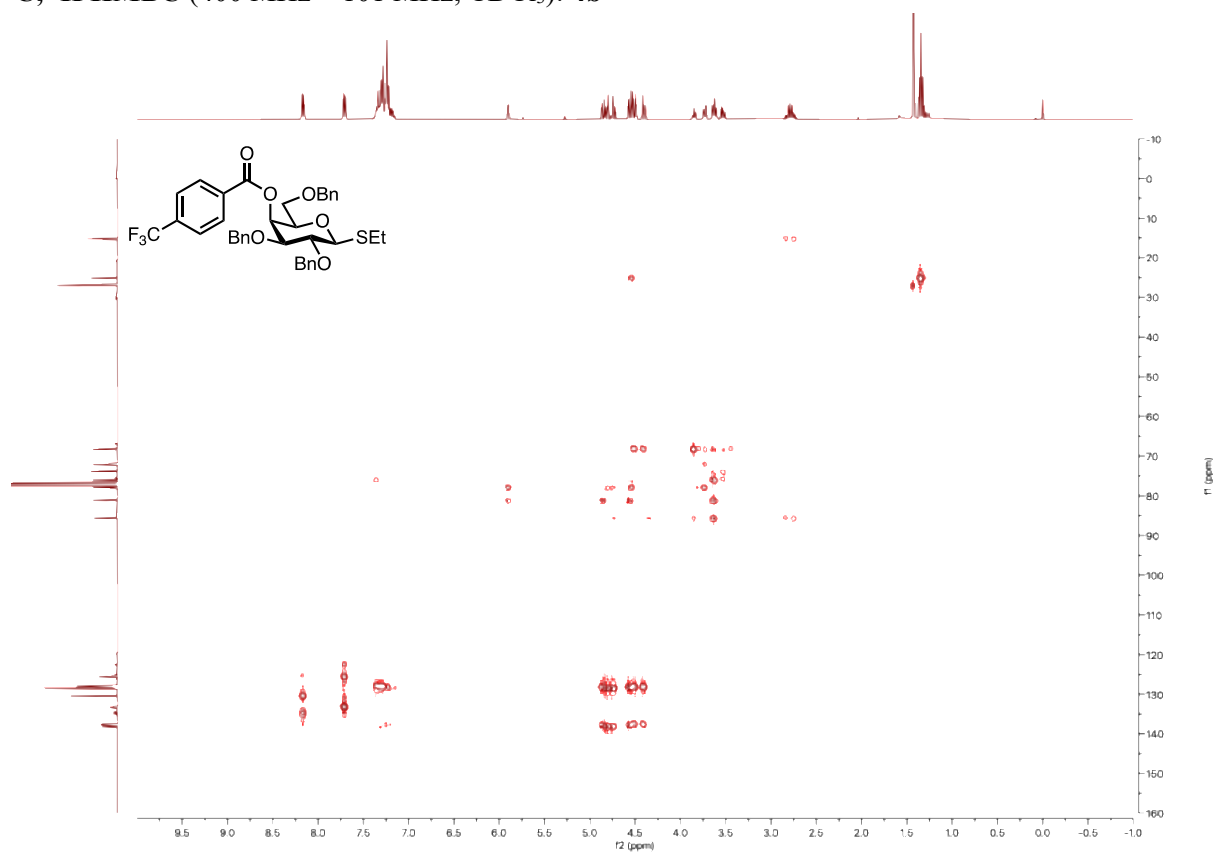
^1H NMR (400 MHz, CDCl_3): **4b**



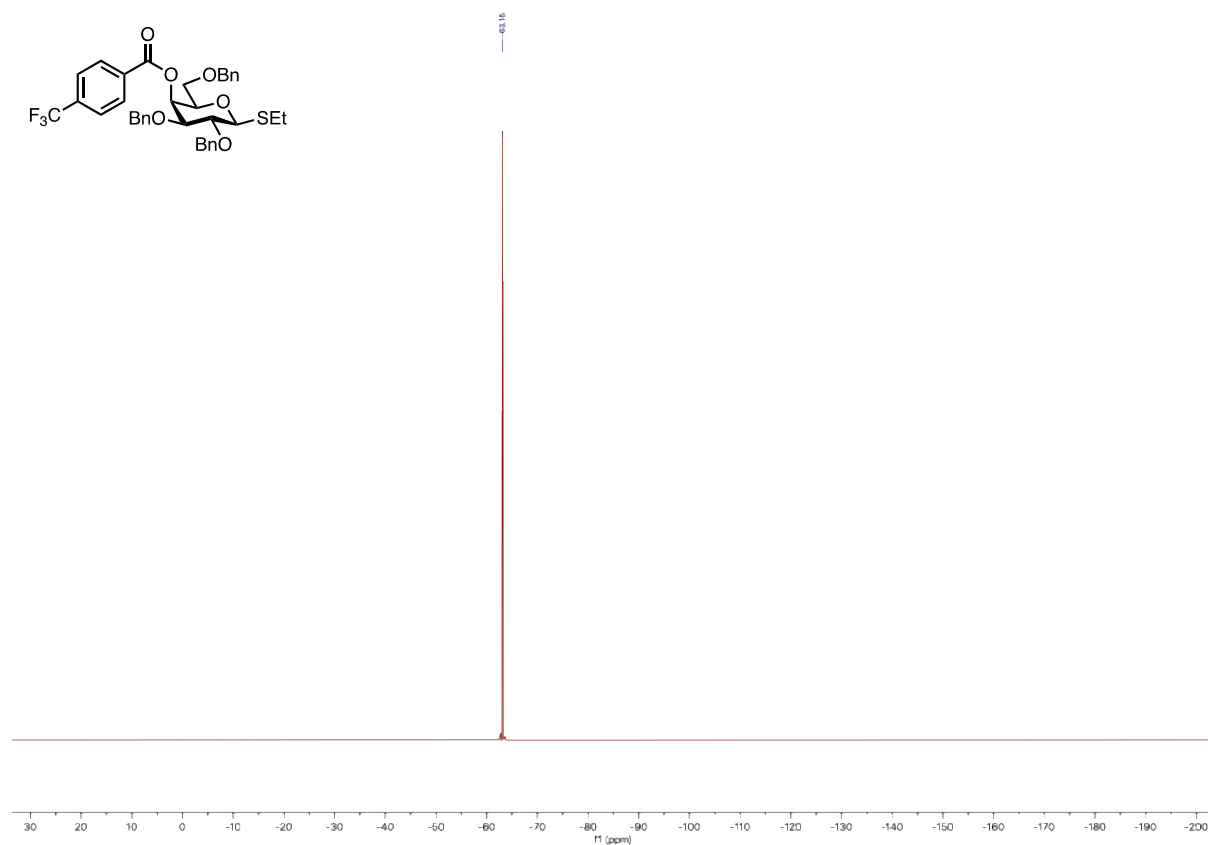
^1H , ^1H COSY (400 MHz, CDCl_3): **4b**



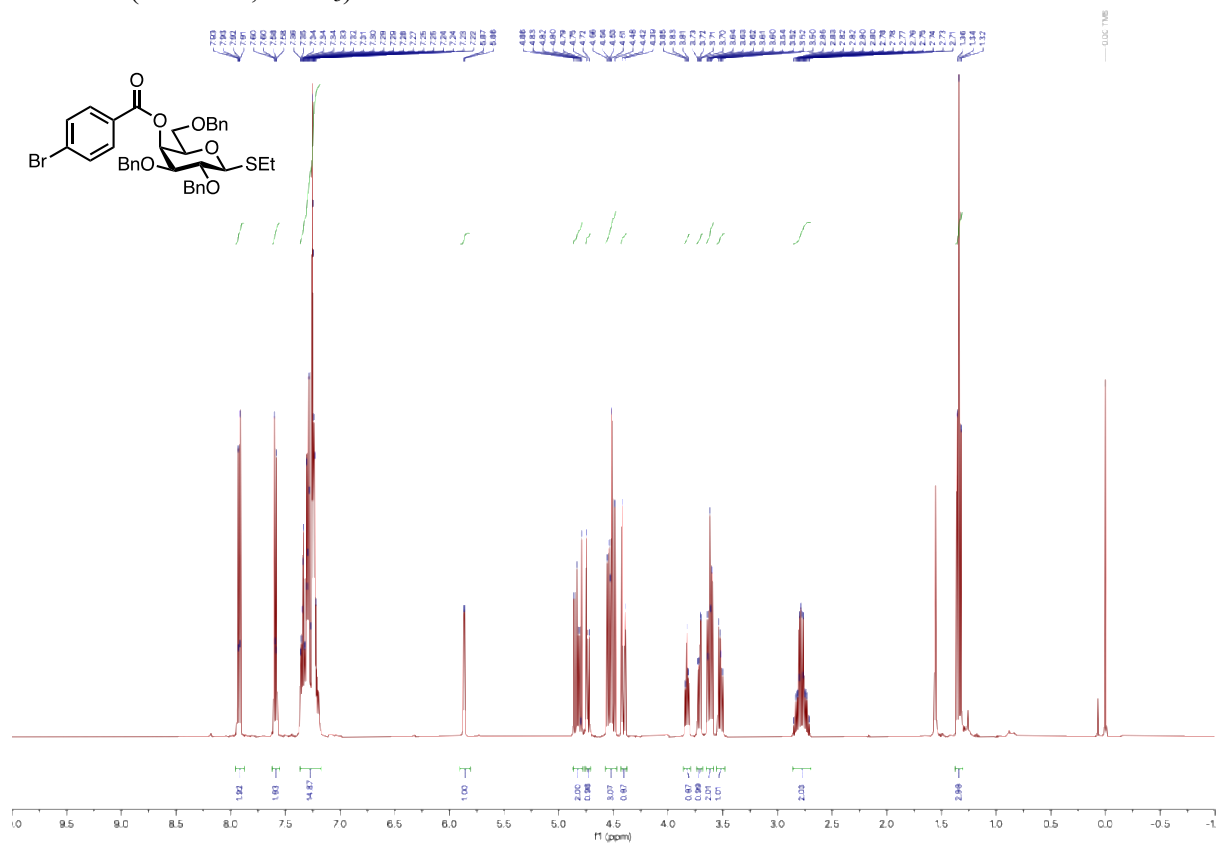
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **4b**



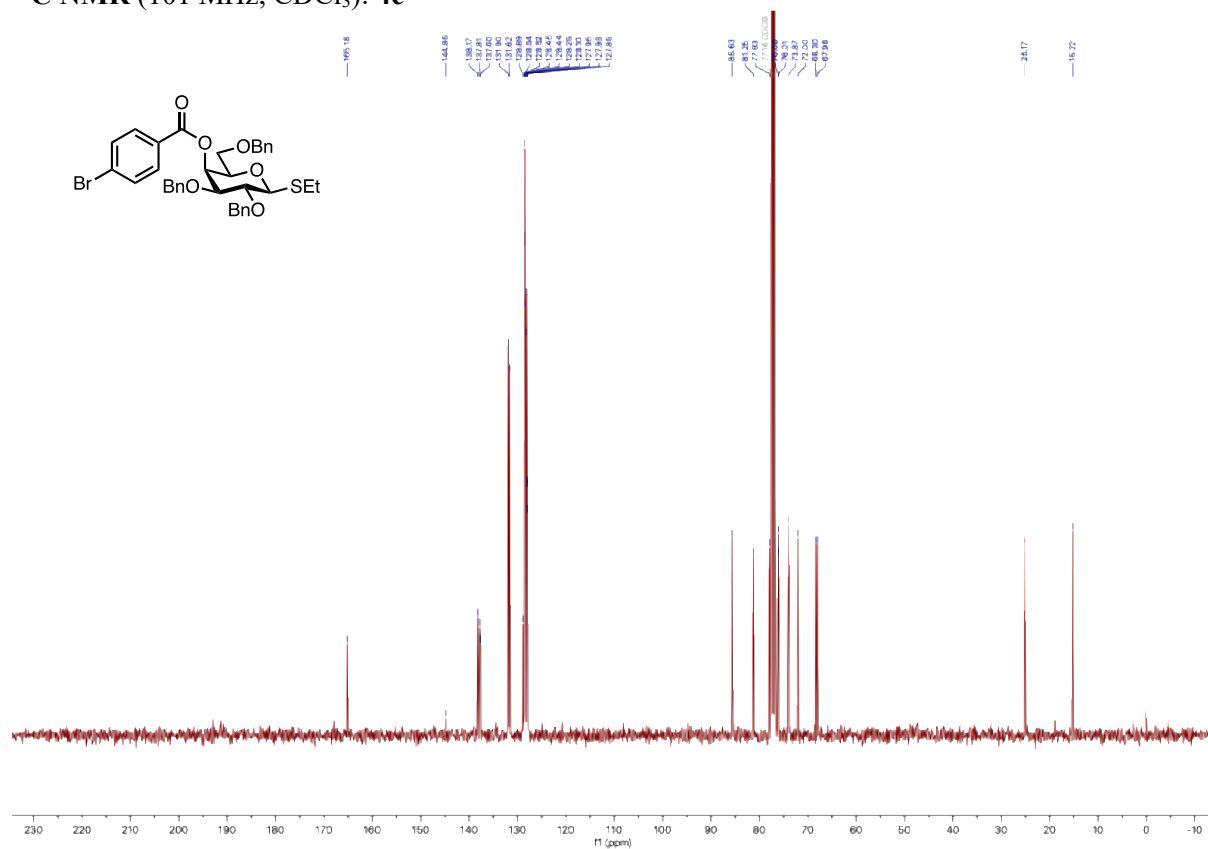
^{19}F NMR (376 MHz, CDCl_3): **4b**



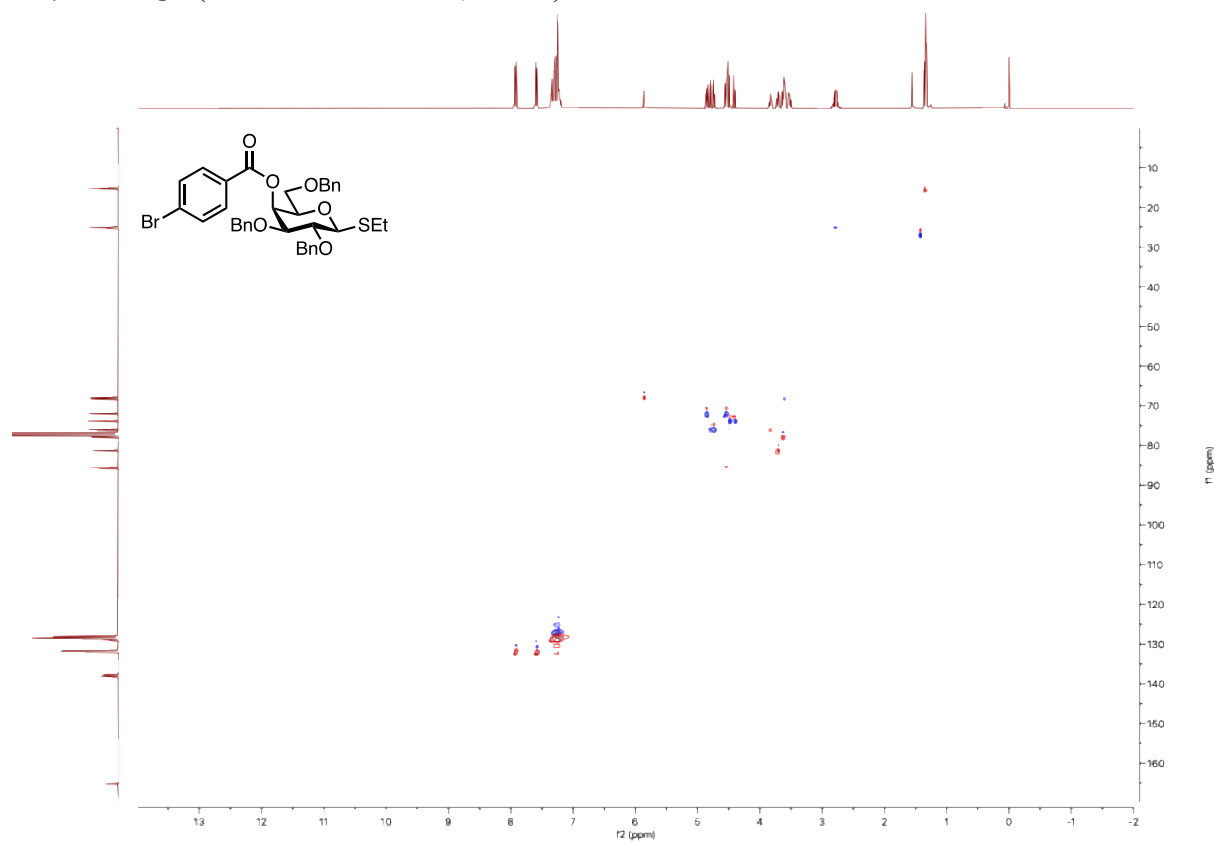
^1H NMR (400 MHz, CDCl_3): **4c**



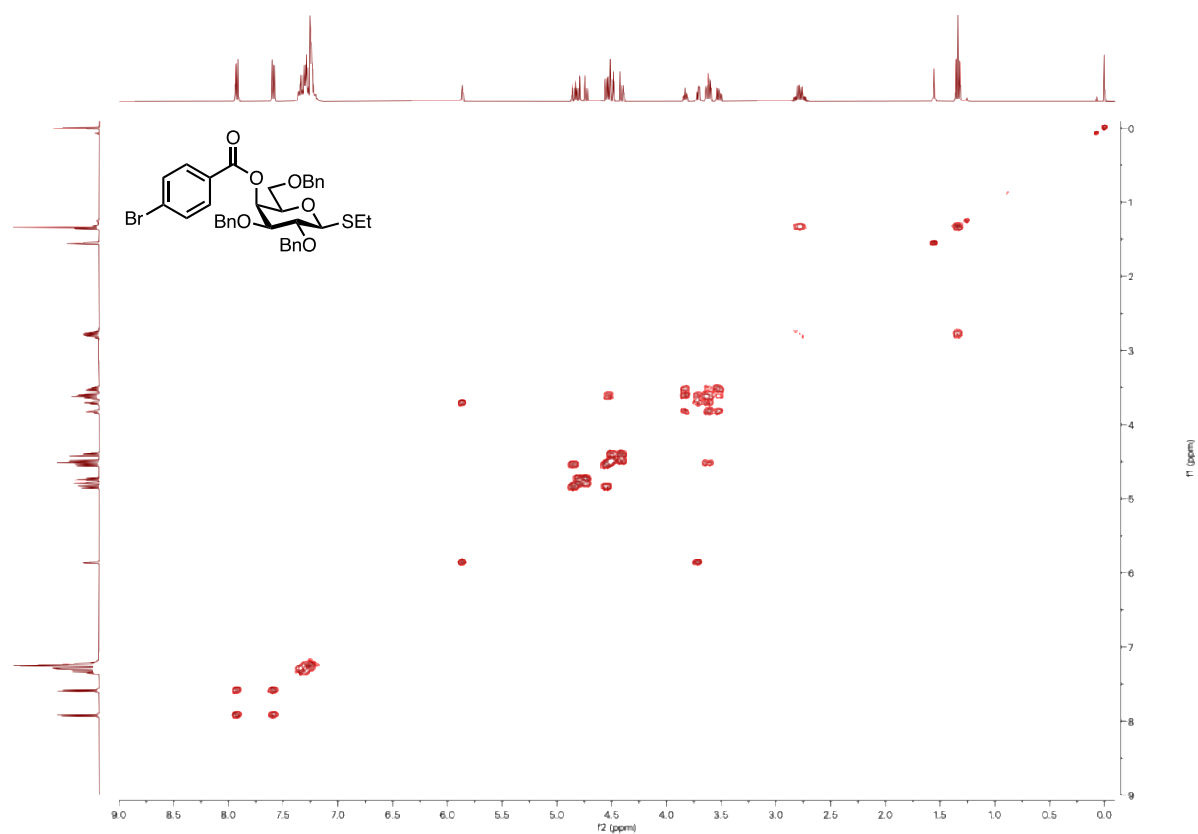
^{13}C NMR (101 MHz, CDCl_3): **4c**



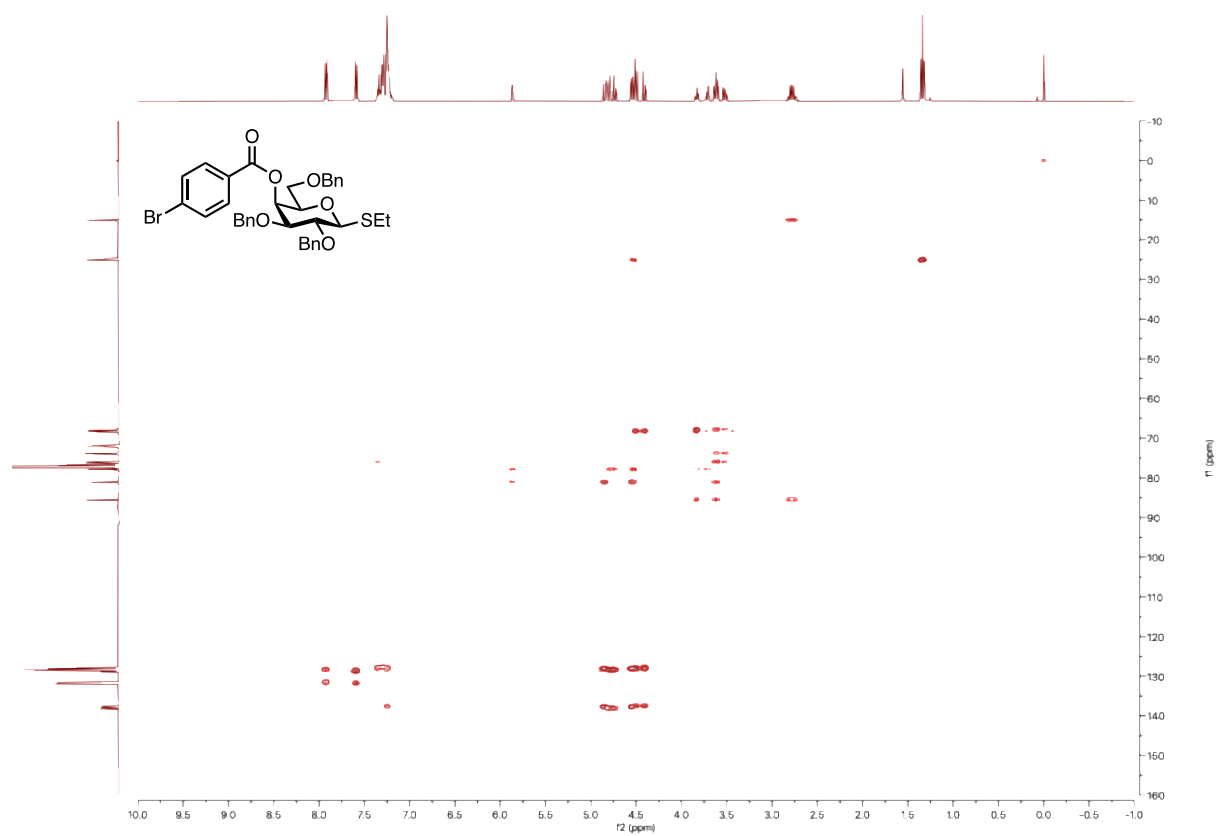
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **4c**



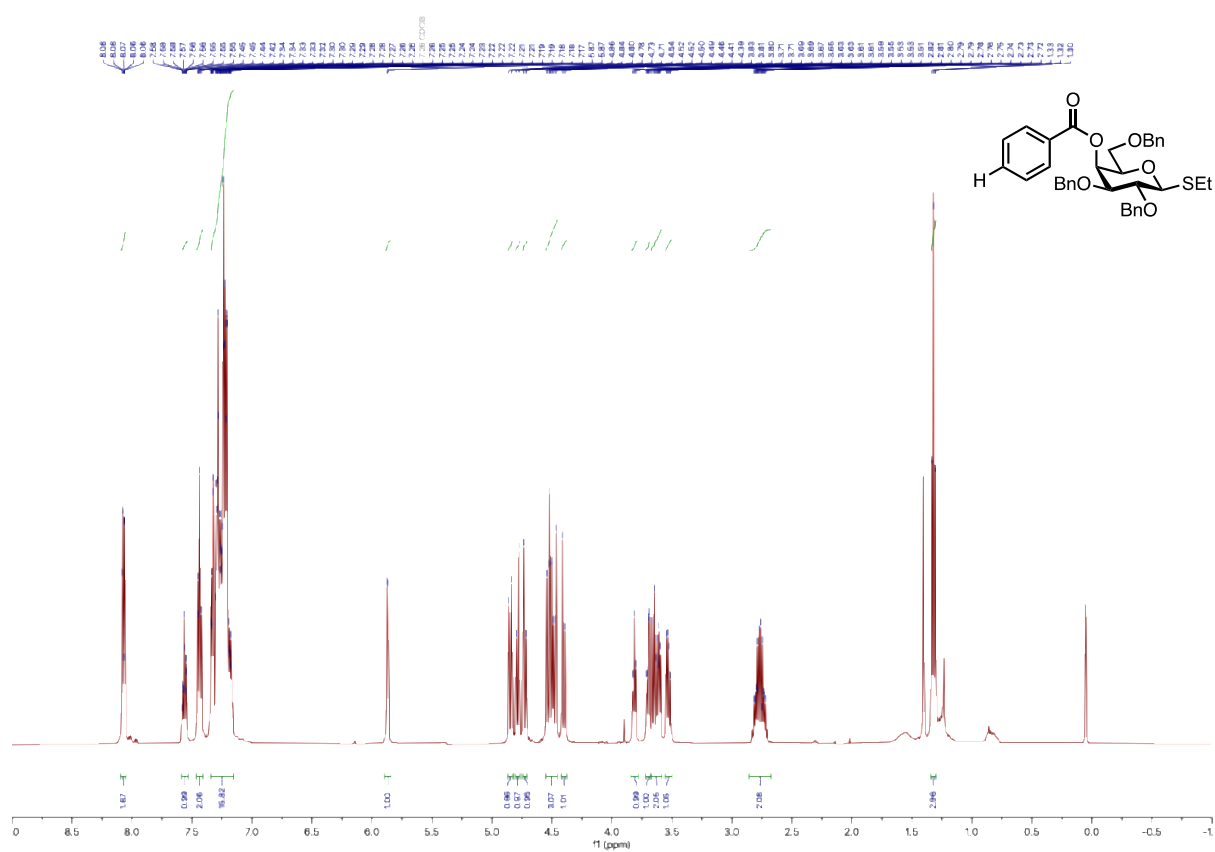
^1H , ^1H COSY (400 MHz, CDCl_3): **4c**



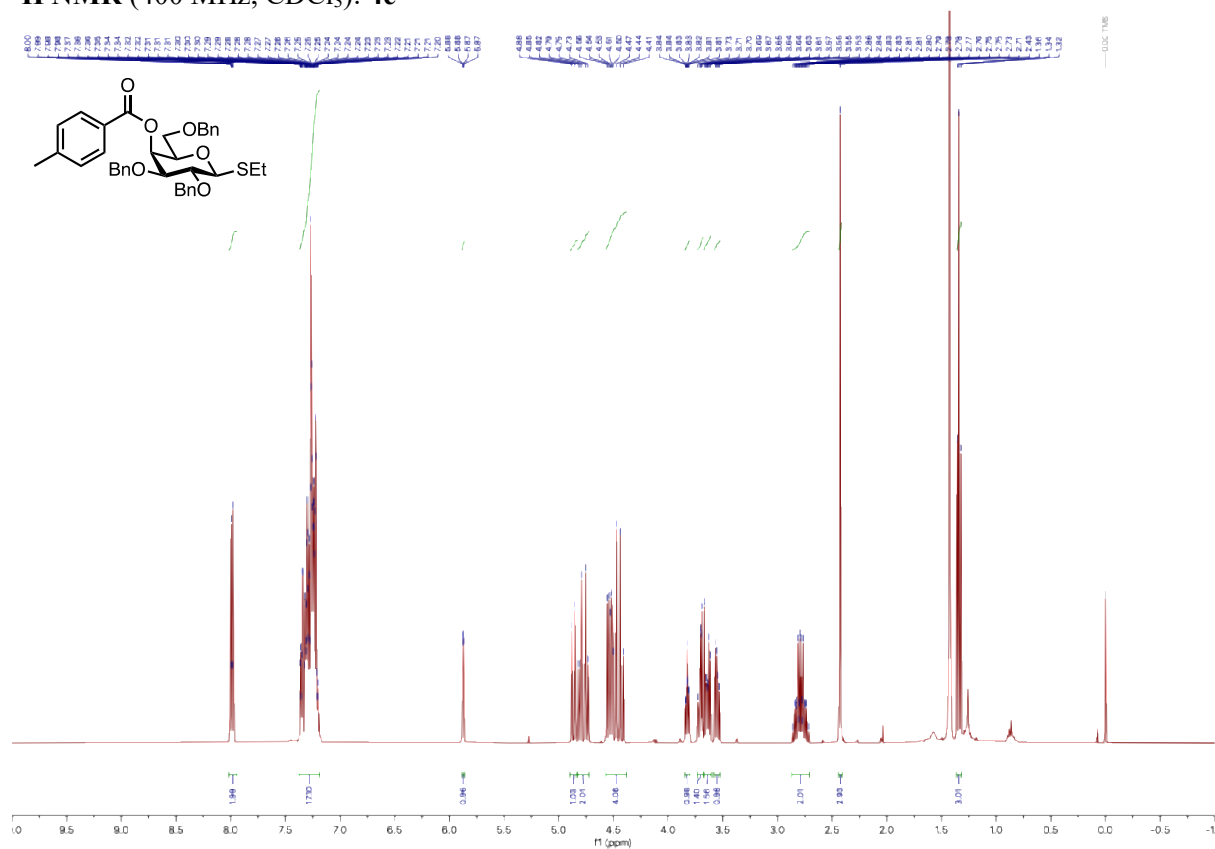
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **4c**



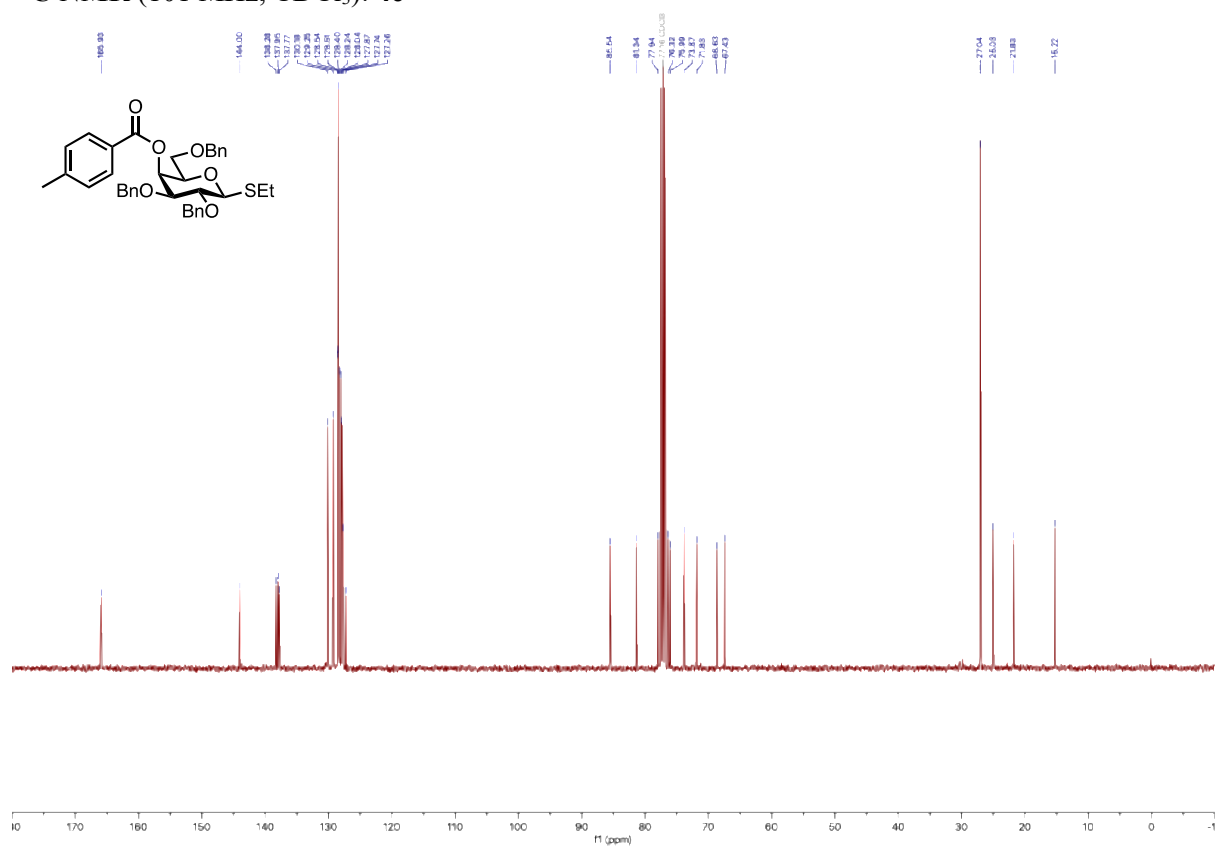
¹H NMR (500 MHz, CDCl₃): **4d**



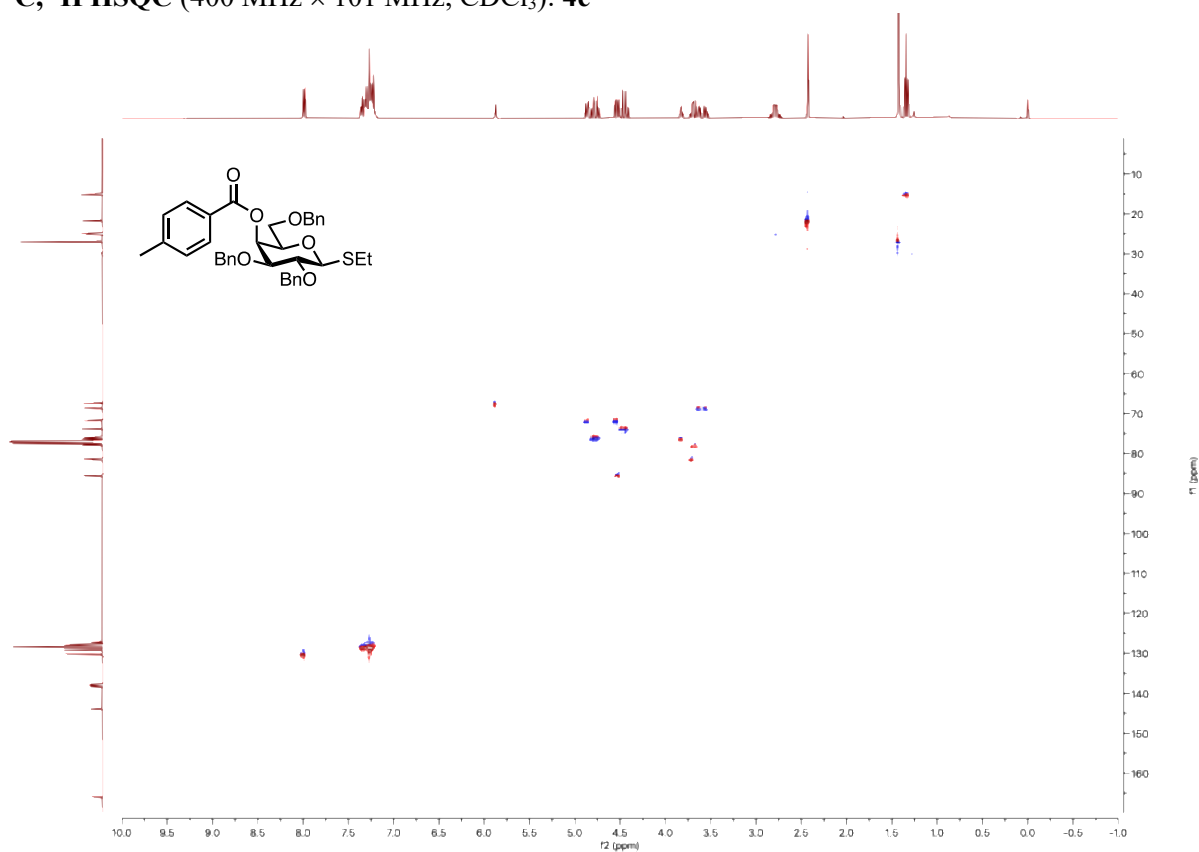
¹H NMR (400 MHz, CDCl₃): 4e



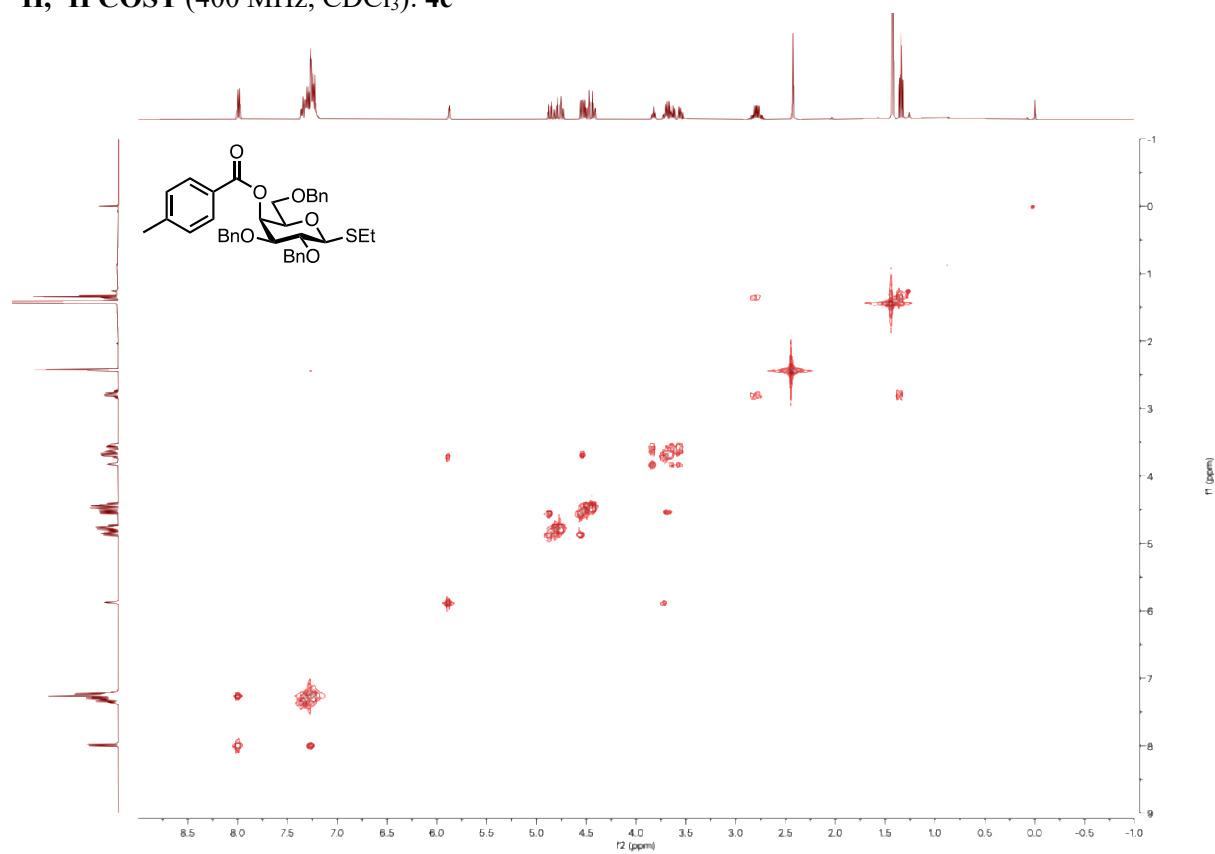
¹³C NMR (101 MHz, CDCl₃): 4e

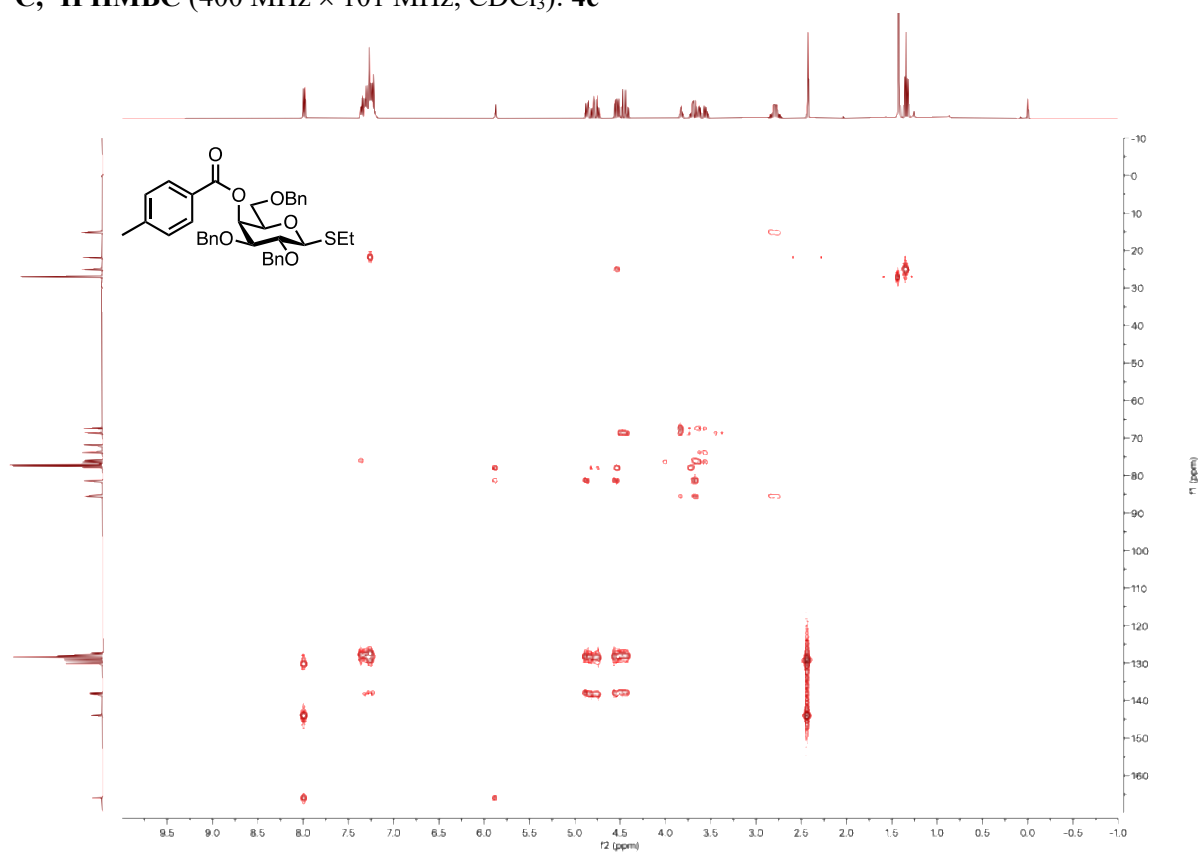


^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **4e**

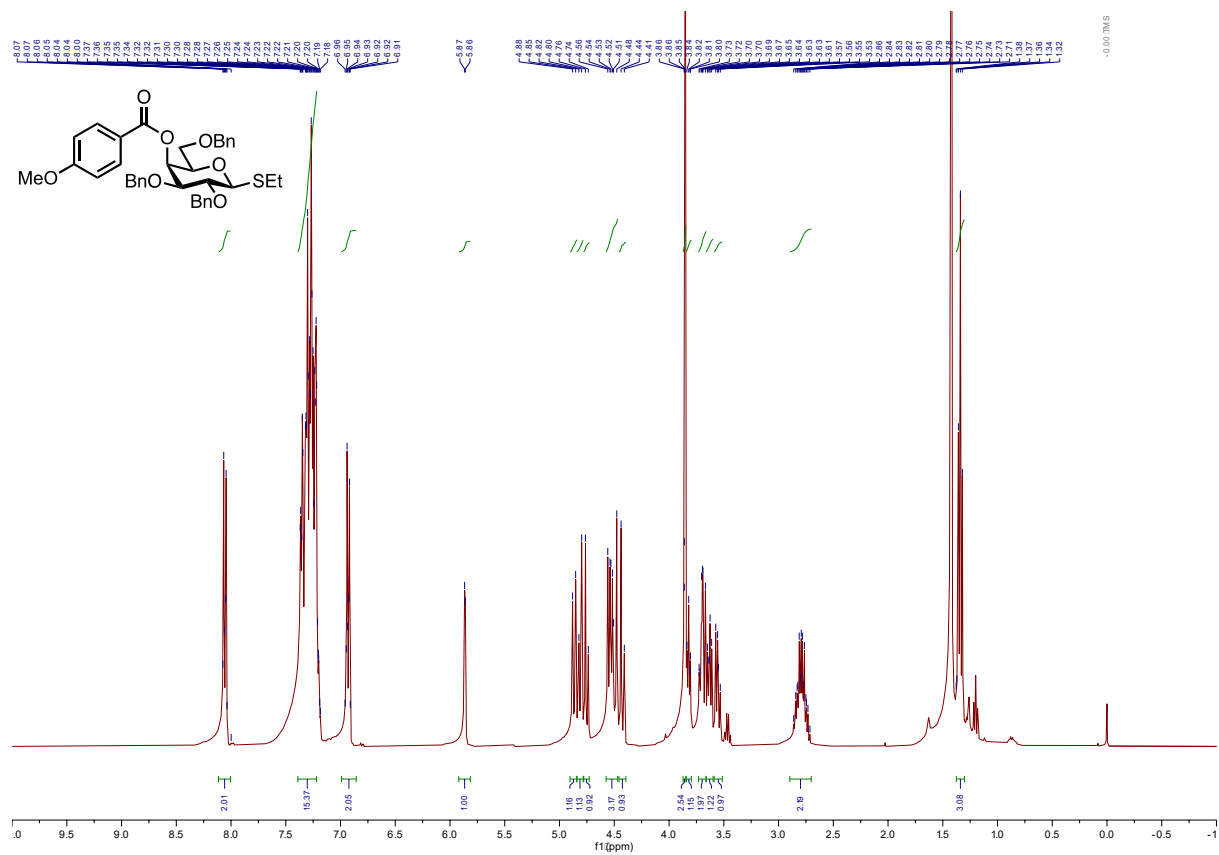


^1H , ^1H COSY (400 MHz, CDCl_3): **4e**

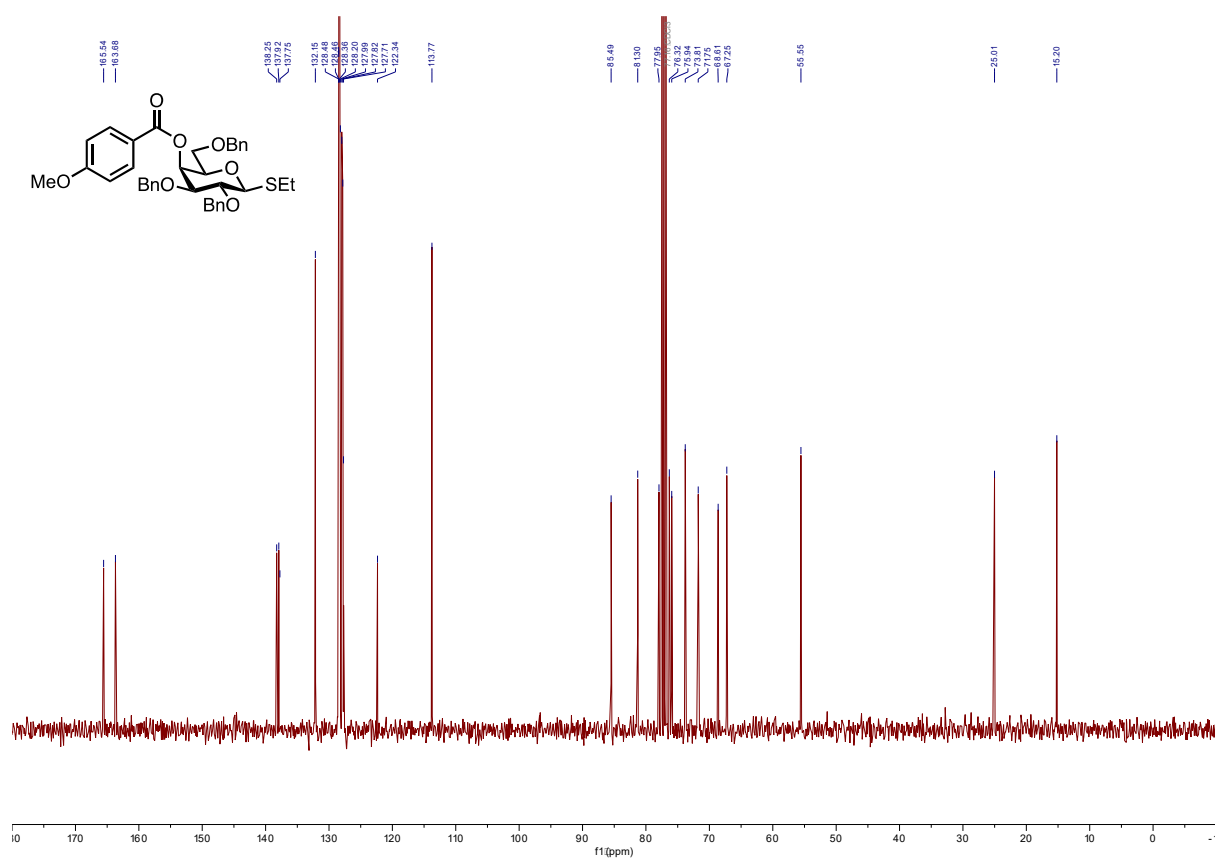


^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **4e**

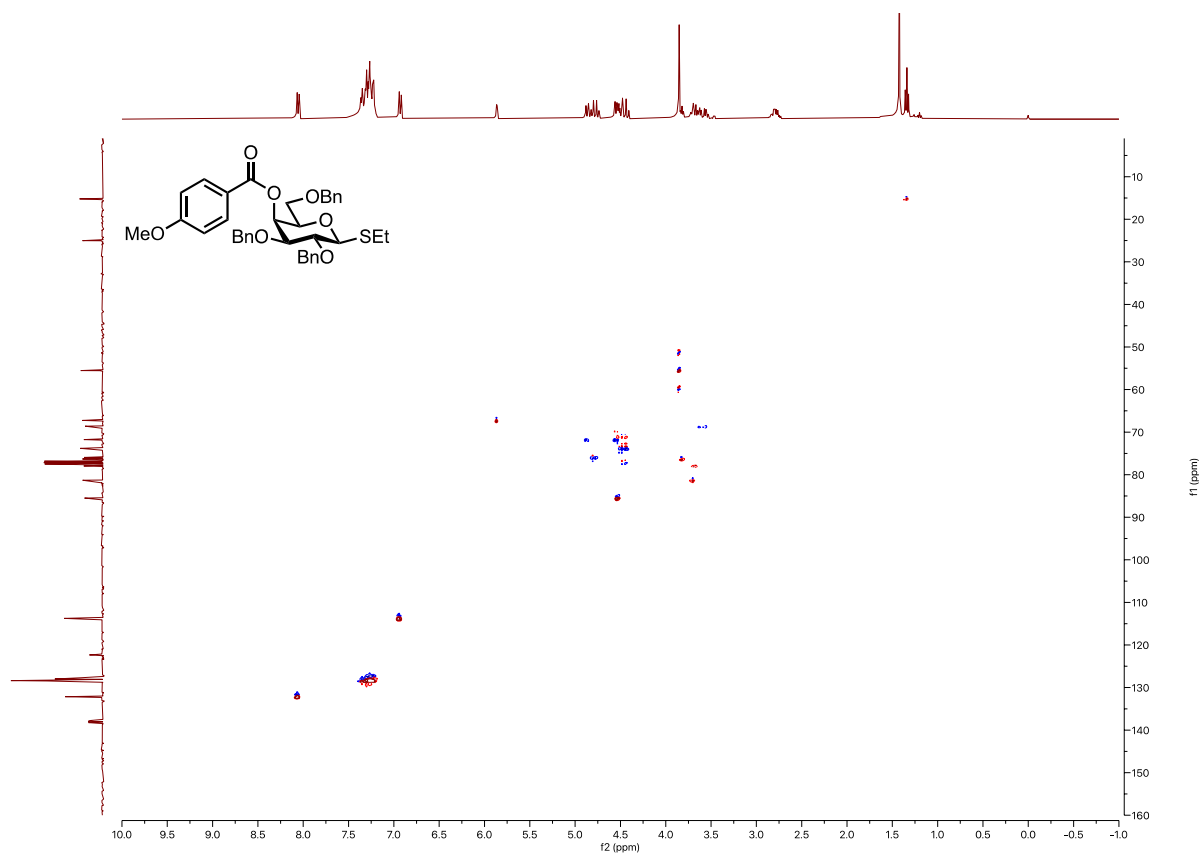
¹H NMR (400 MHz, CDCl₃): **4f**



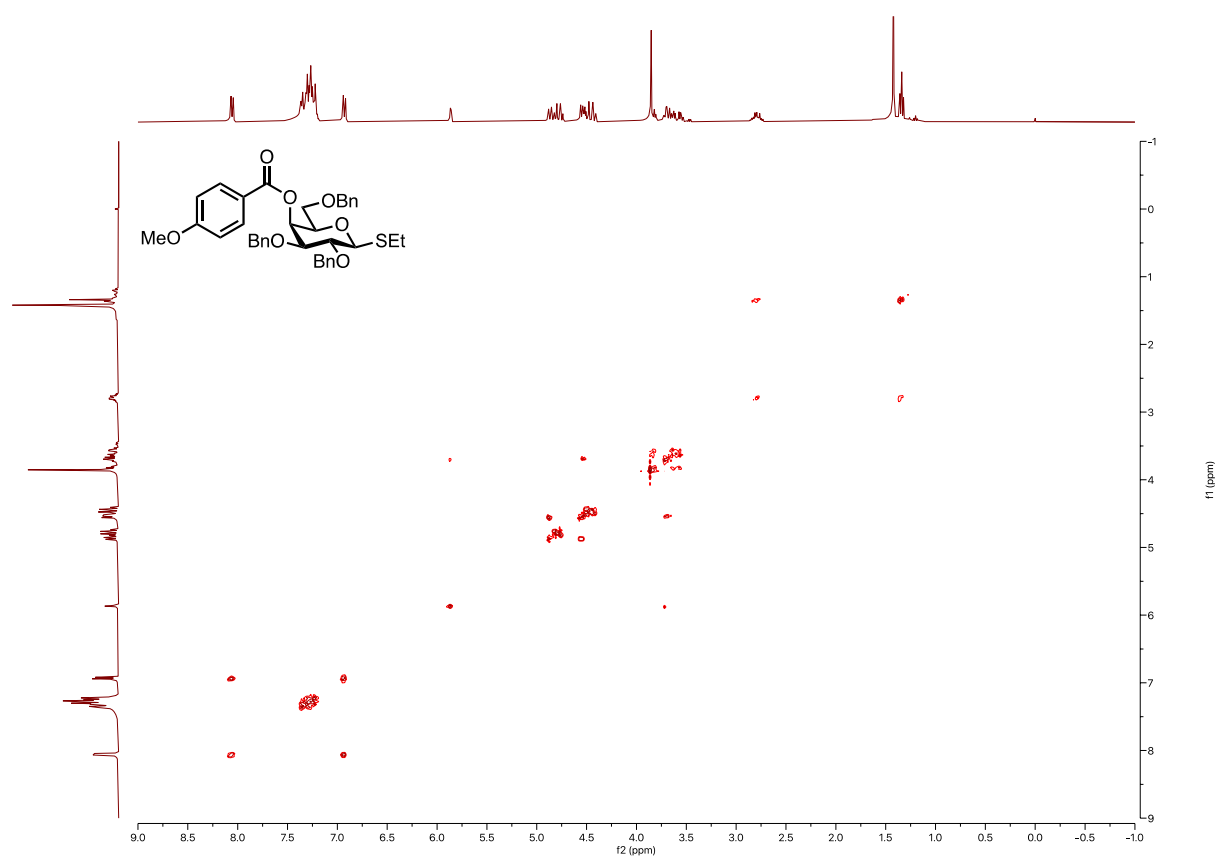
^{13}C NMR (101 MHz, CDCl_3): 4f



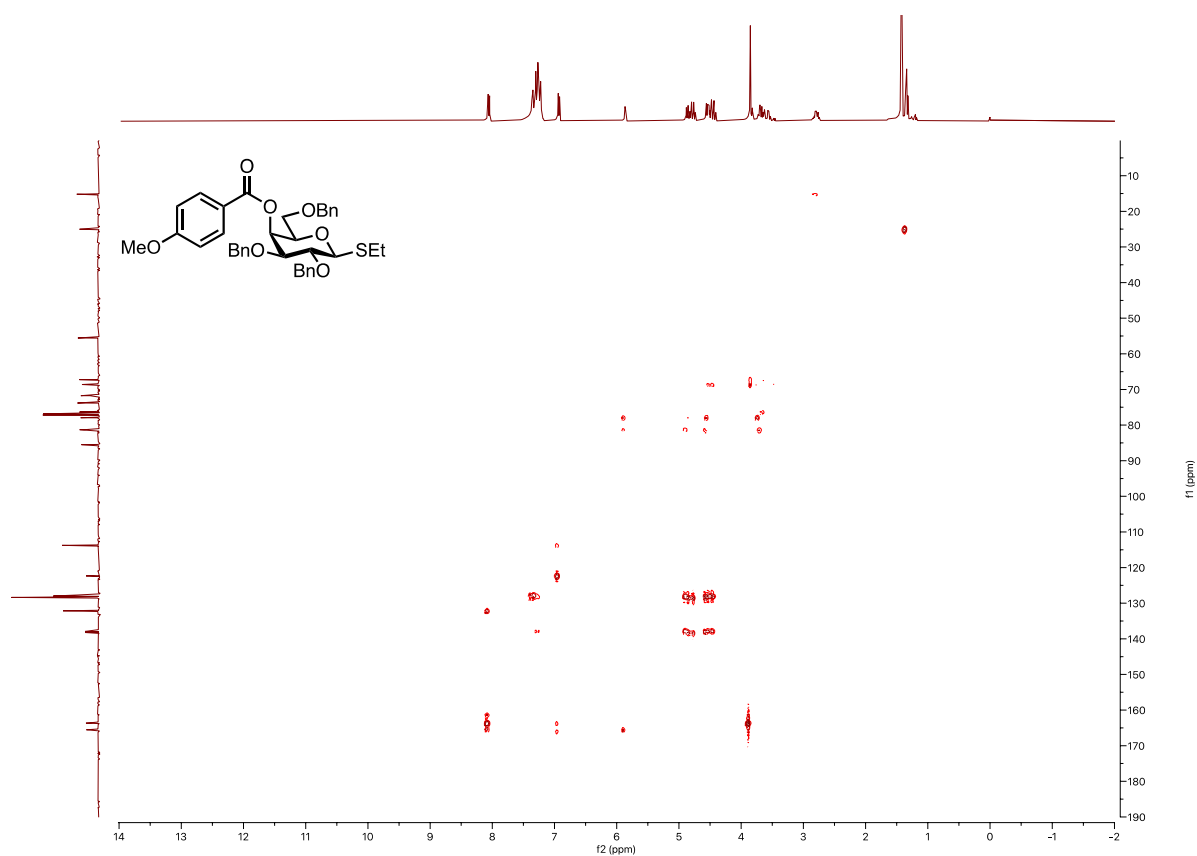
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): 4f



^1H , ^1H COSY (400 MHz, CDCl_3): 4f



^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 4f



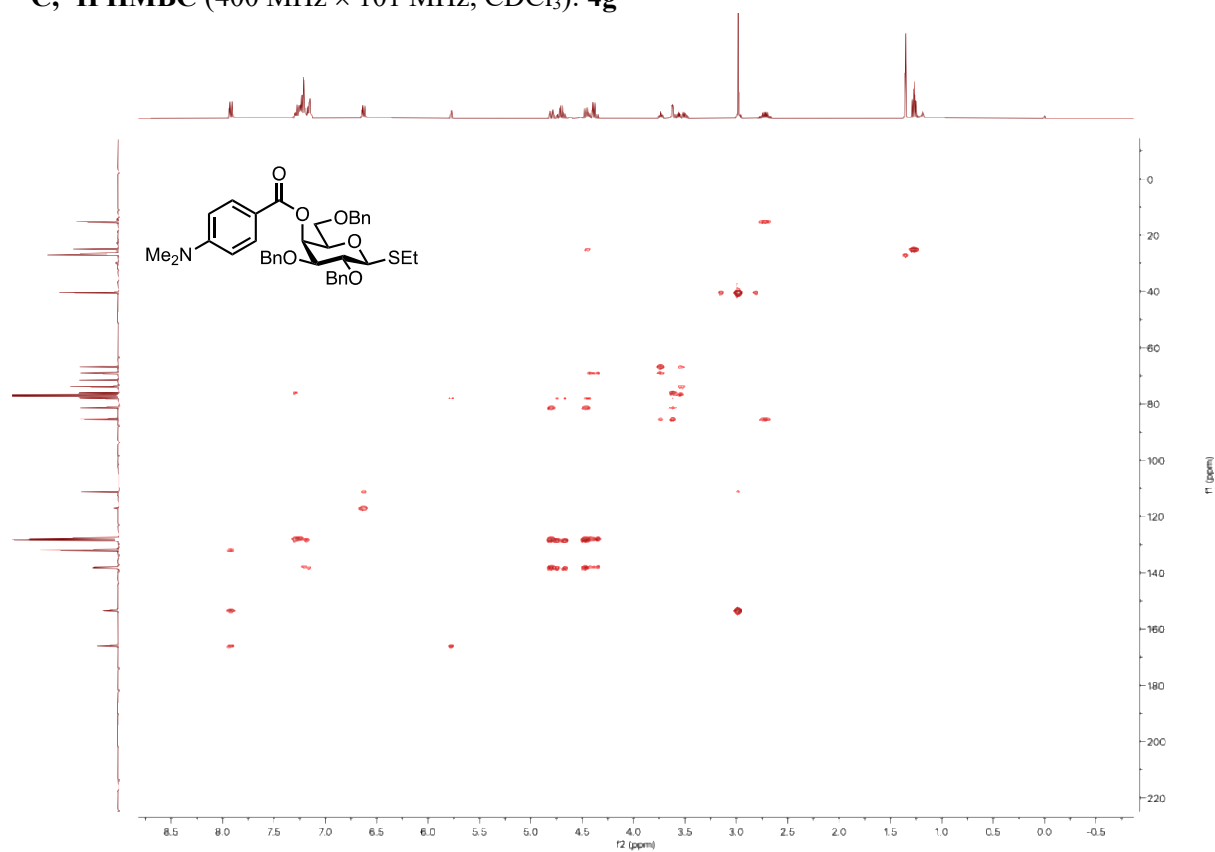
1D ¹³C NMR (400 MHz, CDCl₃) and 2D HMQC (400 MHz × 101 MHz, CDCl₃) of **4g**.

The chemical structure of **4g** is shown in the top left of the 2D HMQC plot. It is a substituted cyclohexane derivative with a benzoyl group, a benzylidene acetal, and a selenide group.

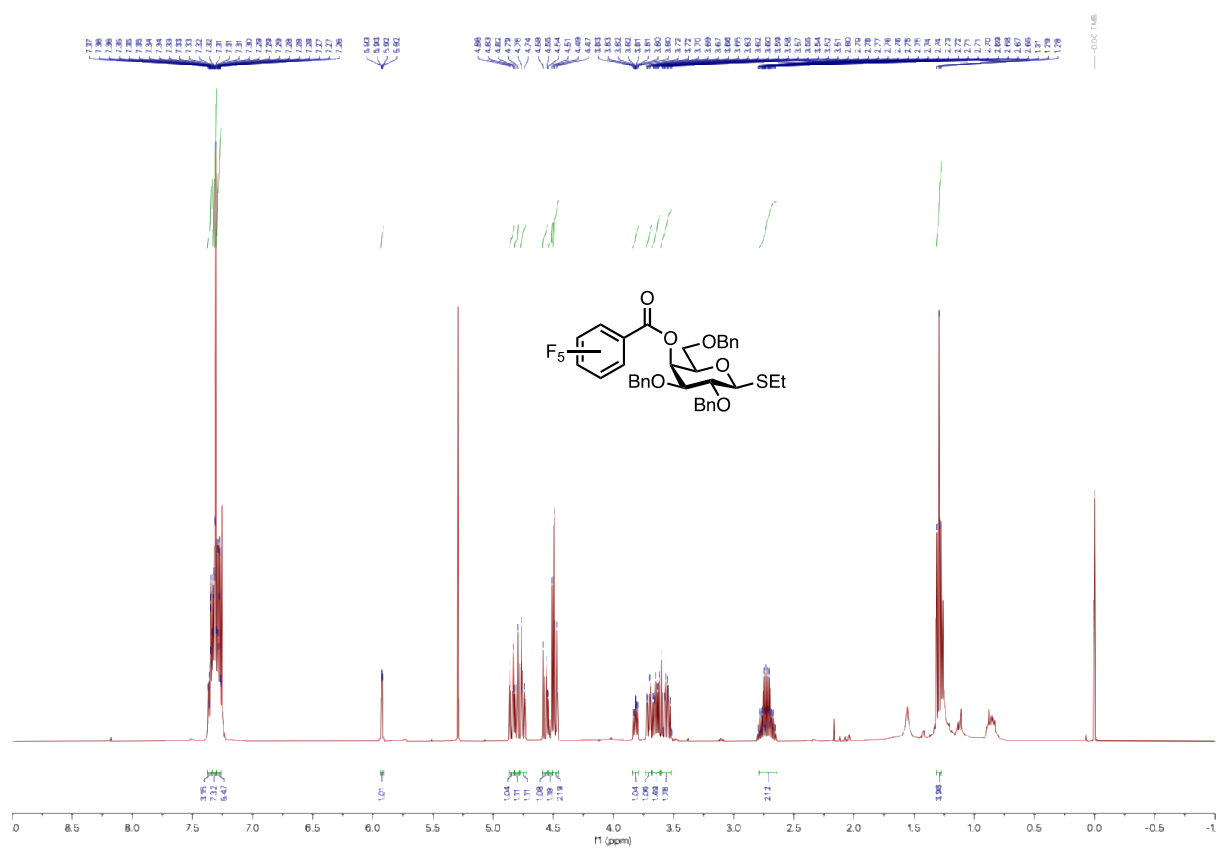
The 1D ¹³C NMR spectrum (top) shows peaks at approximately 150, 140, 130, 120, 110, 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, and 0 ppm.

The 2D HMQC spectrum (bottom) shows correlations between ¹H and ¹³C chemical shifts. The x-axis represents ¹H chemical shift (ppm) from 0 to 9, and the y-axis represents ¹³C chemical shift (ppm) from -5 to 150. The spectrum displays several cross-peaks, including a large peak at (1.2 ppm, 15 ppm) corresponding to the selenide group, and a cluster of peaks between 3.5-5.5 ppm ¹H and 30-70 ppm ¹³C corresponding to the cyclohexane ring protons and carbons.

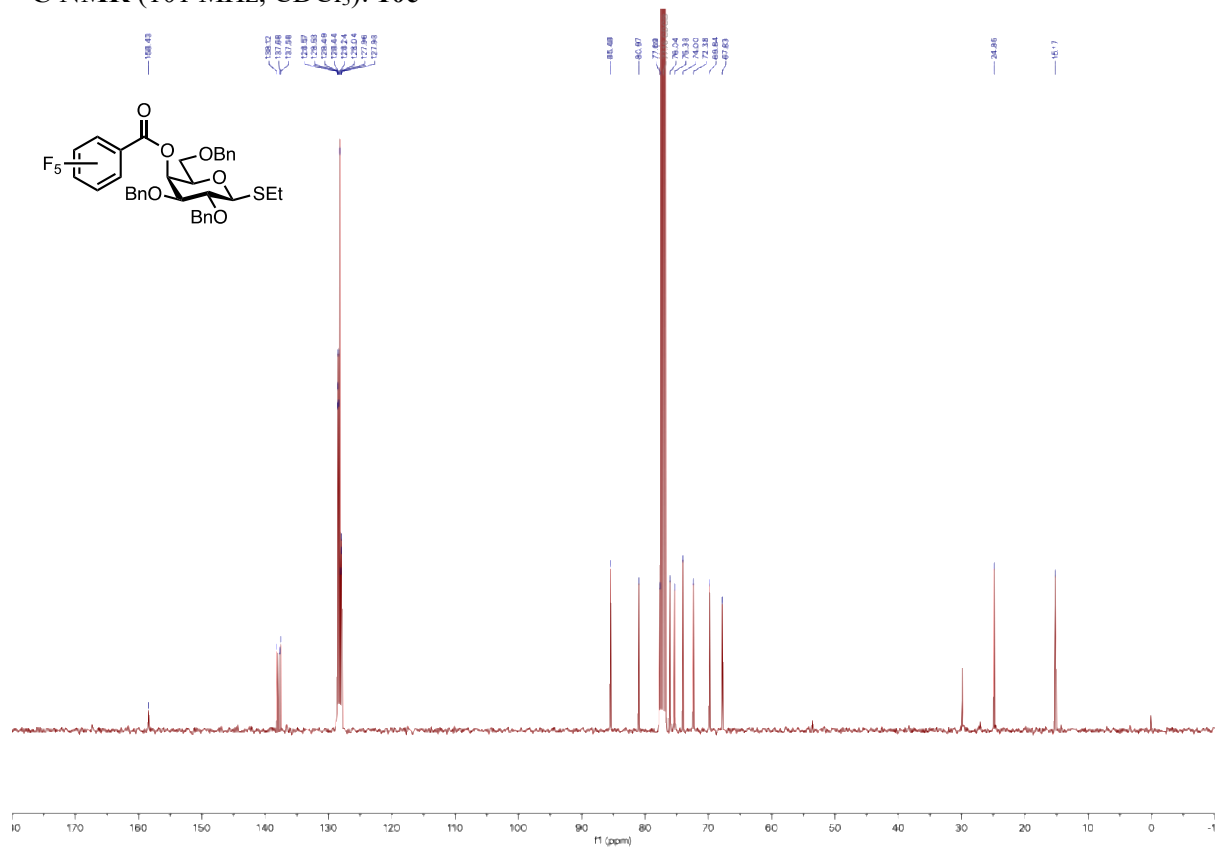
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **4g**



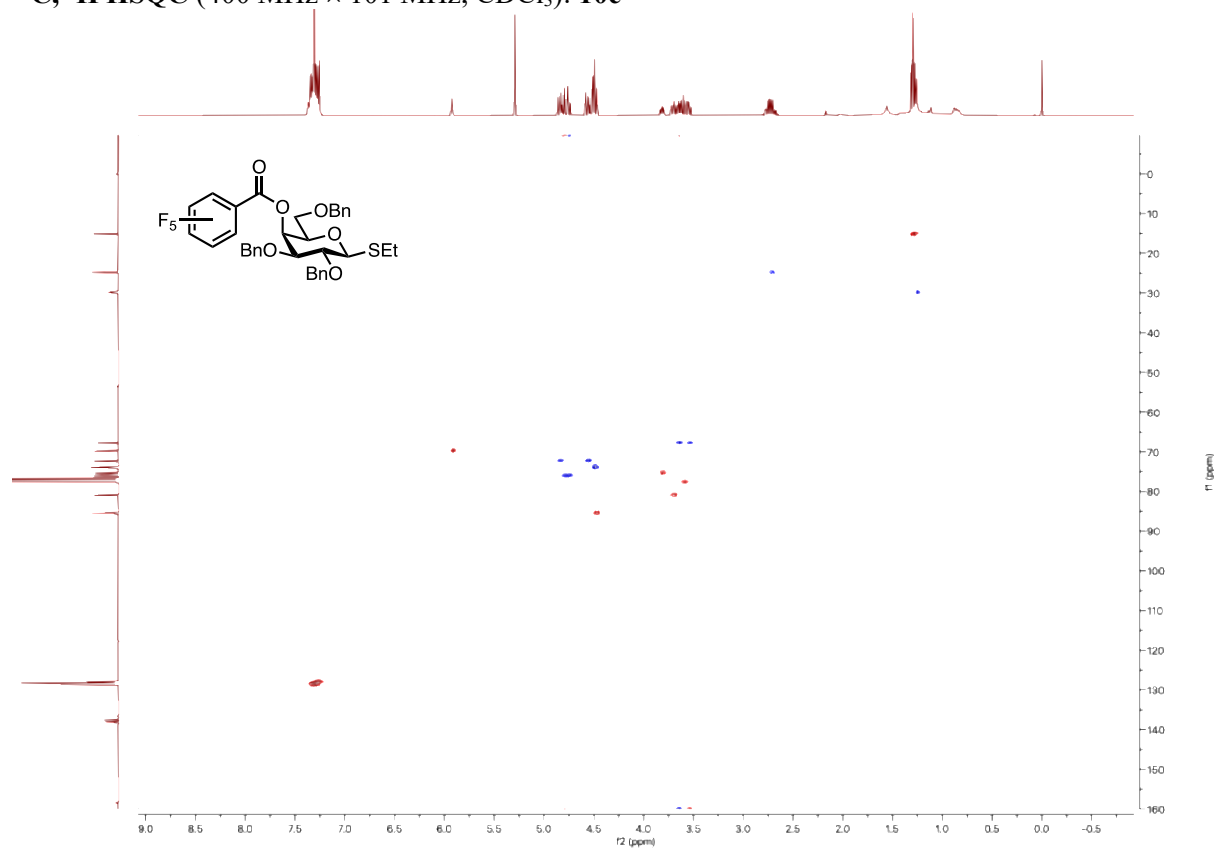
^1H NMR (400 MHz, CDCl_3): **10c**



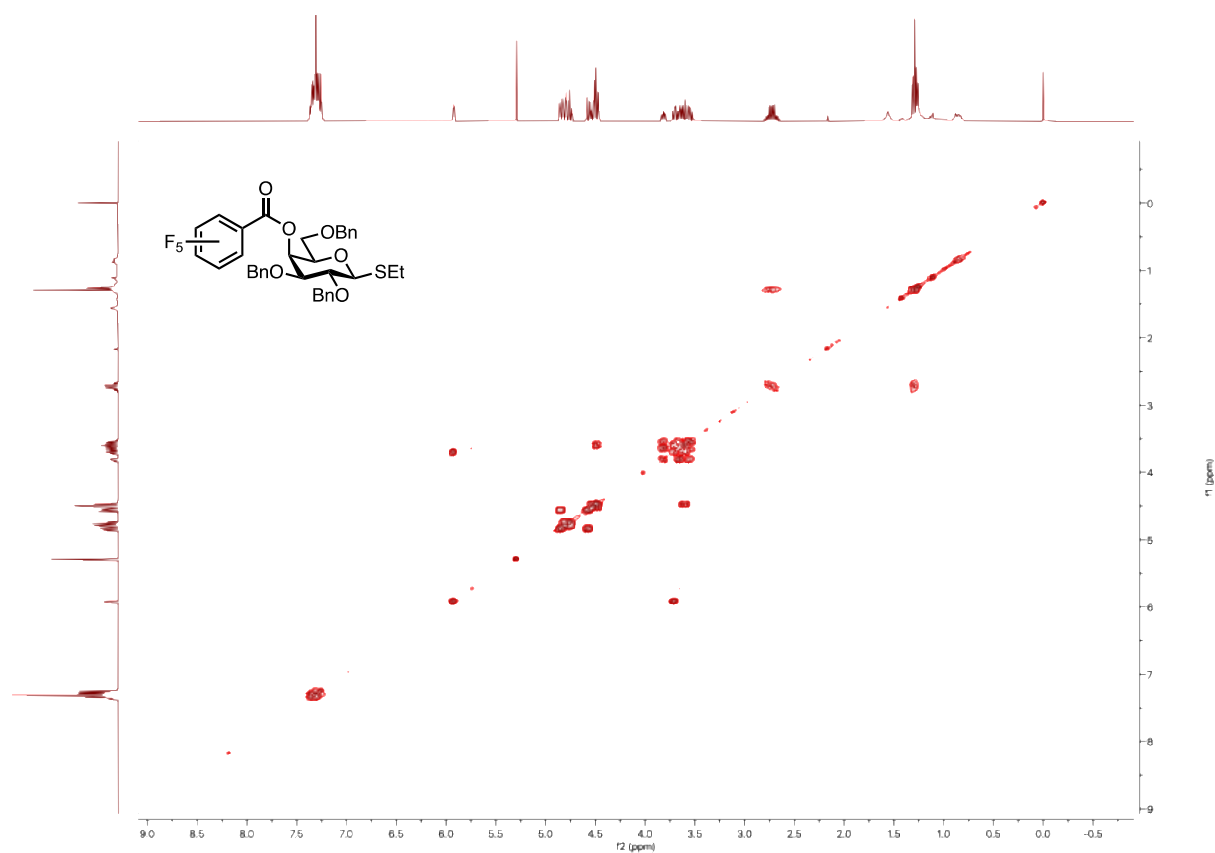
^{13}C NMR (101 MHz, CDCl_3): 10c



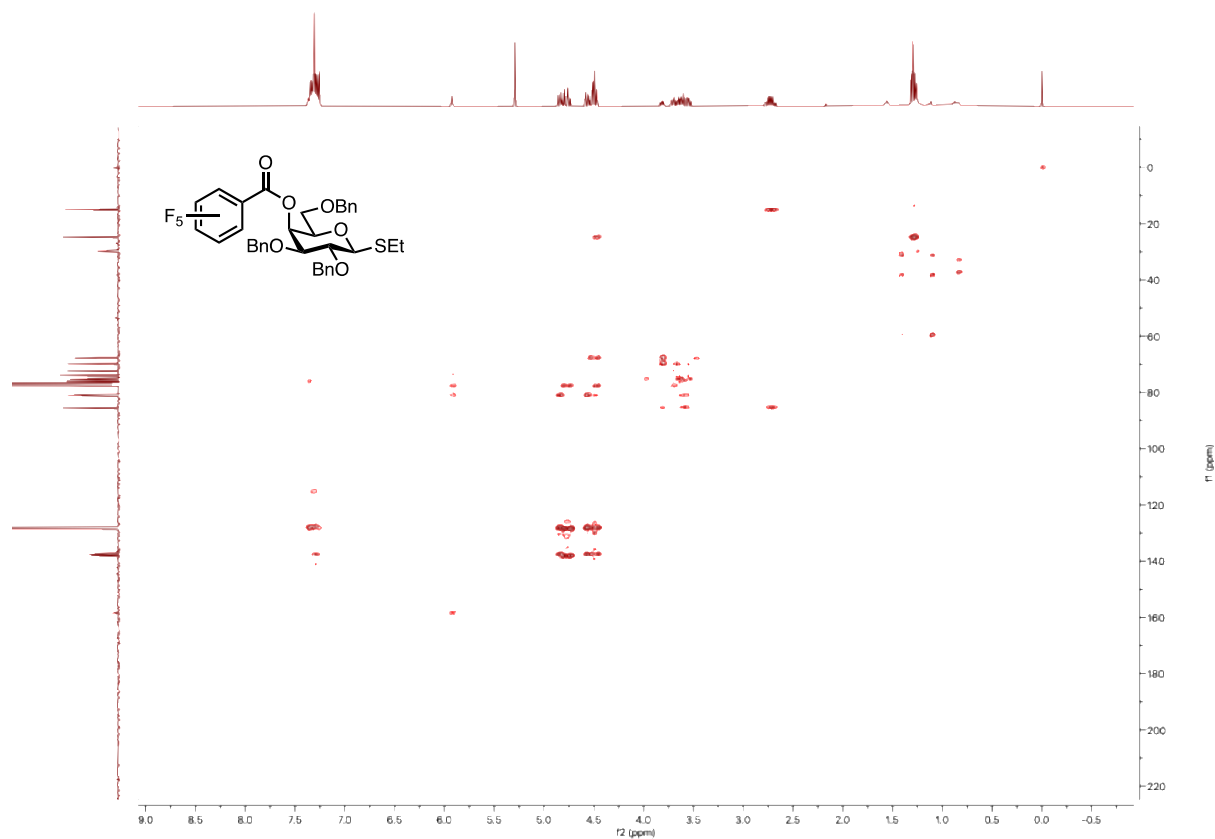
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): 10c



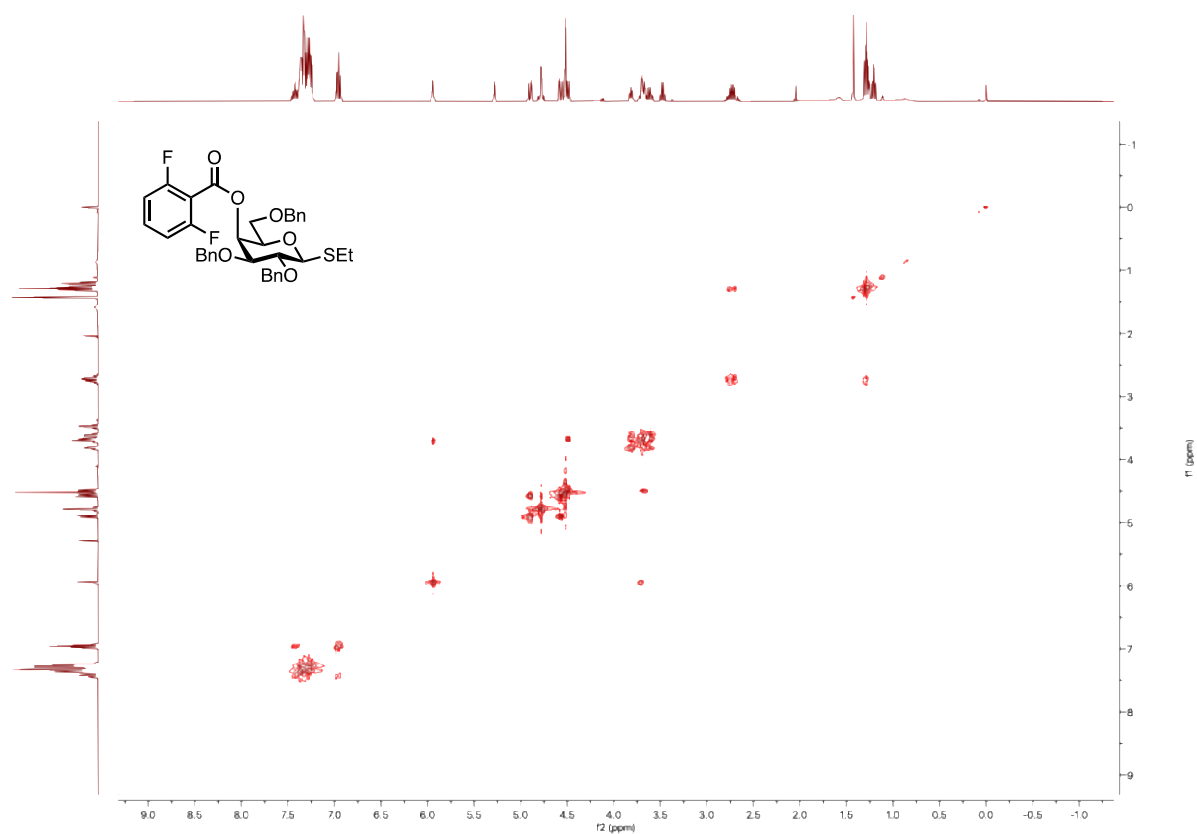
^1H , ^1H COSY (400 MHz, CDCl_3): 10c



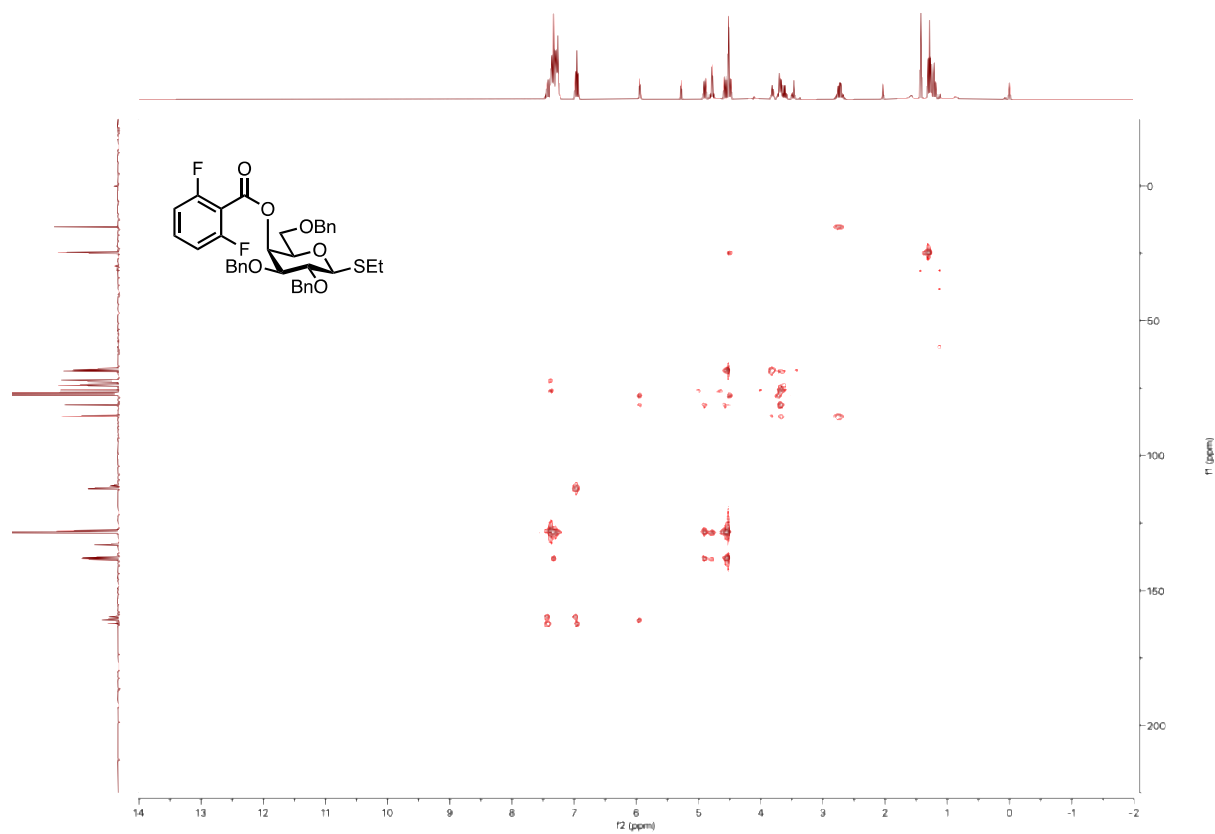
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 10c



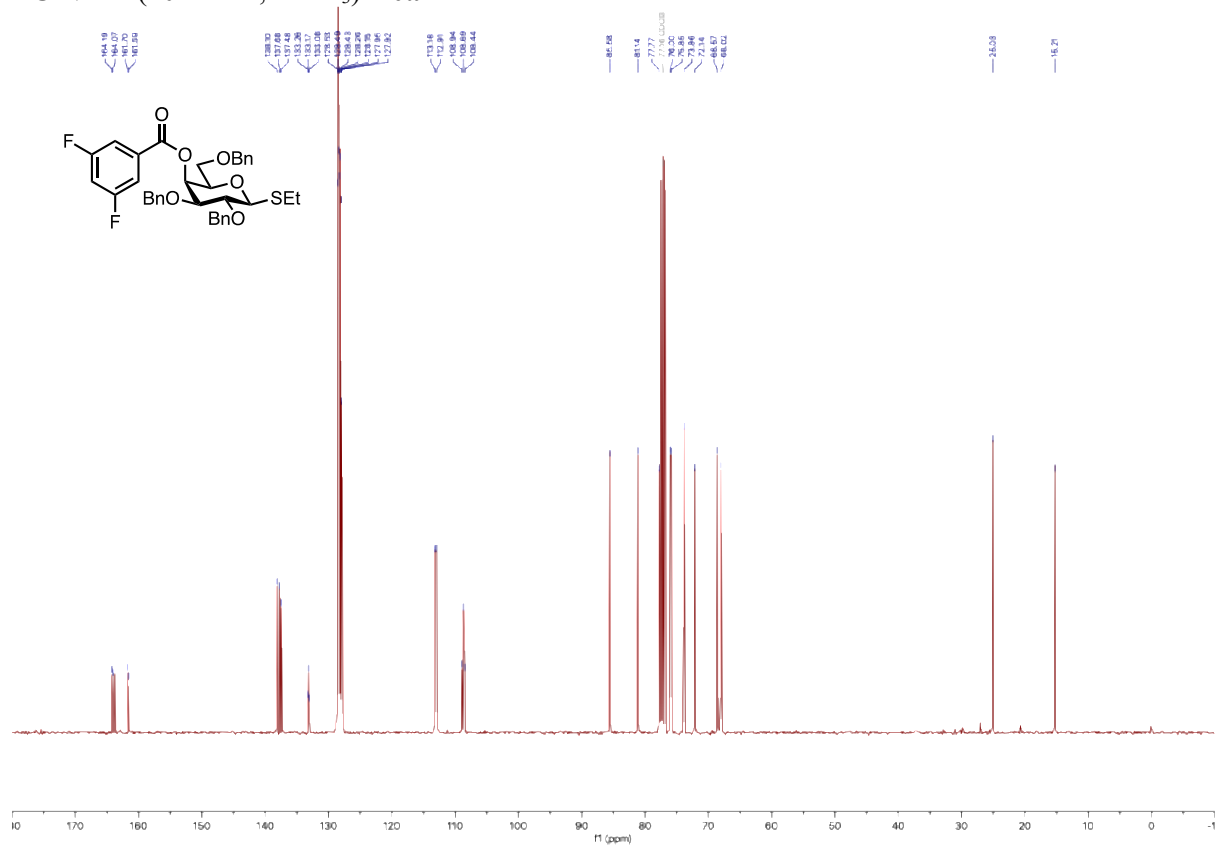
^1H , ^1H COSY (400 MHz, CDCl_3): **10b**



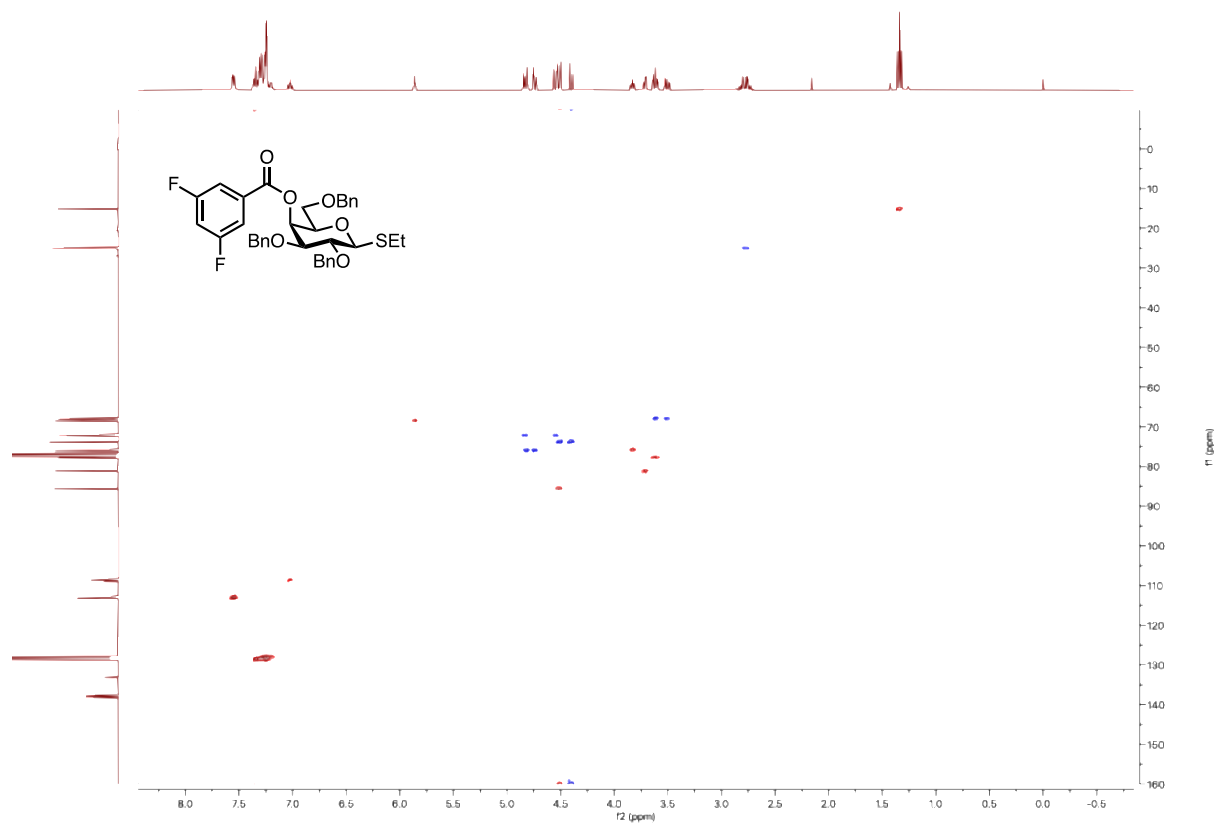
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **10b**



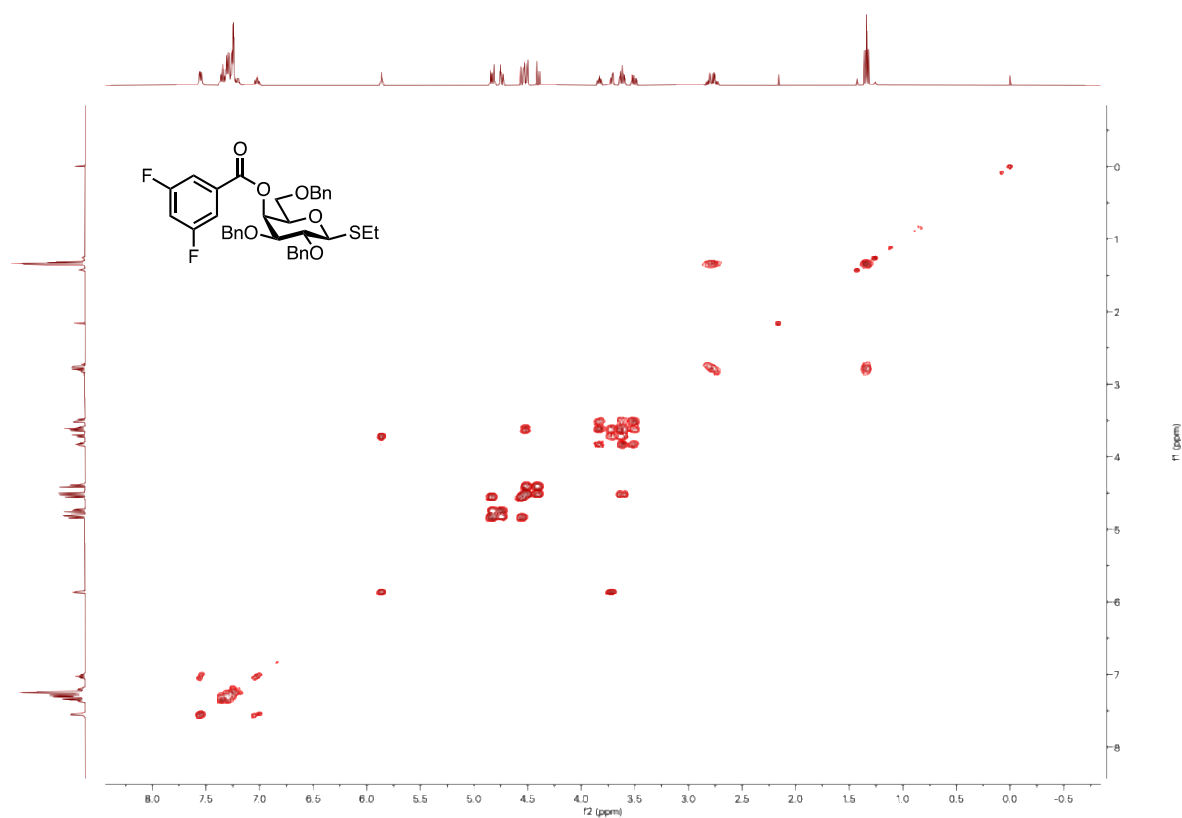
^{13}C NMR (101 MHz, CDCl_3): 10a



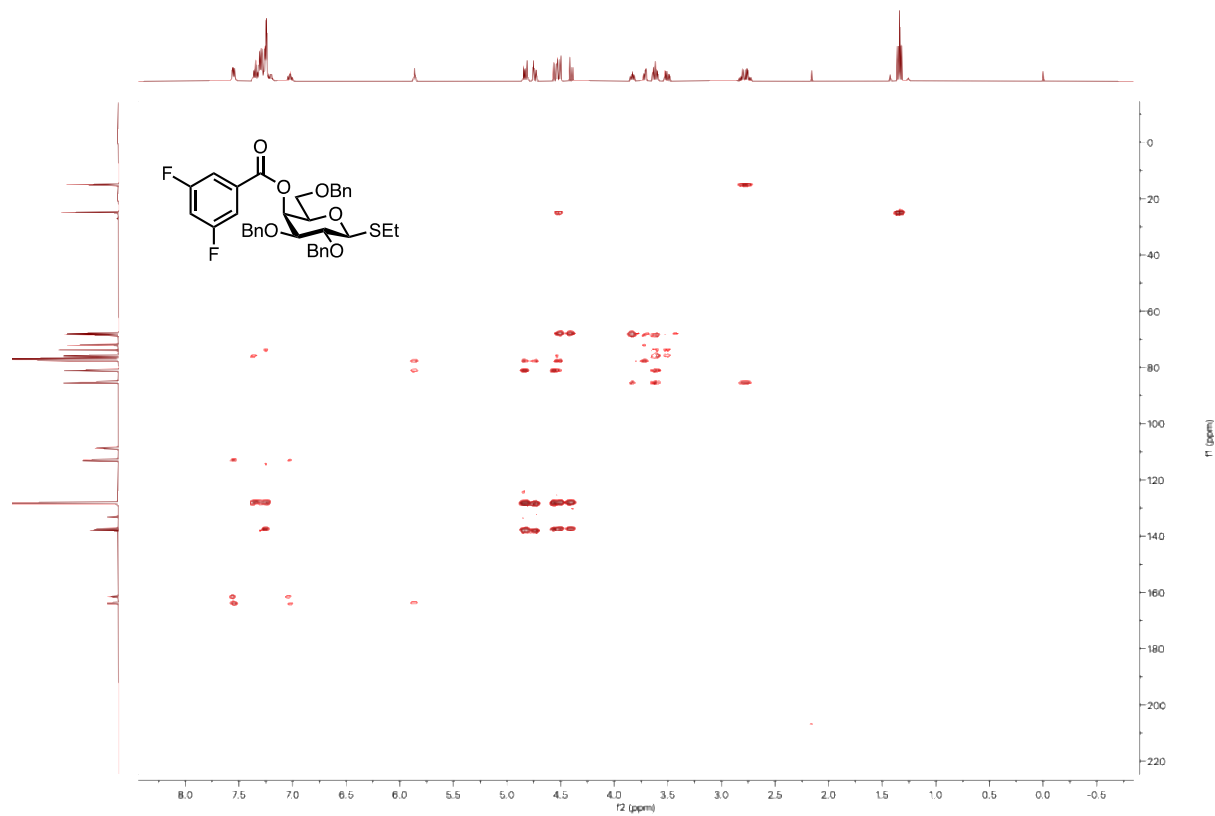
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): 10a



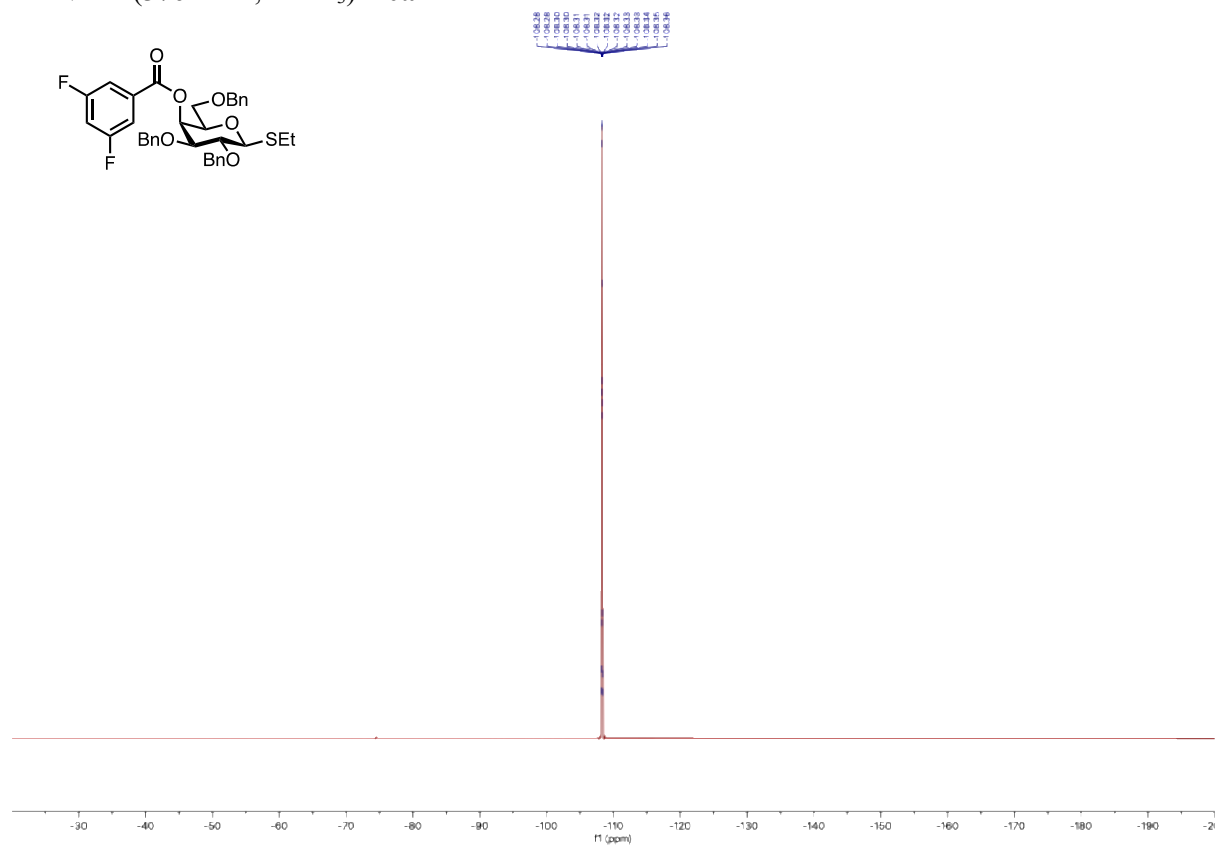
^1H , ^1H COSY (400 MHz, CDCl_3): **10a**



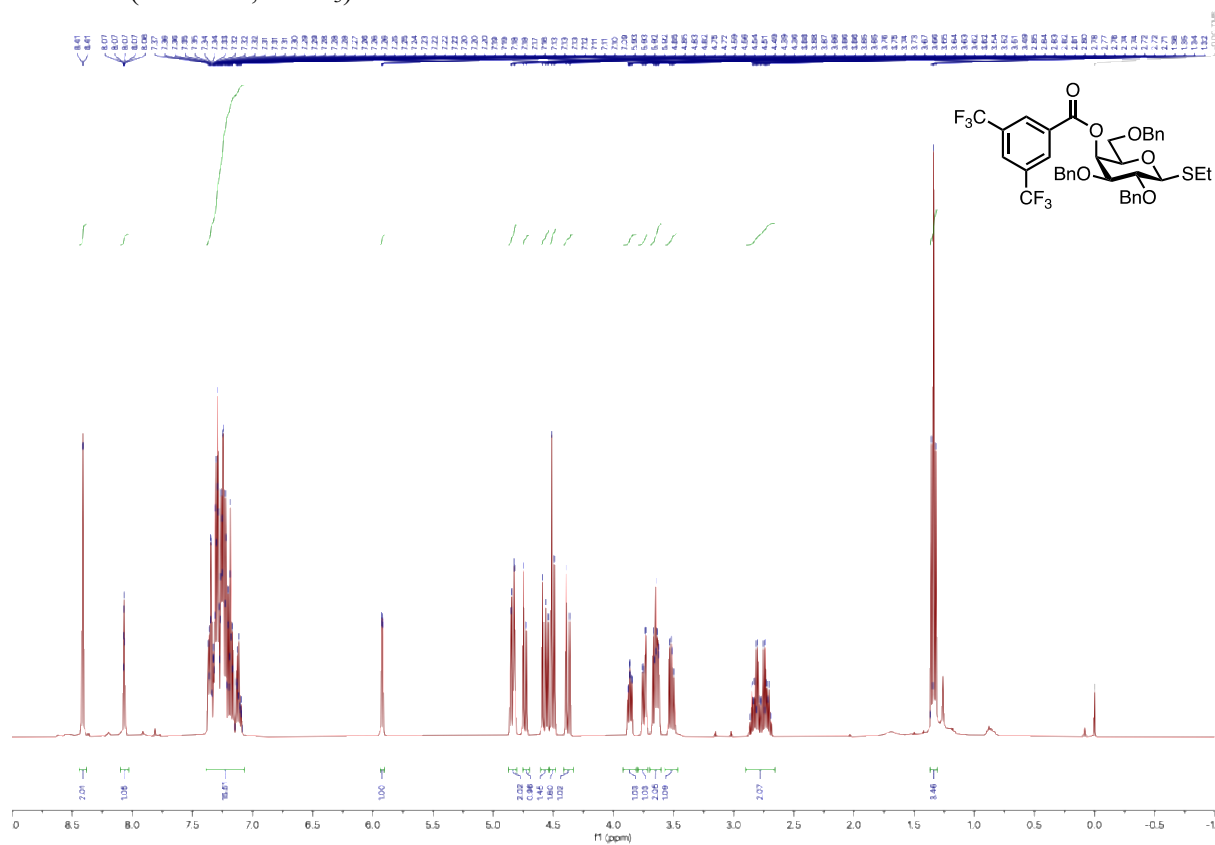
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **10a**



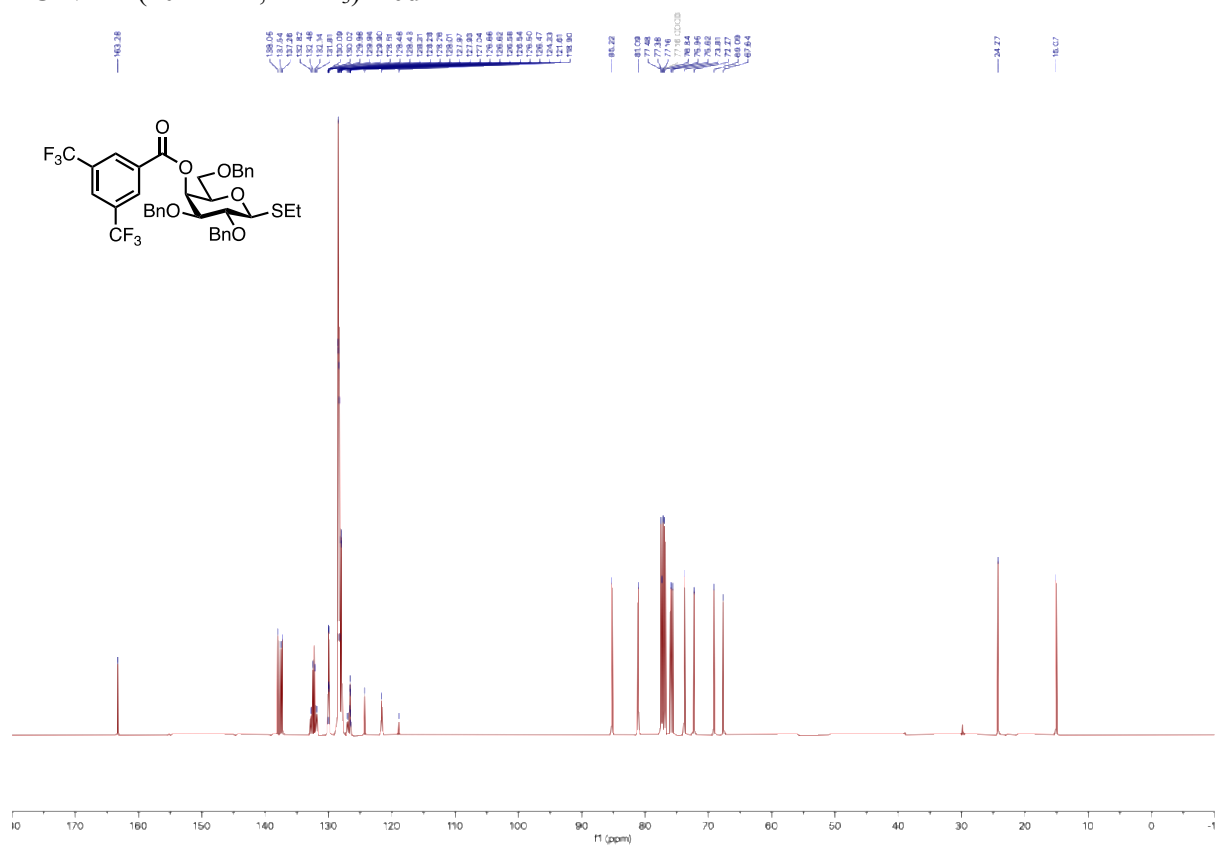
^{19}F NMR (376 MHz, CDCl_3): 10a



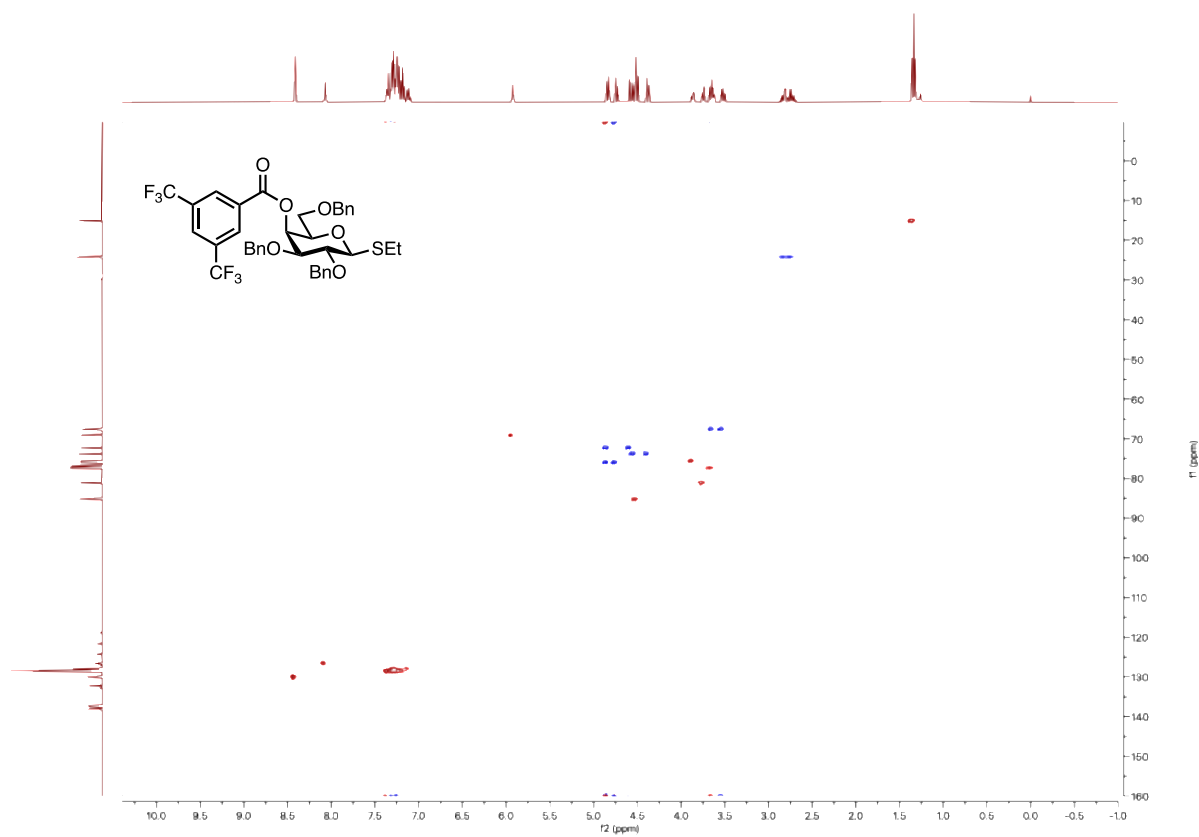
^1H NMR (400 MHz, CDCl_3): 10d



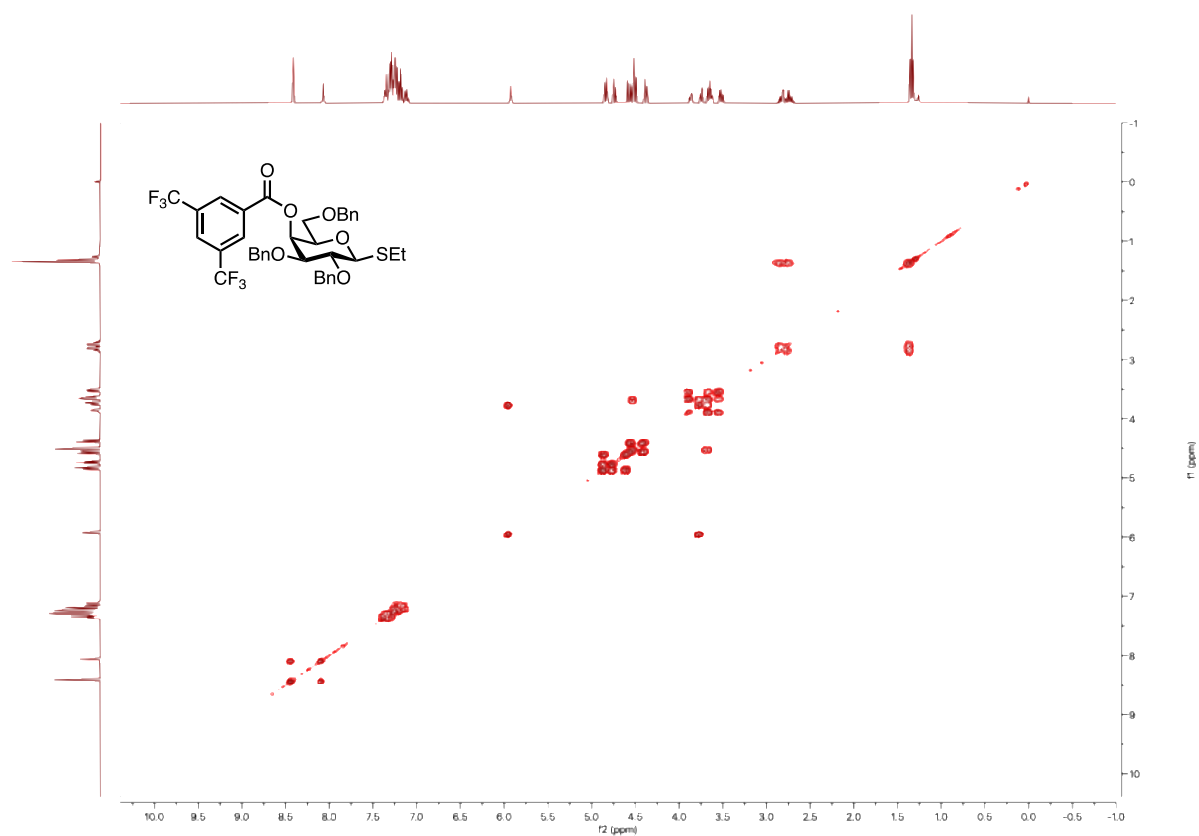
^{13}C NMR (101 MHz, CDCl_3): 10d



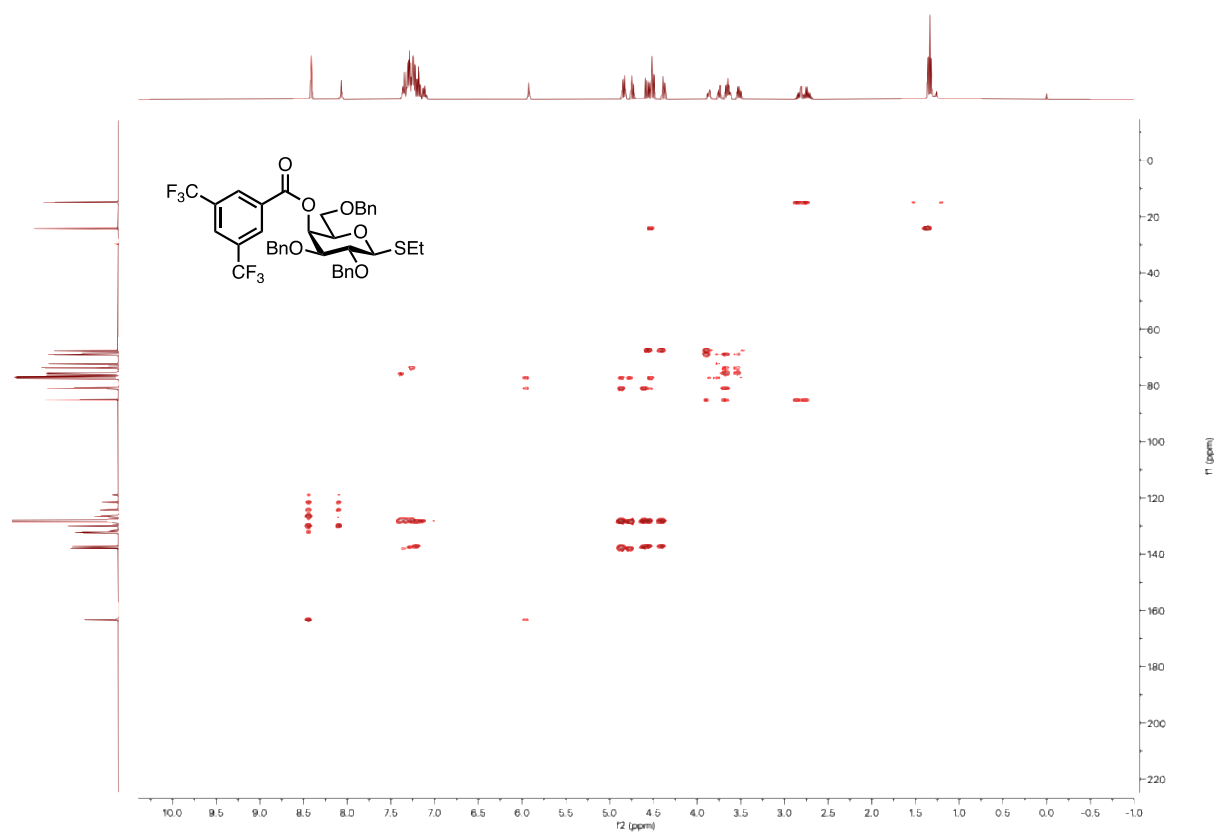
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): 10d



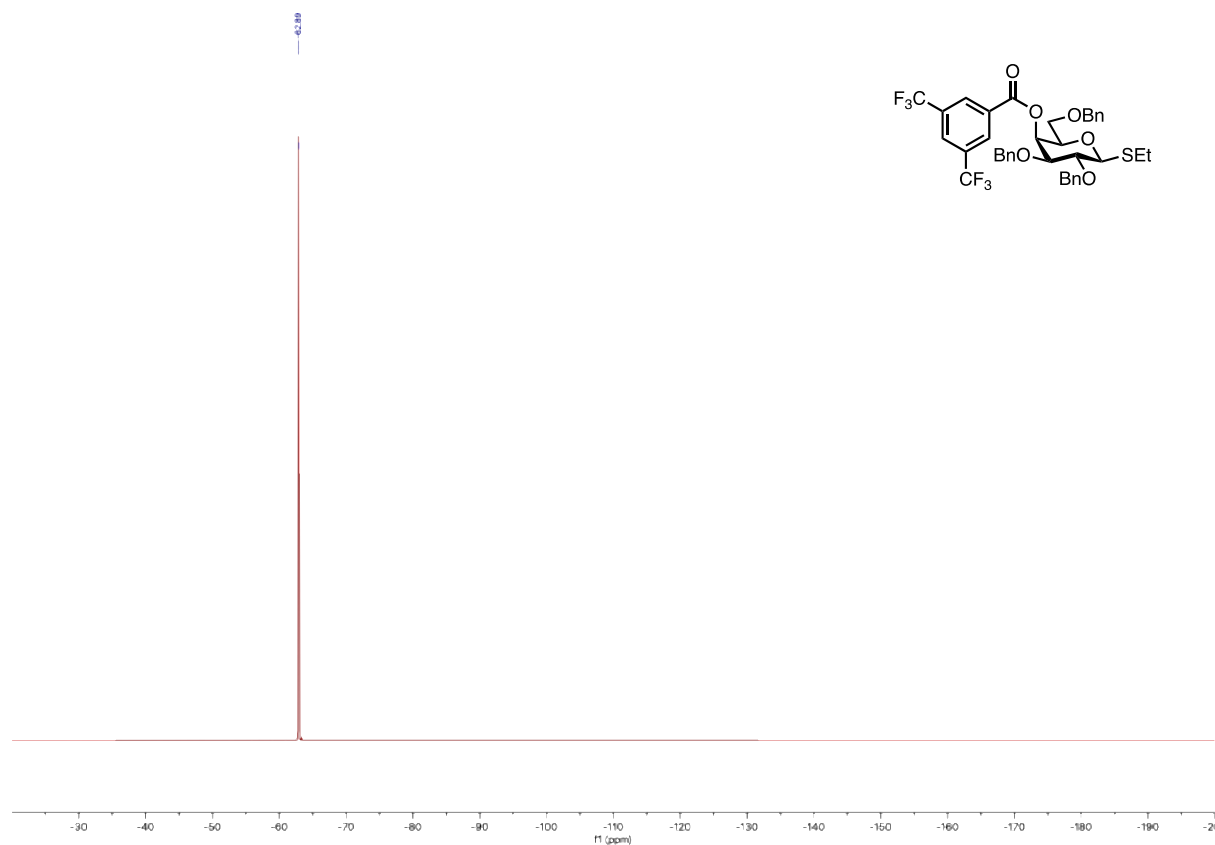
^1H , ^1H COSY (400 MHz, CDCl_3): 10d



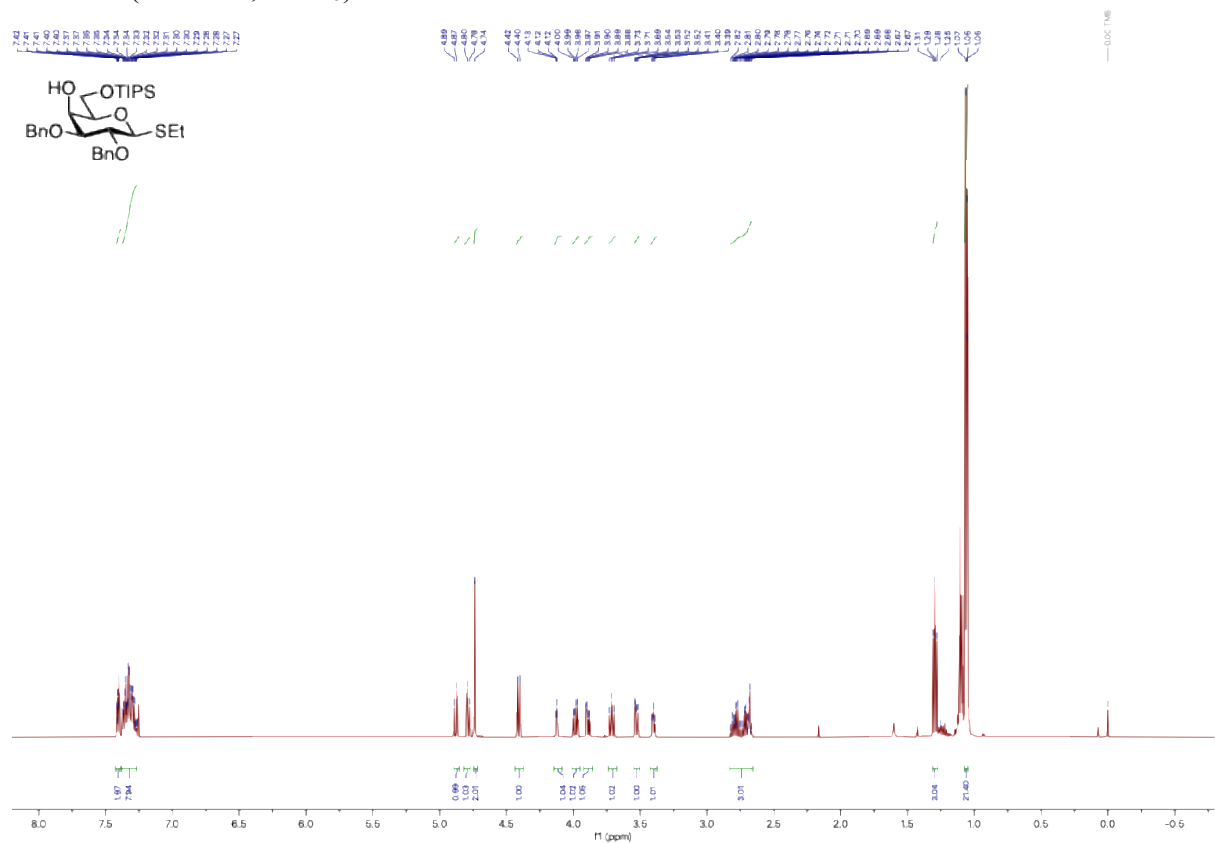
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 10d



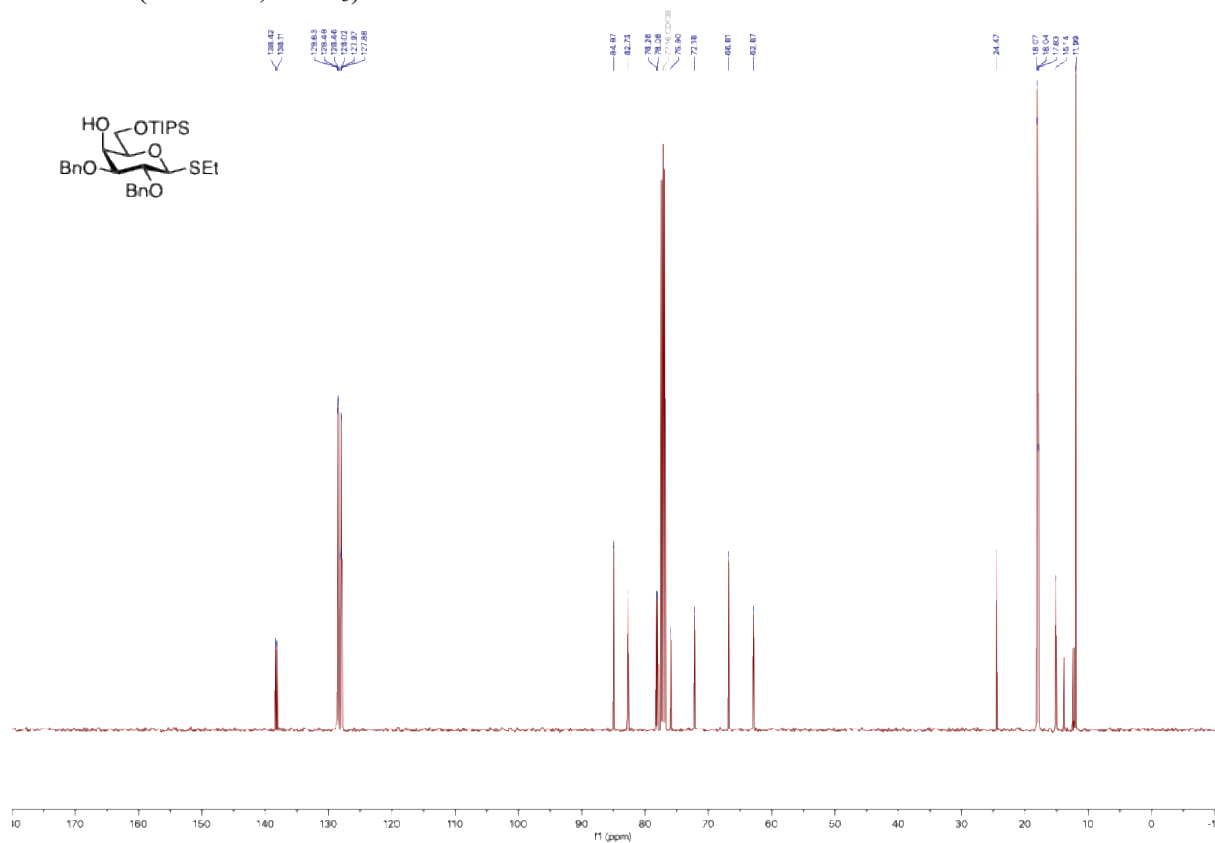
^{19}F NMR (376 MHz, CDCl_3): **10d**



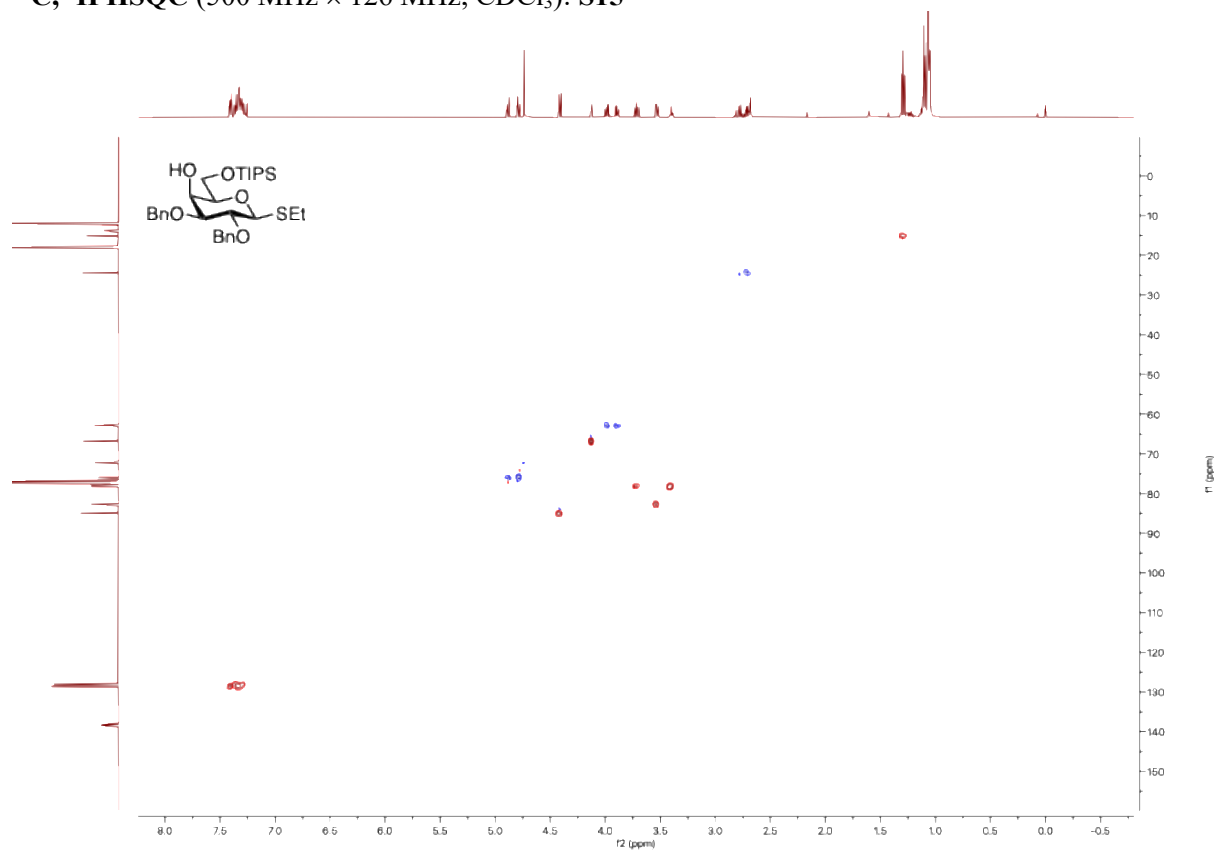
^1H NMR (500 MHz, CDCl_3): **S15**



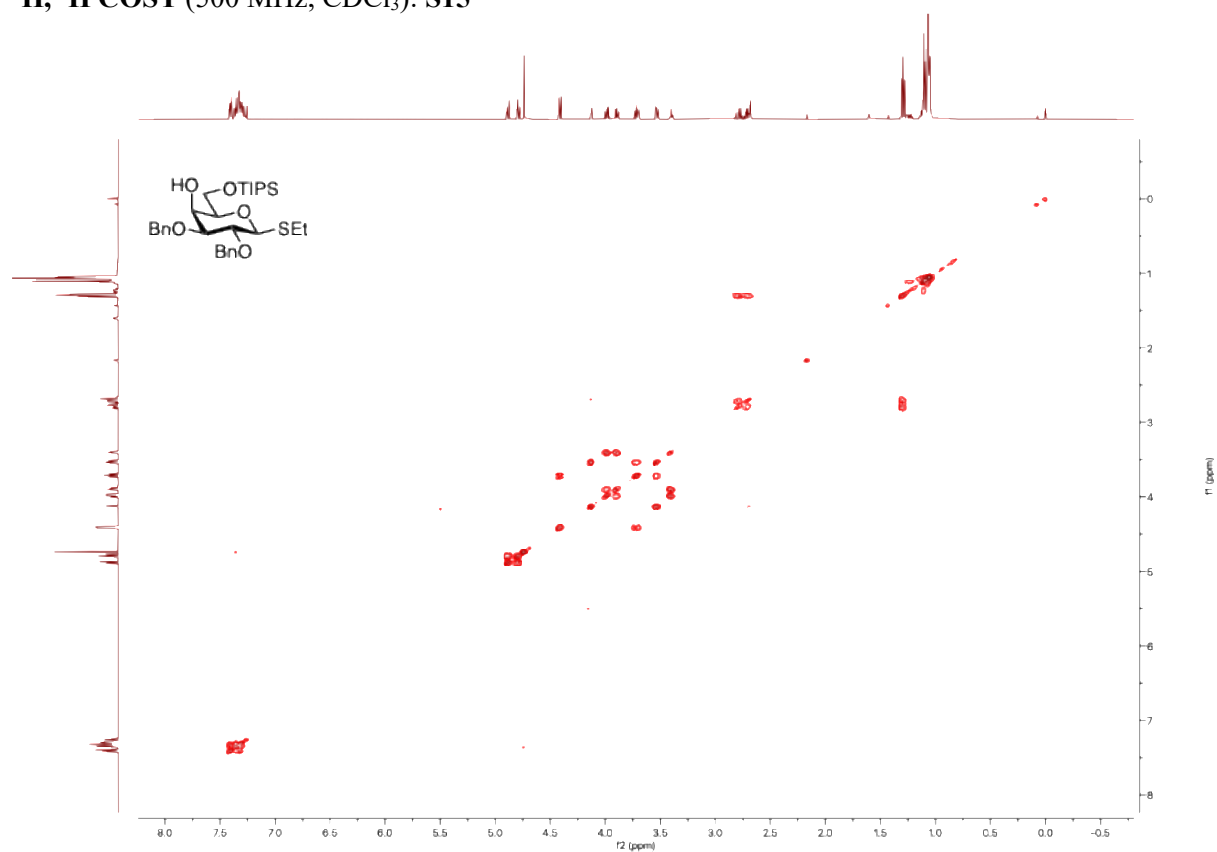
^{13}C NMR (126 MHz, CDCl_3): S15



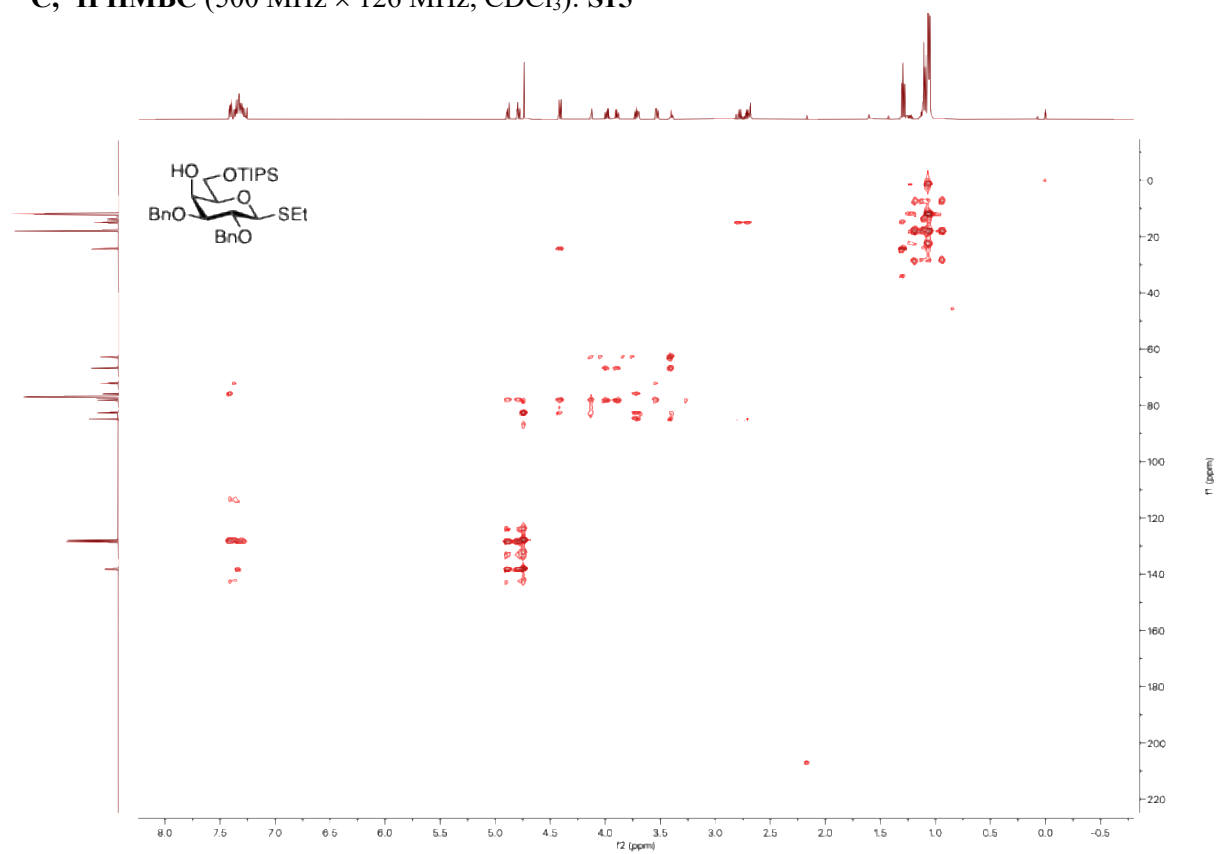
^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): S15



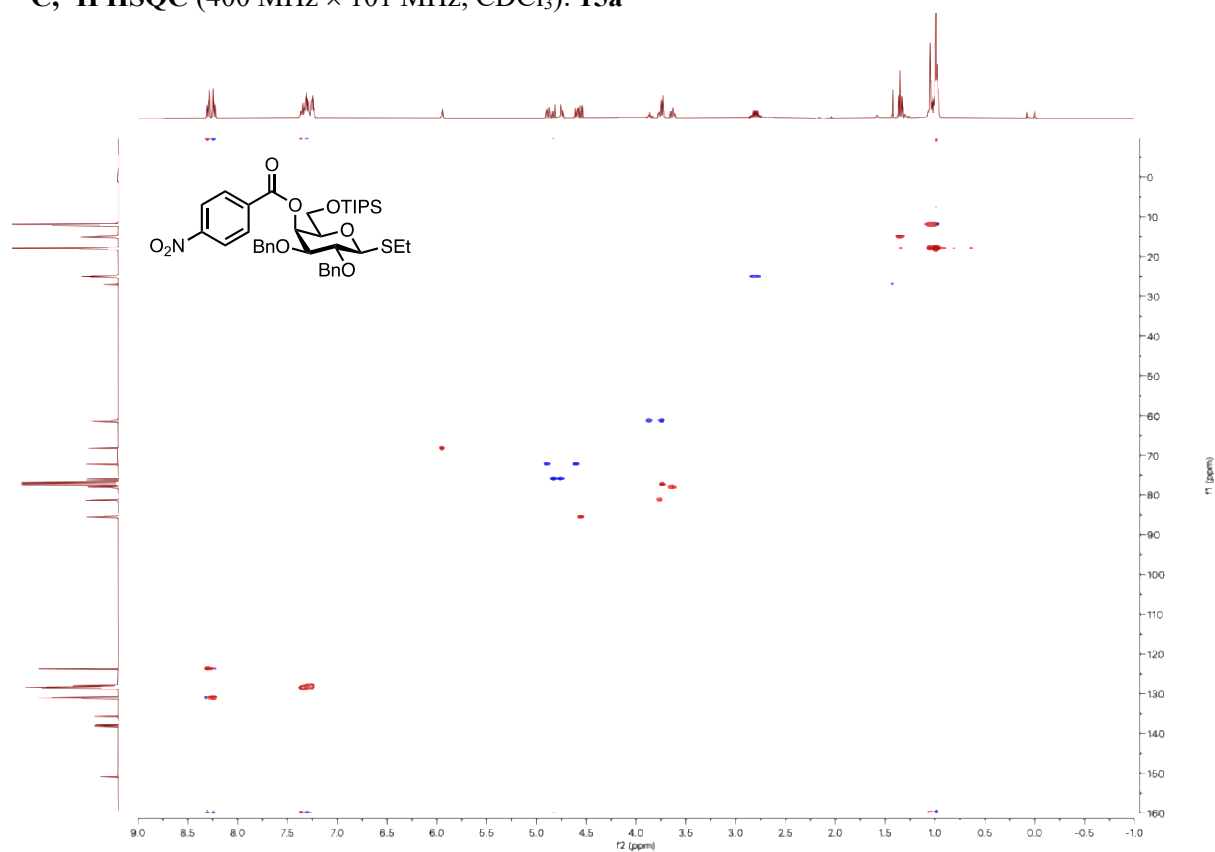
^1H , ^1H COSY (500 MHz, CDCl_3): S15



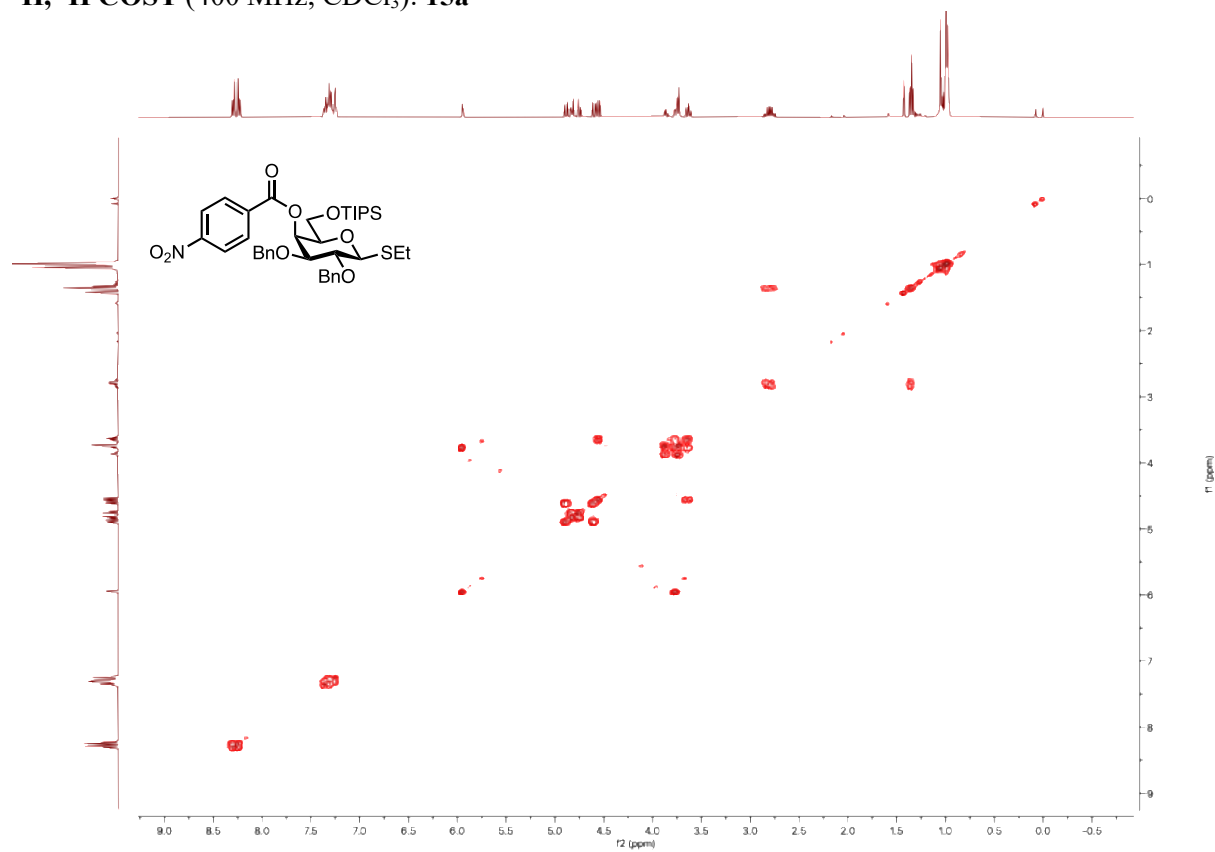
^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): S15



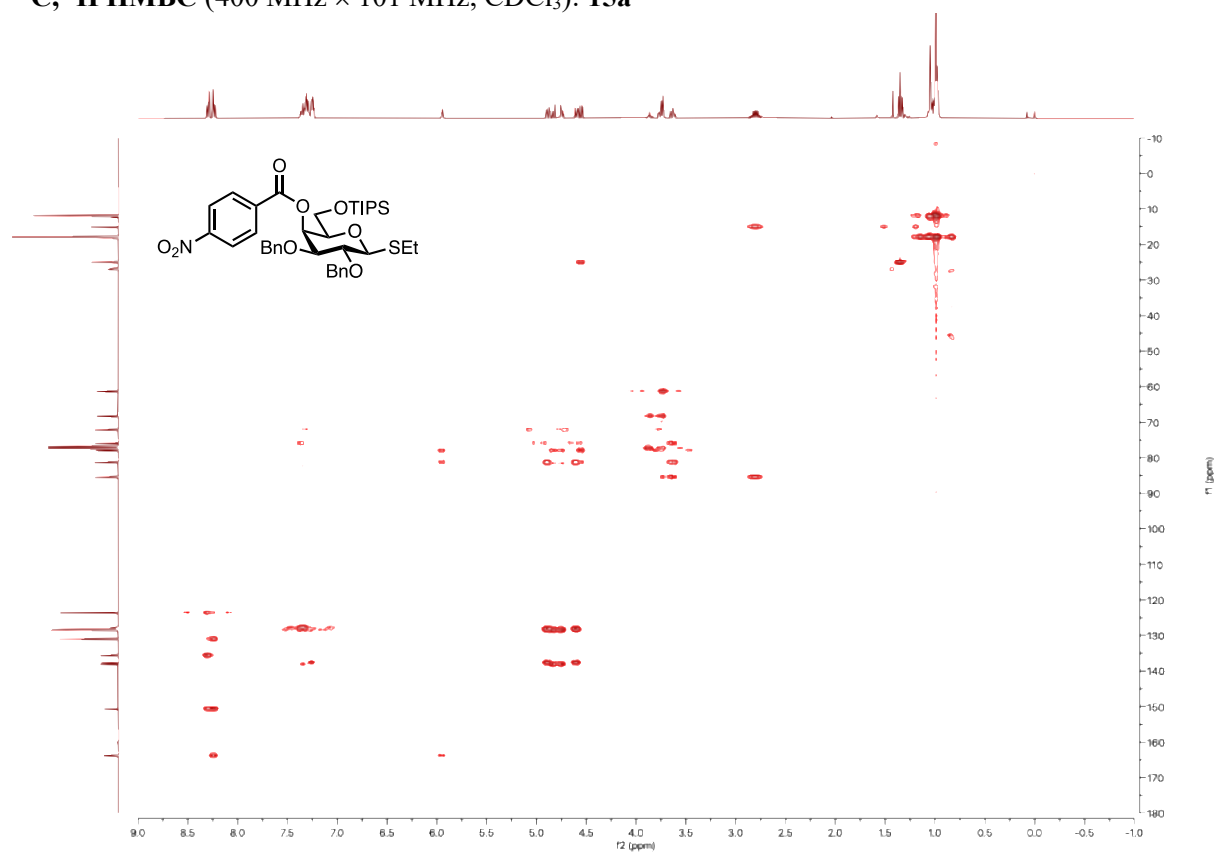
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **15a**



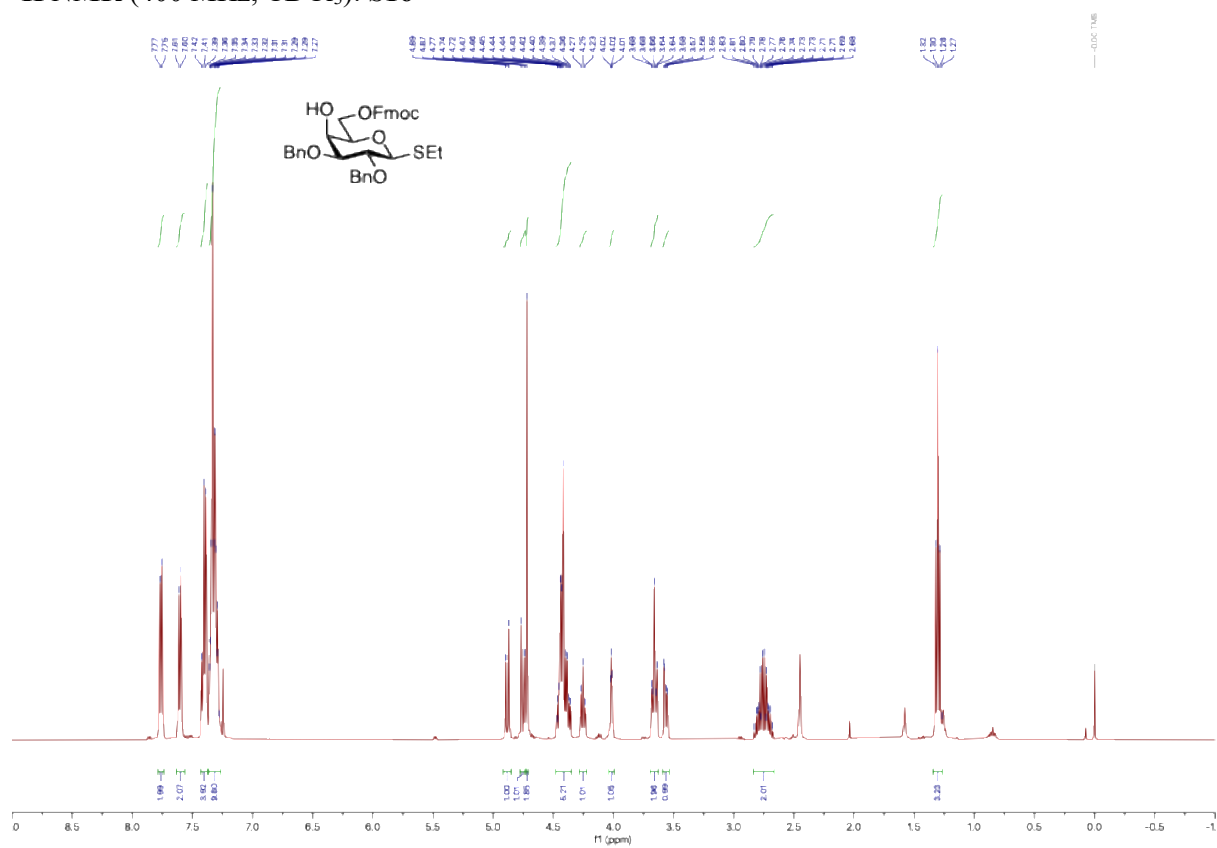
^1H , ^1H COSY (400 MHz, CDCl_3): **15a**



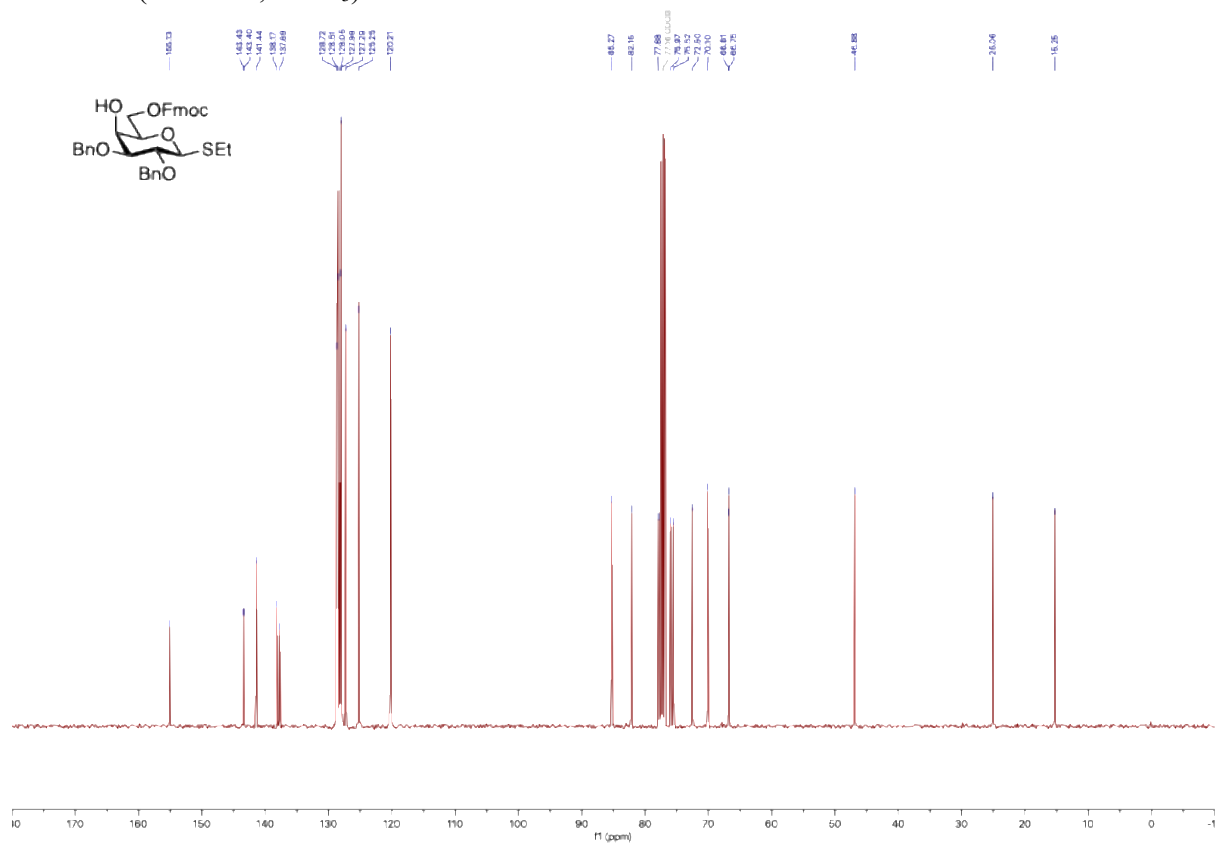
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **15a**



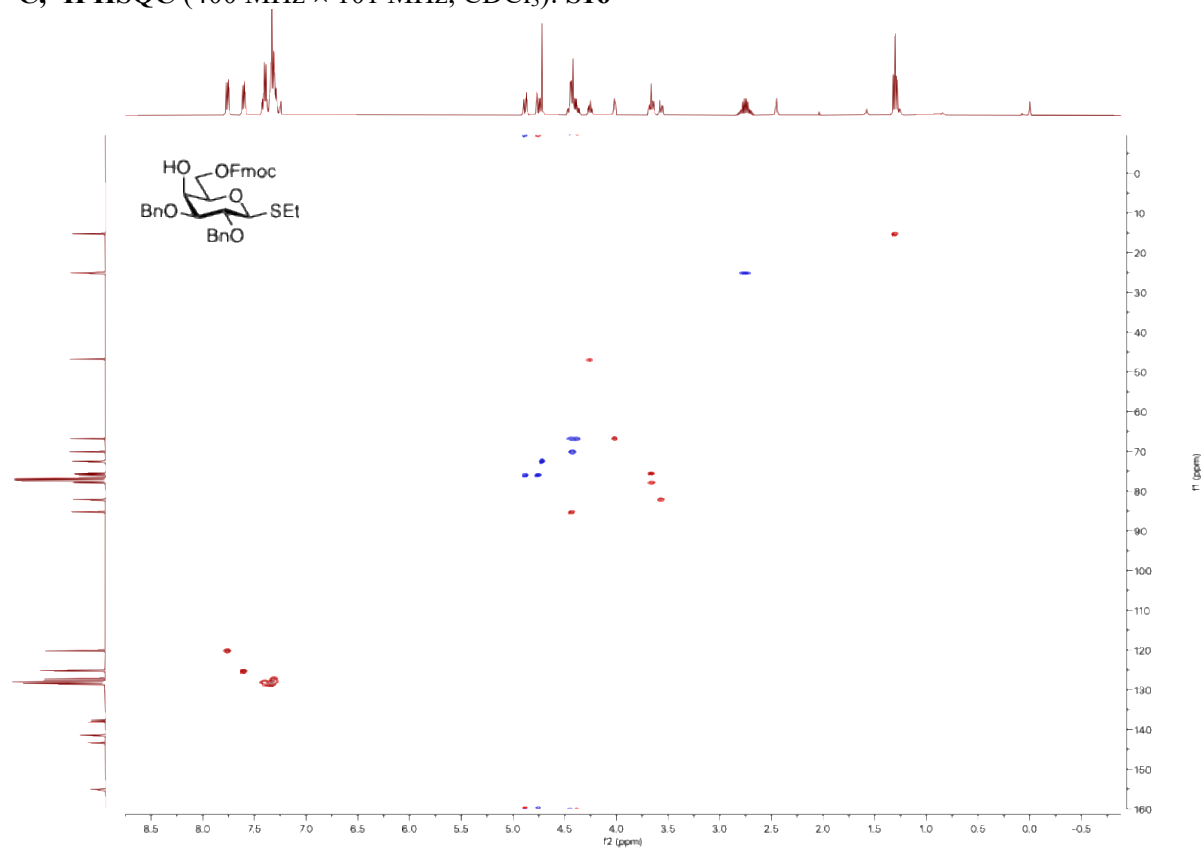
^1H NMR (400 MHz, CDCl_3): **S16**



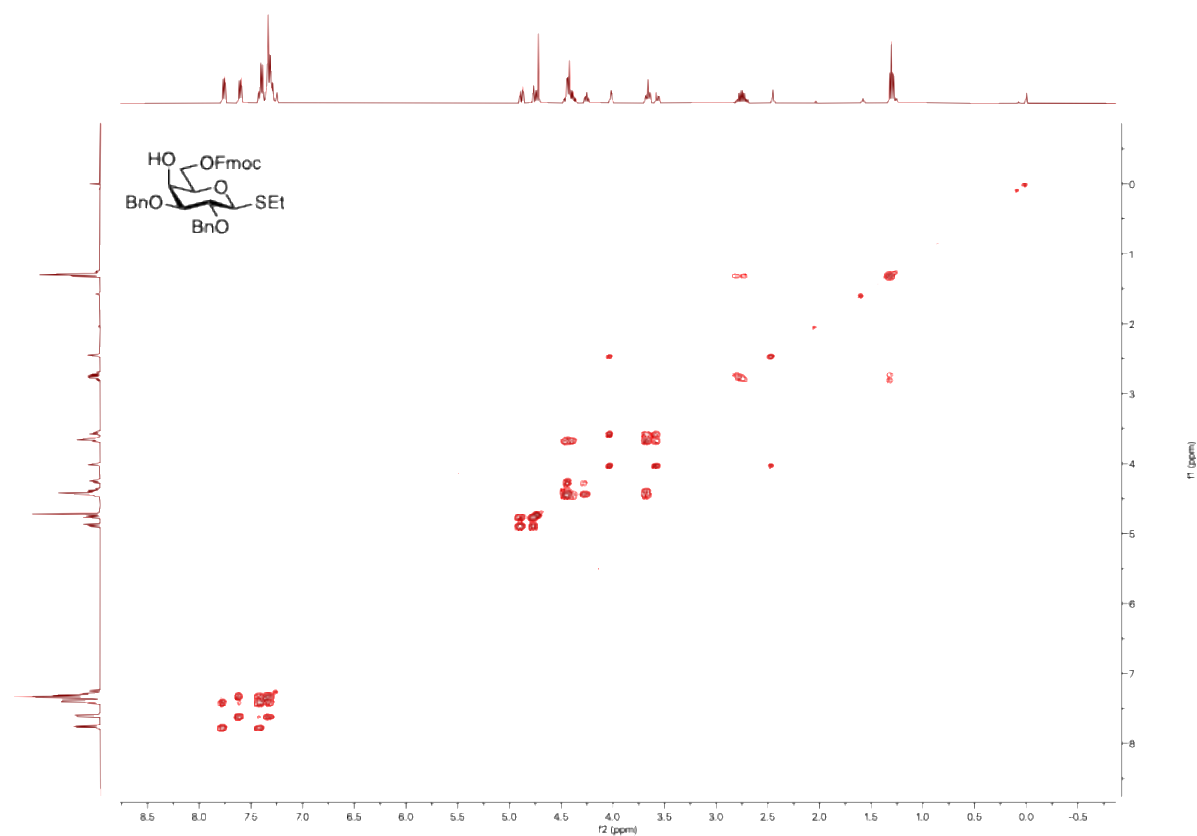
^{13}C NMR (101 MHz, CDCl_3): S16



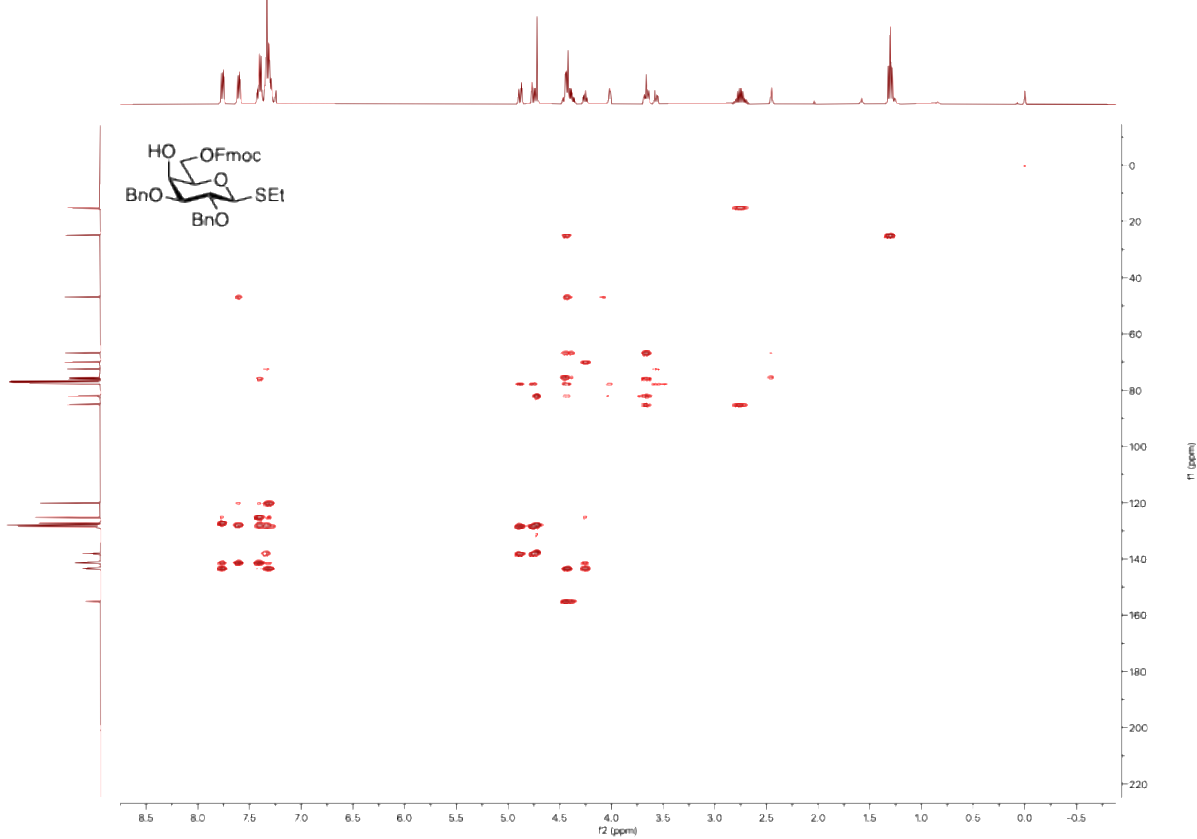
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): S16



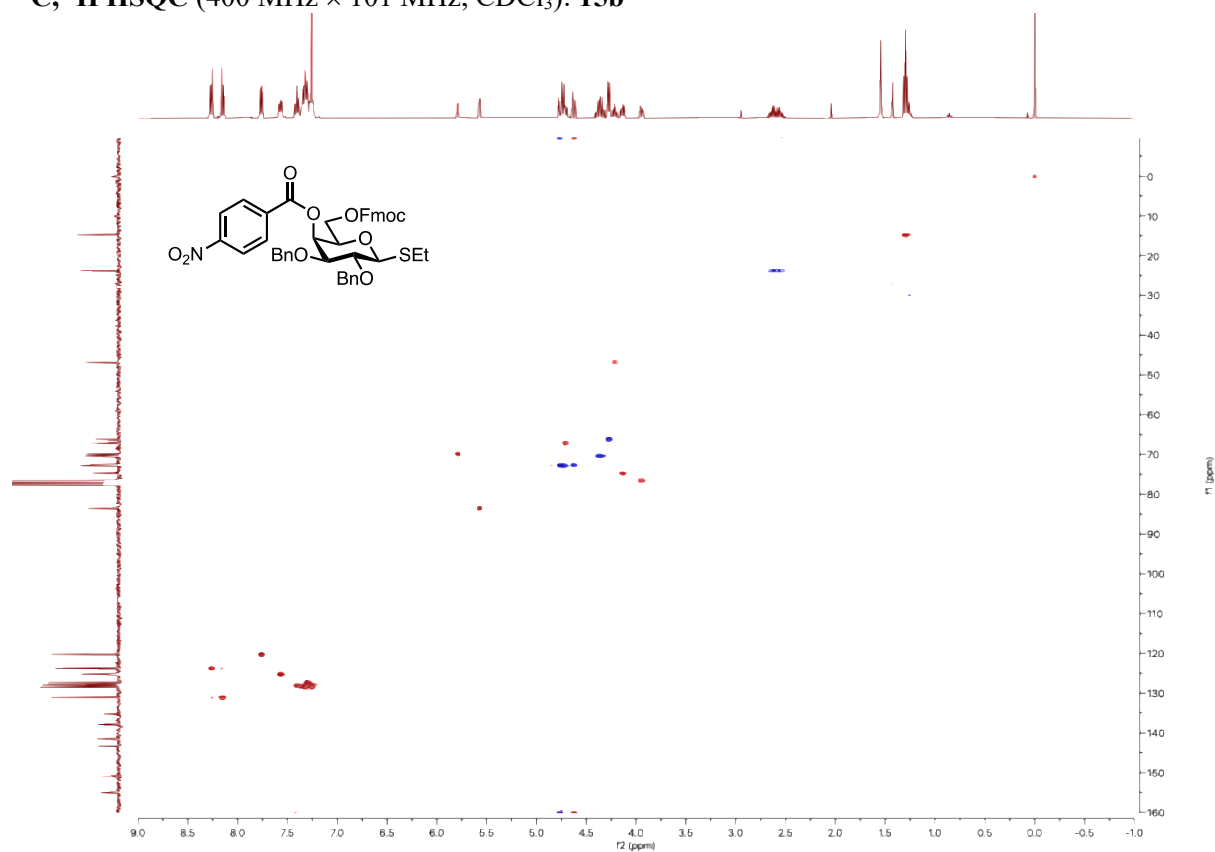
^1H , ^1H COSY (400 MHz, CDCl_3): S16



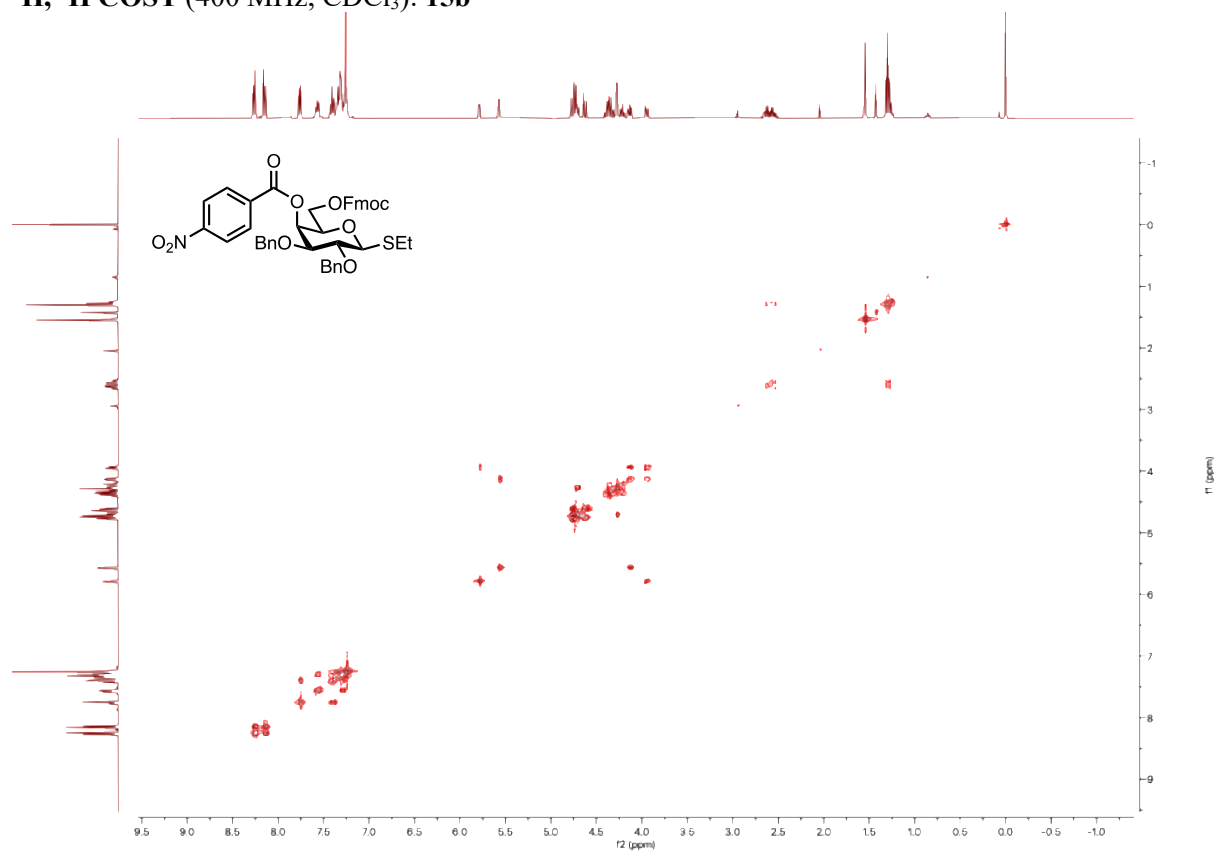
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): S16



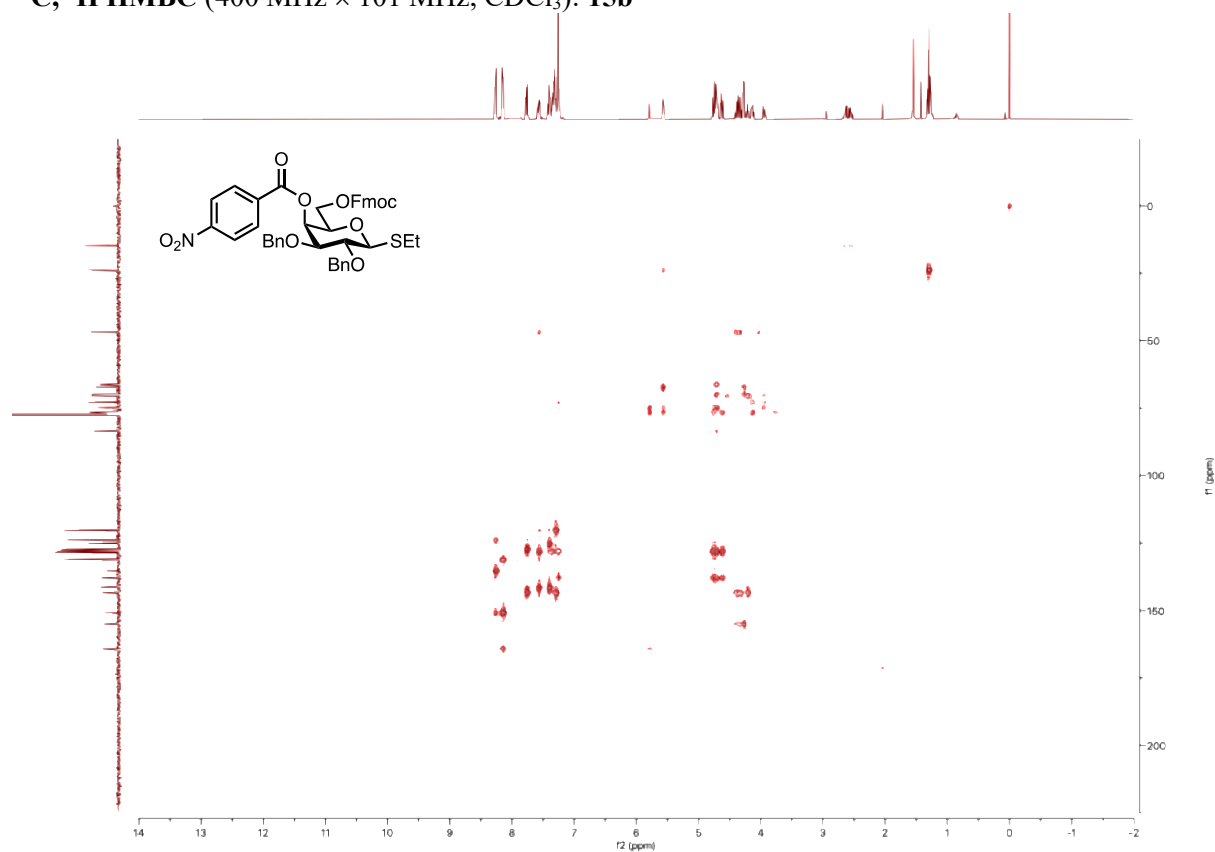
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **15b**



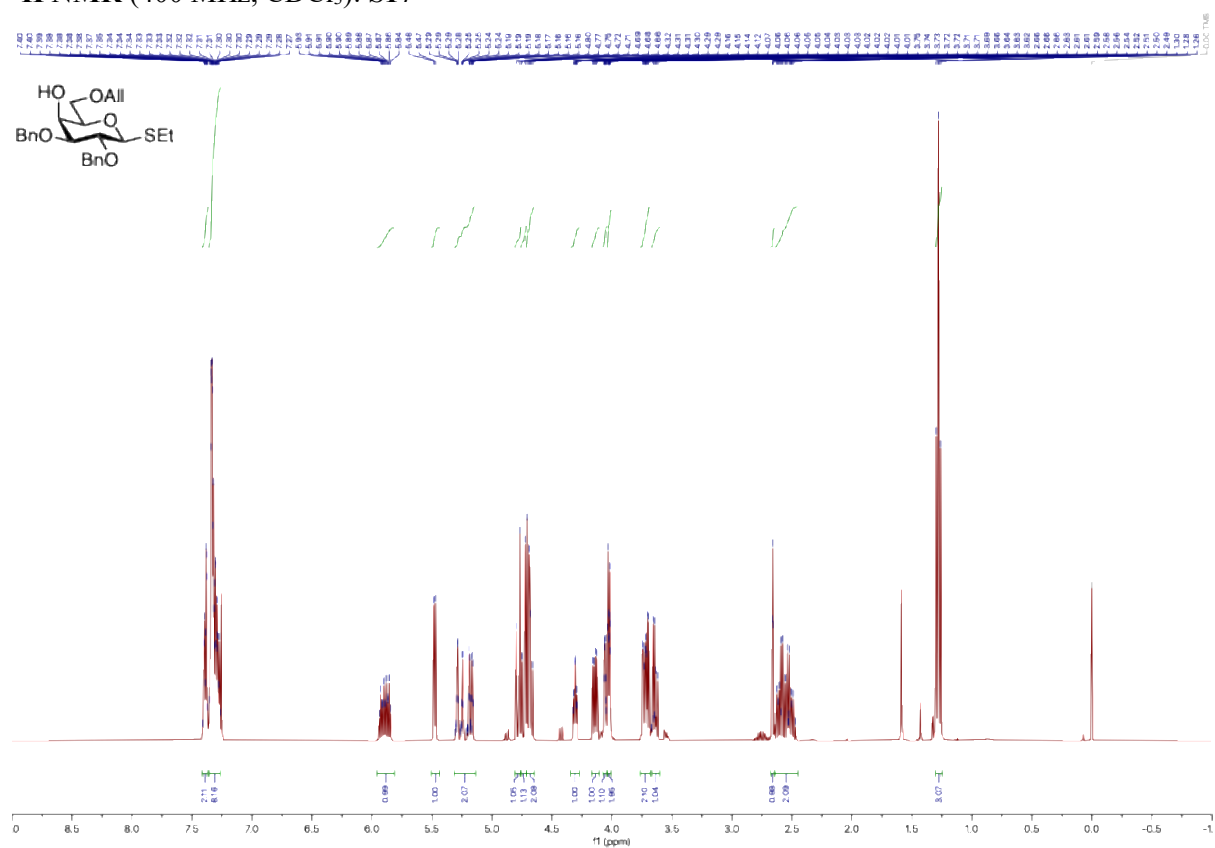
^1H , ^1H COSY (400 MHz, CDCl_3): **15b**



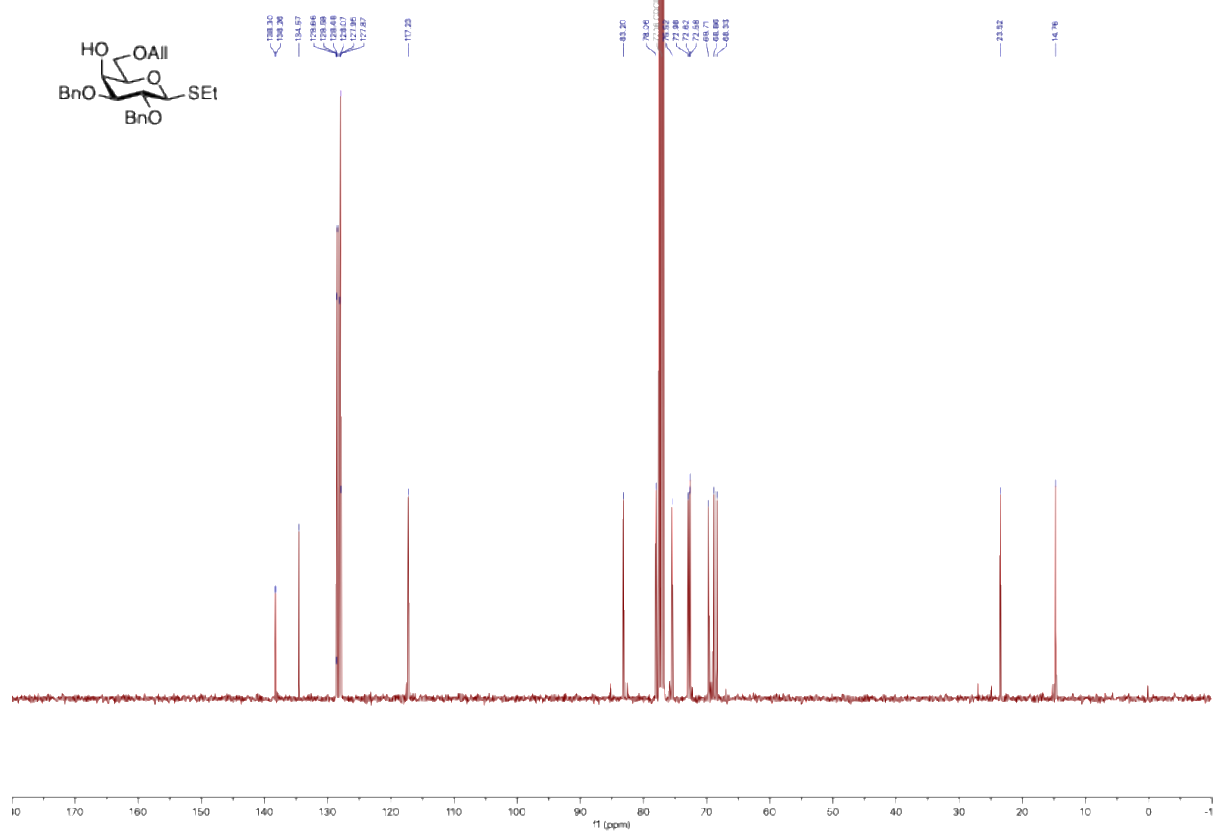
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **15b**



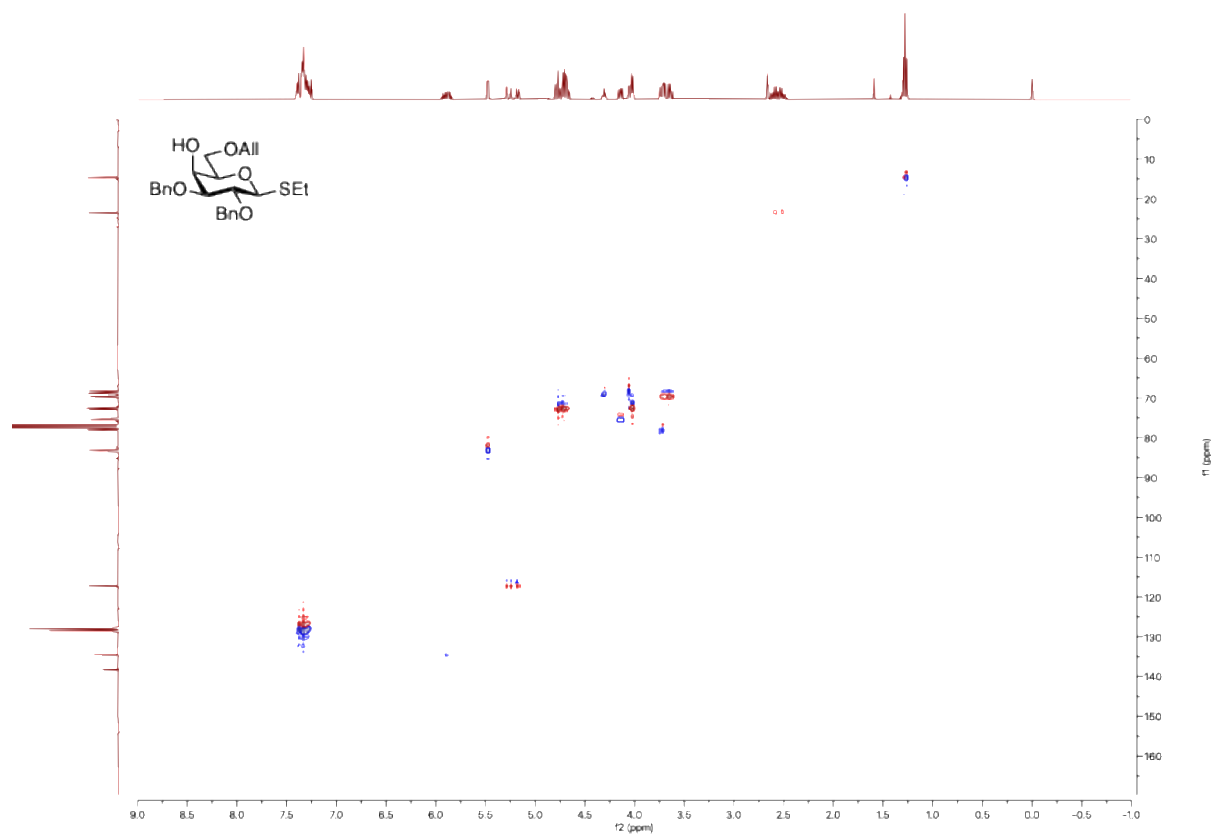
^1H NMR (400 MHz, CDCl_3): **S17**



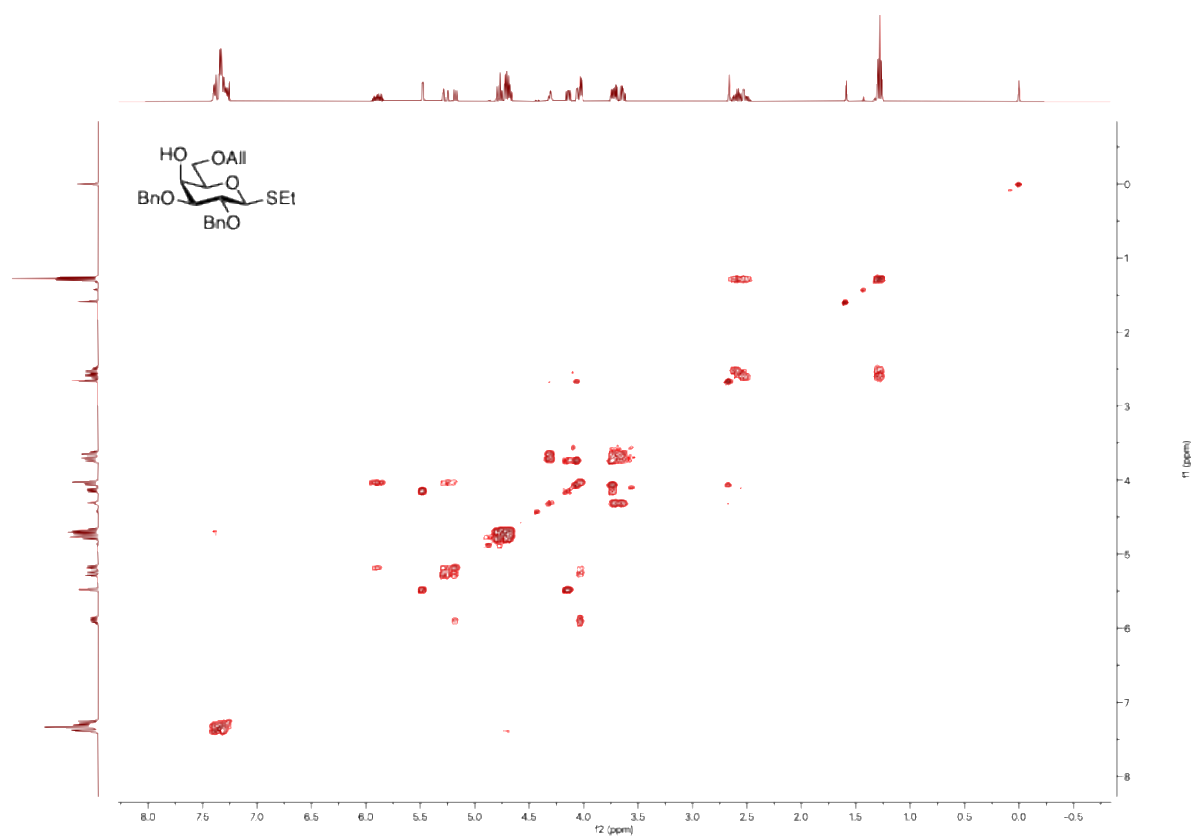
^{13}C NMR (101 MHz, CDCl_3): S17



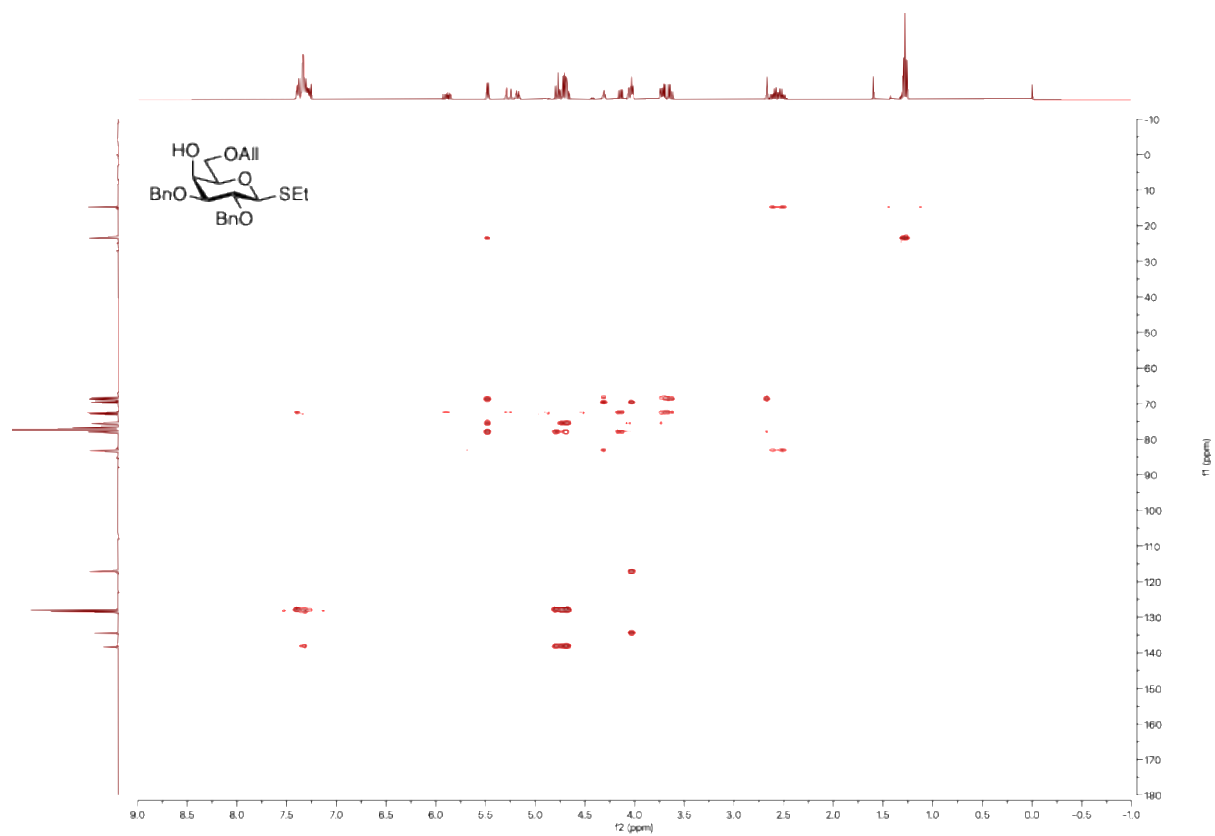
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): S17



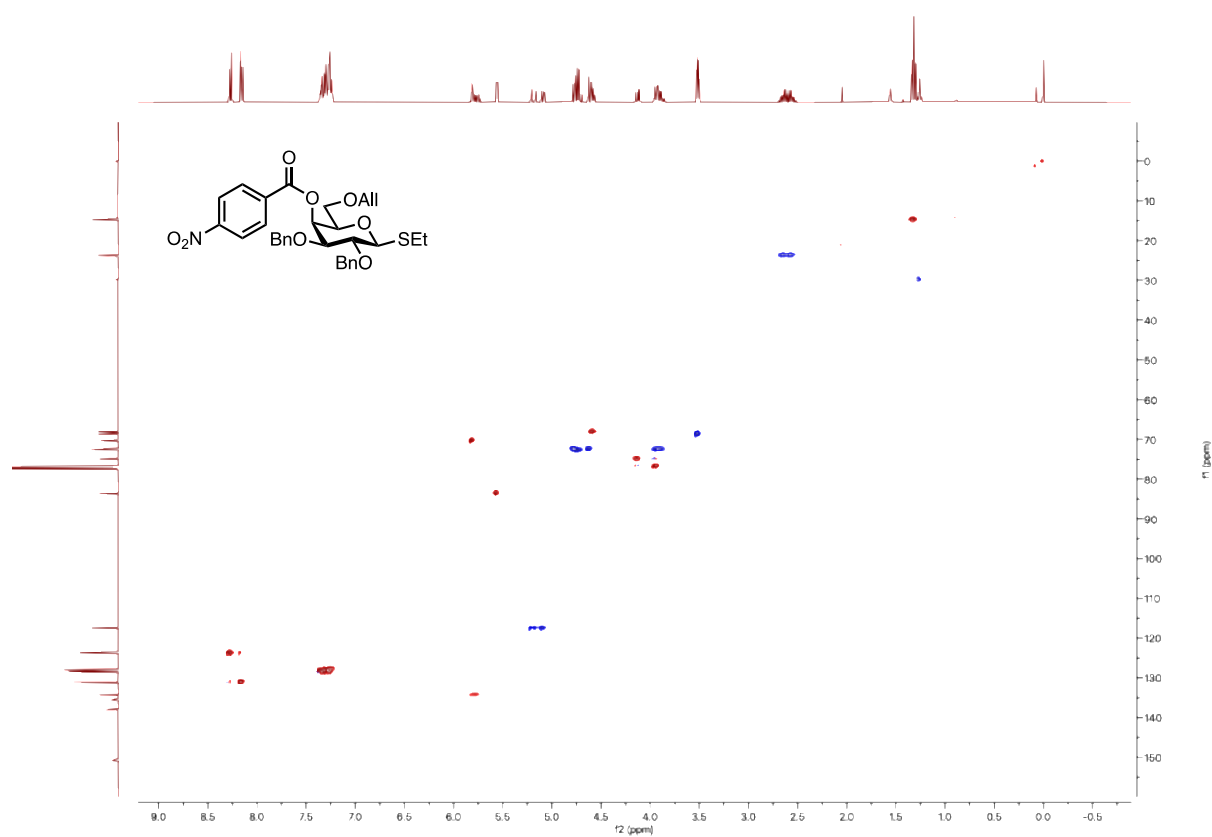
^1H , ^1H COSY (400 MHz, CDCl_3): S17



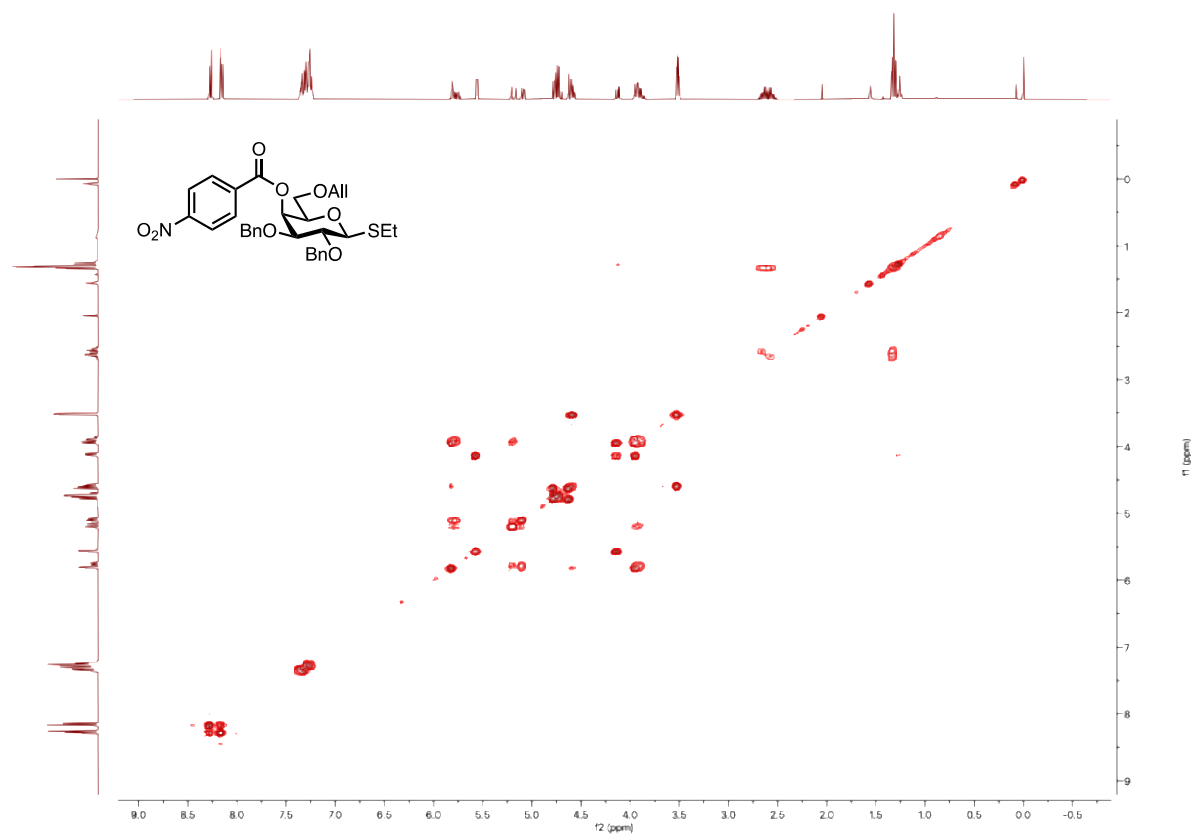
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): S17



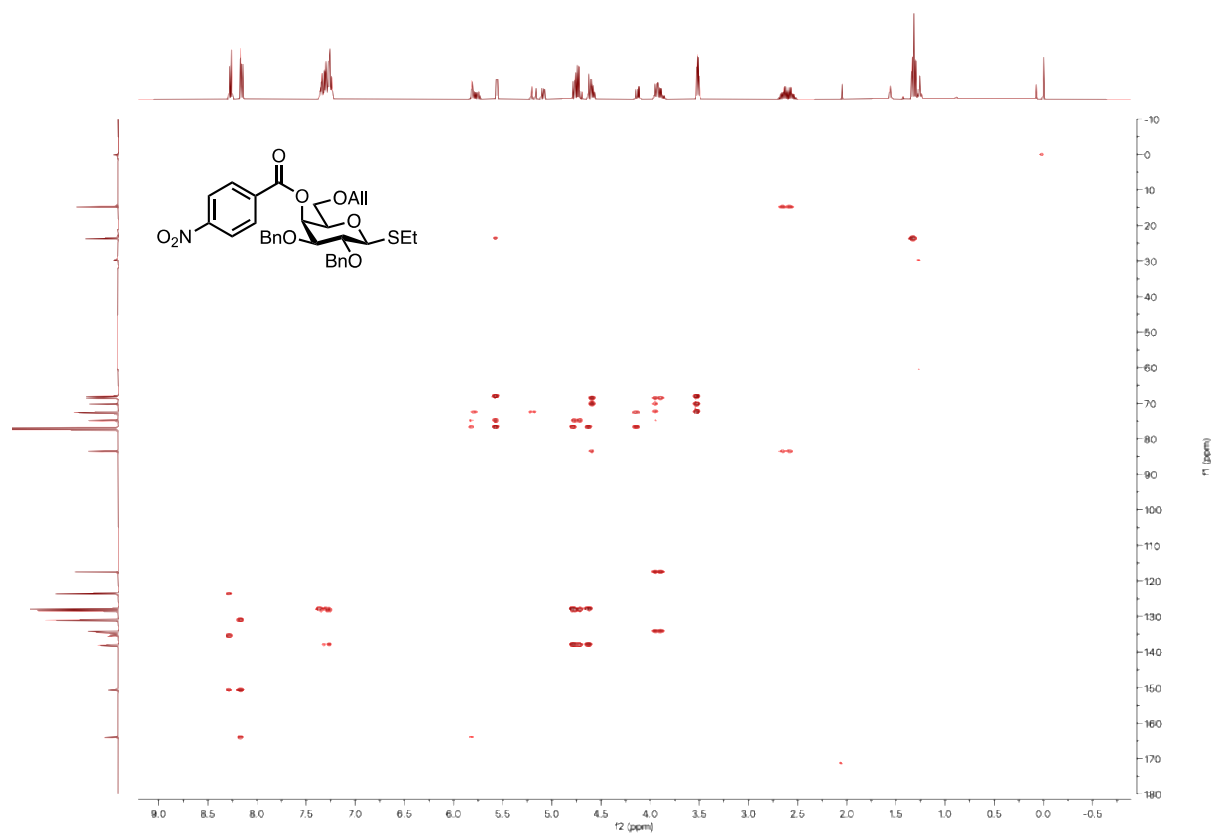
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **15c**



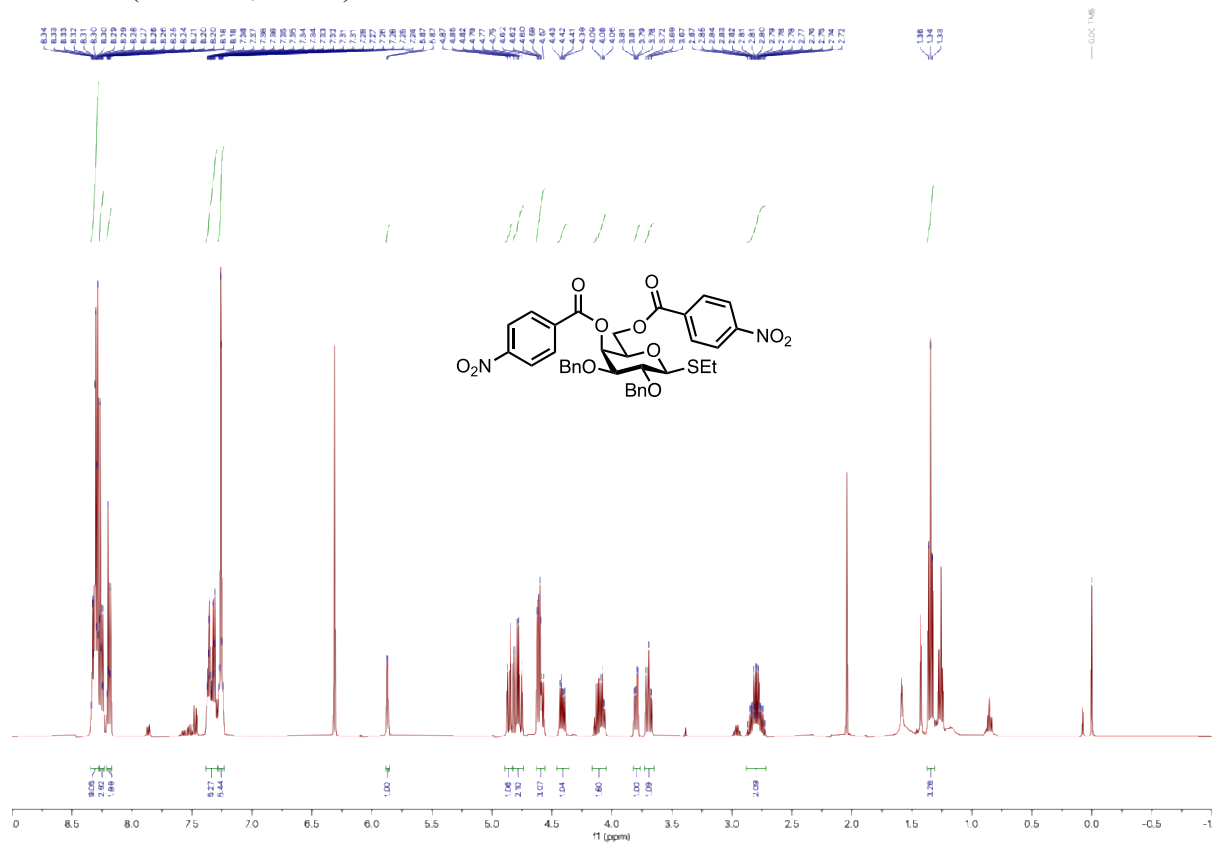
^1H , ^1H COSY (400 MHz, CDCl_3): **15c**



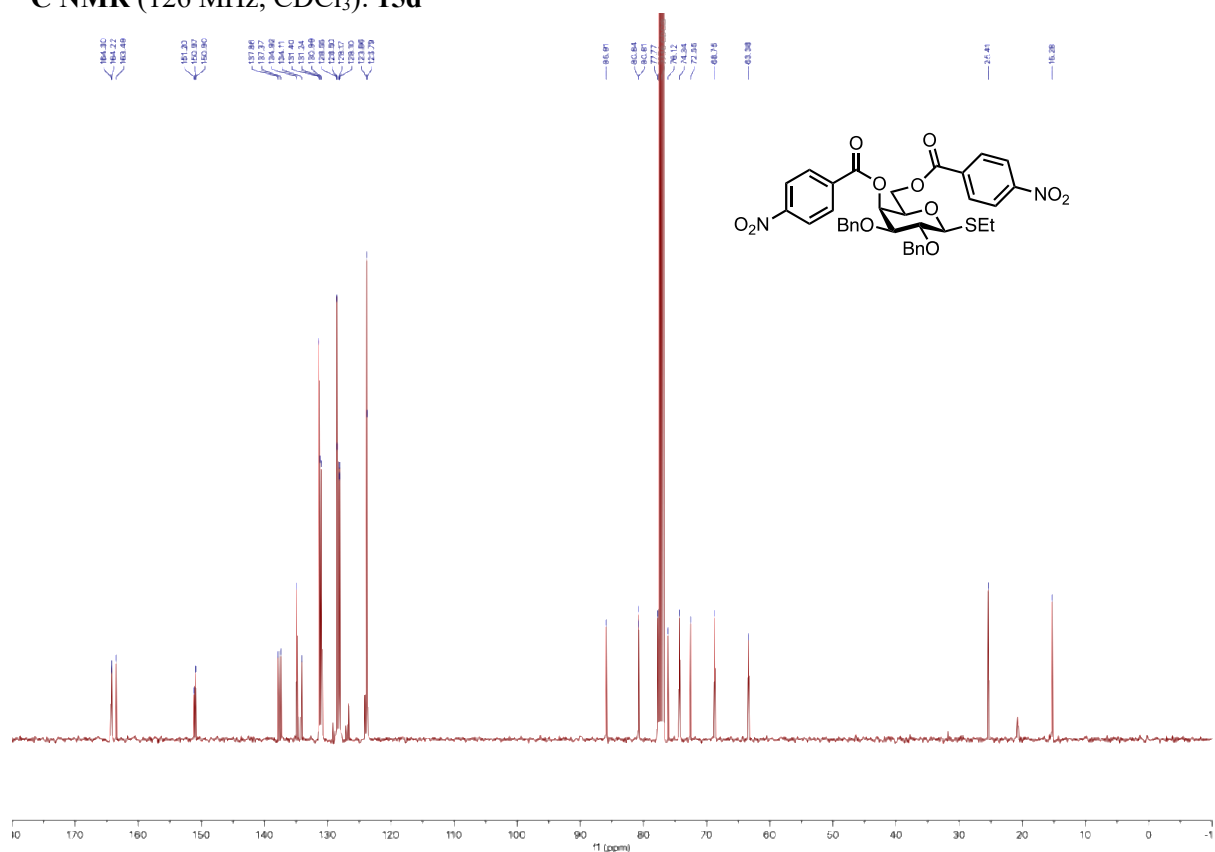
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **15c**



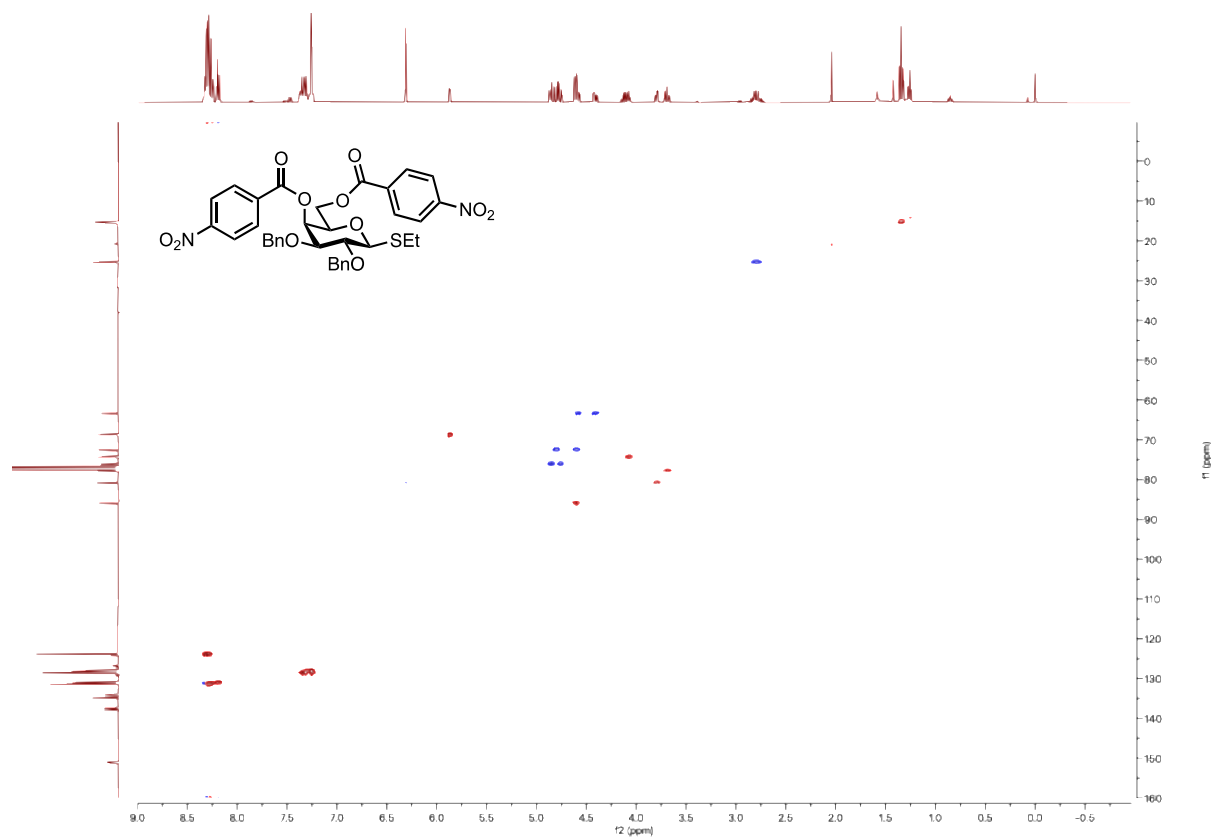
^1H NMR (500 MHz, CDCl_3): **15d**



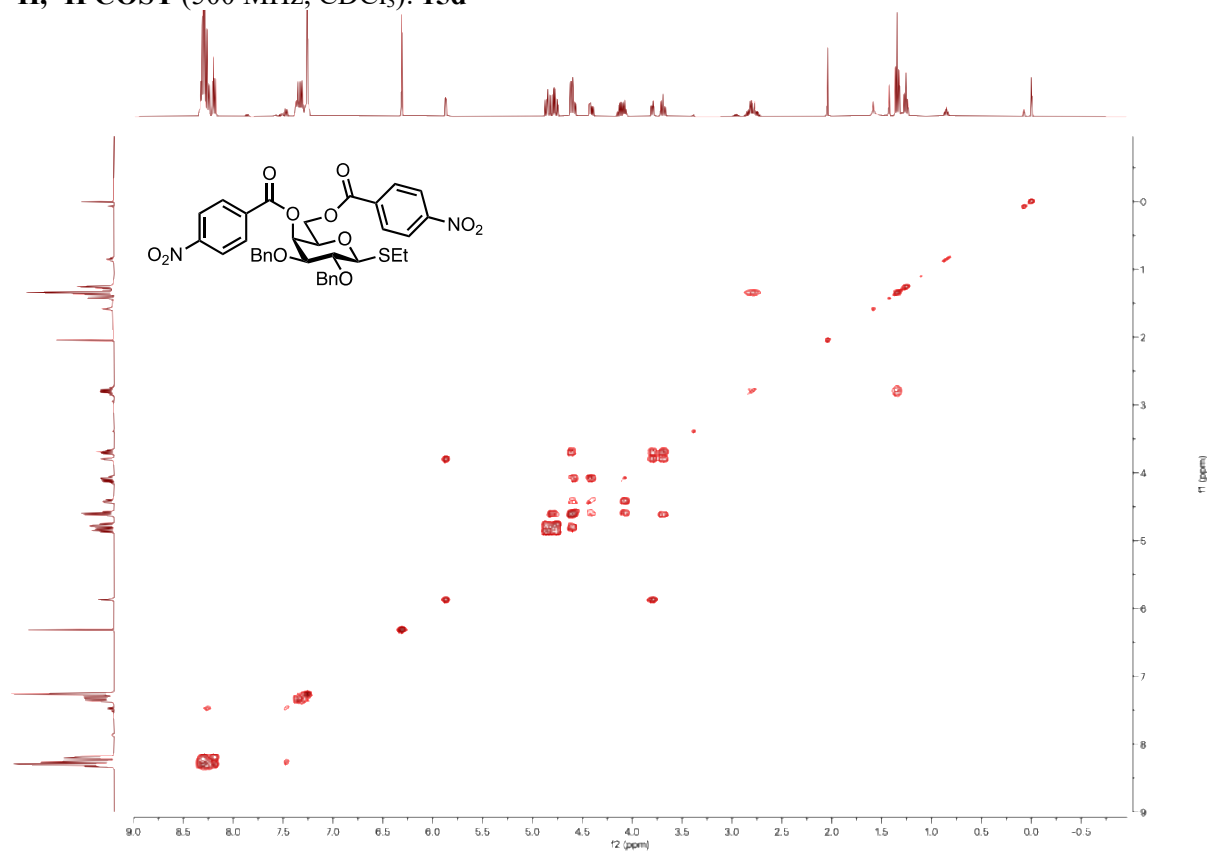
^{13}C NMR (126 MHz, CDCl_3): 15d



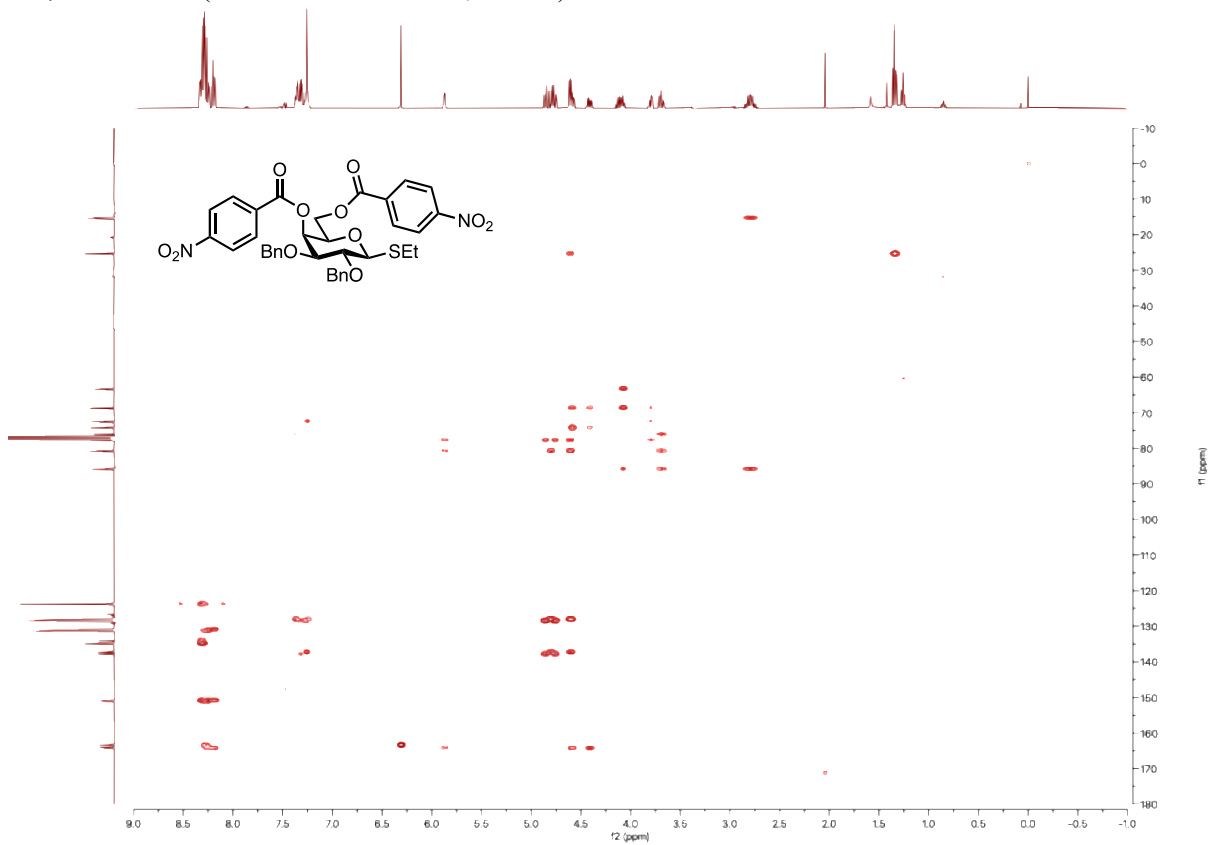
^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): 15d



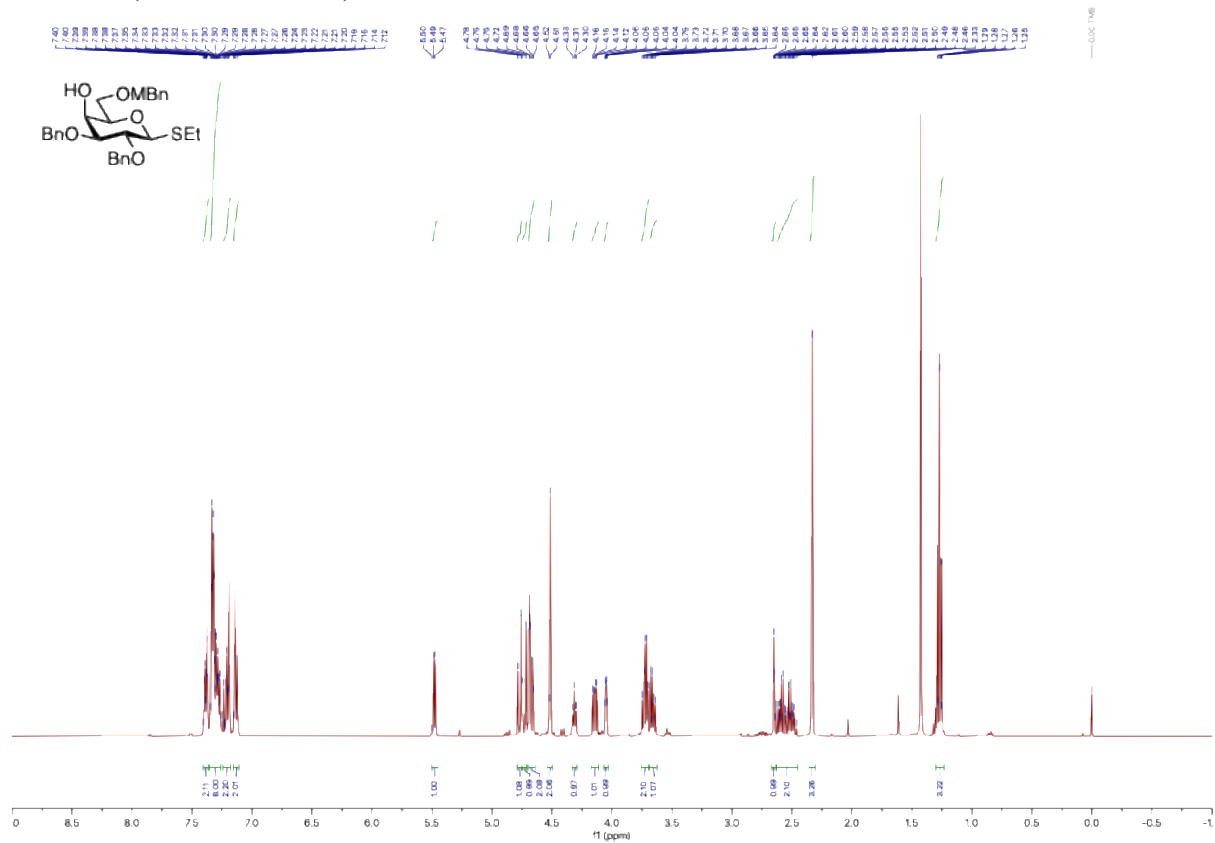
^1H , ^1H COSY (500 MHz, CDCl_3): 15d



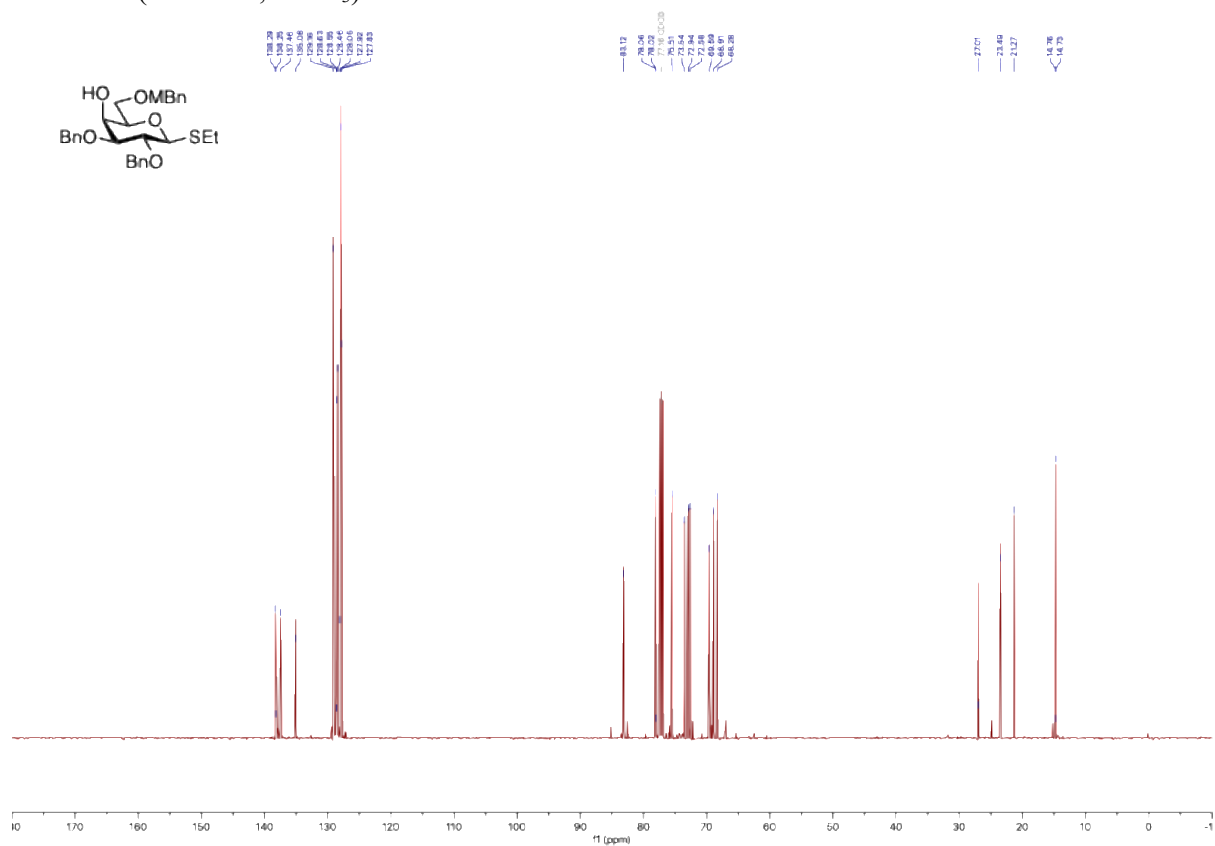
^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): 15d



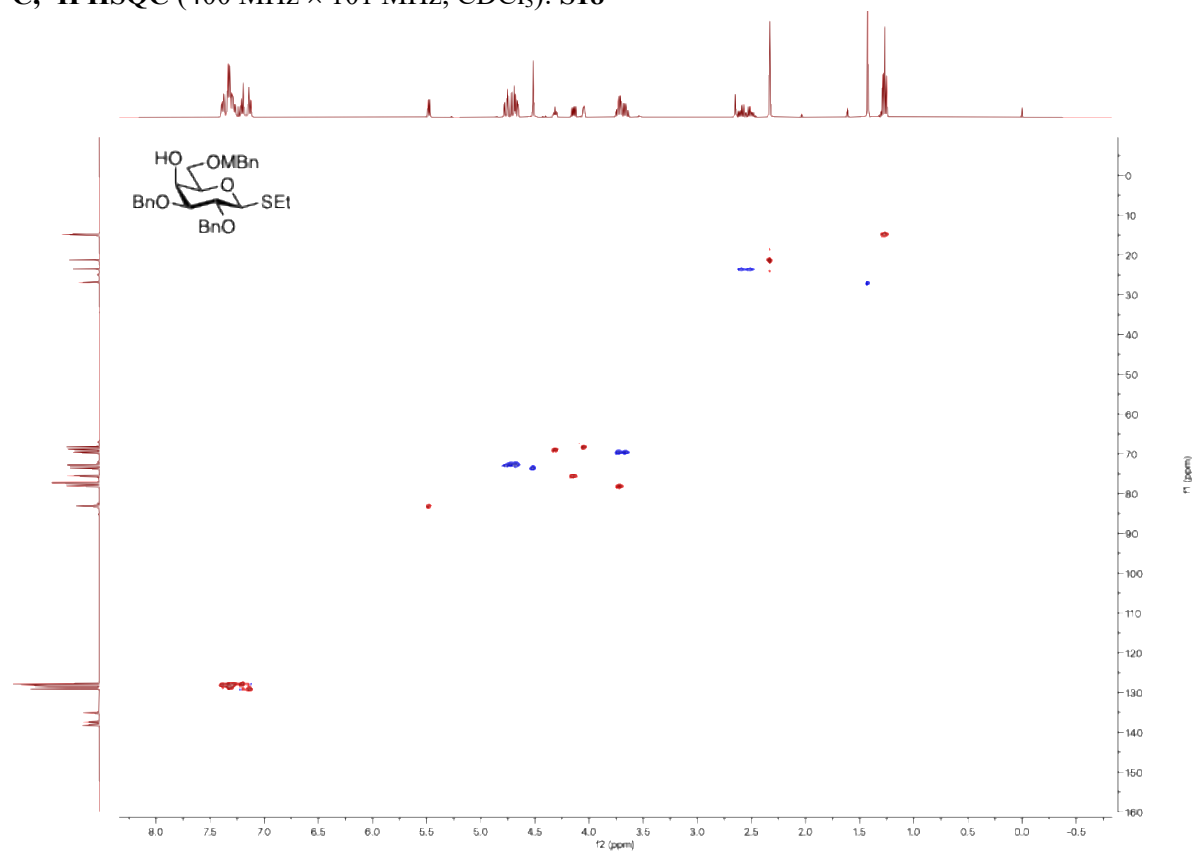
¹H NMR (400 MHz, CDCl₃): S18



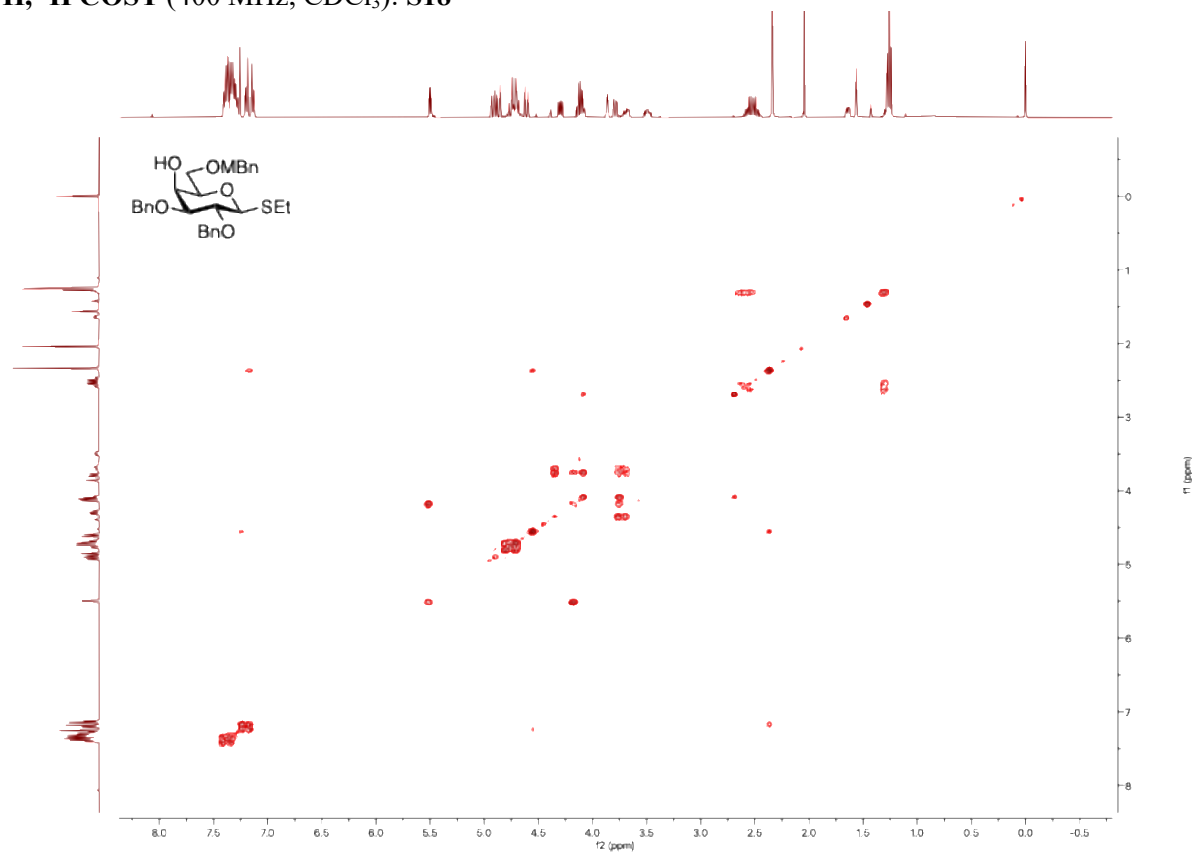
¹³C NMR (101 MHz, CDCl₃): S18



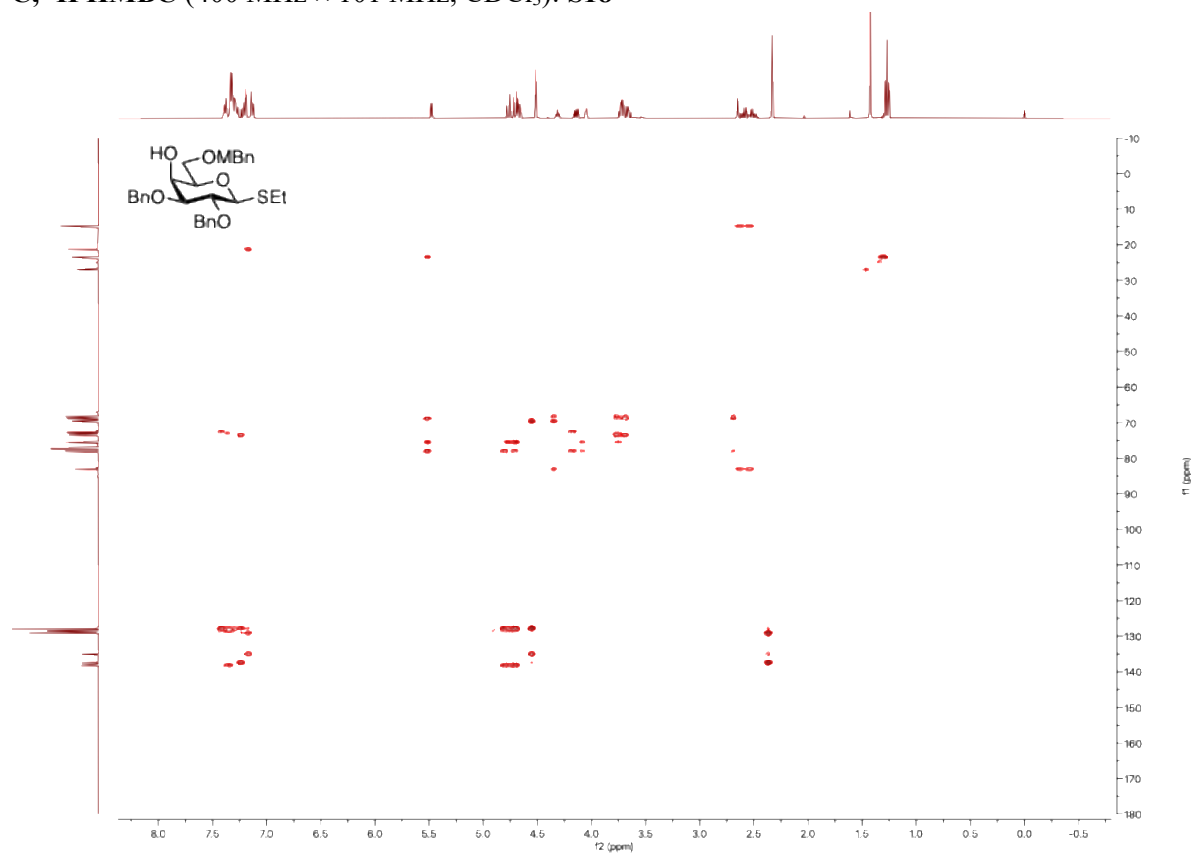
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): S18



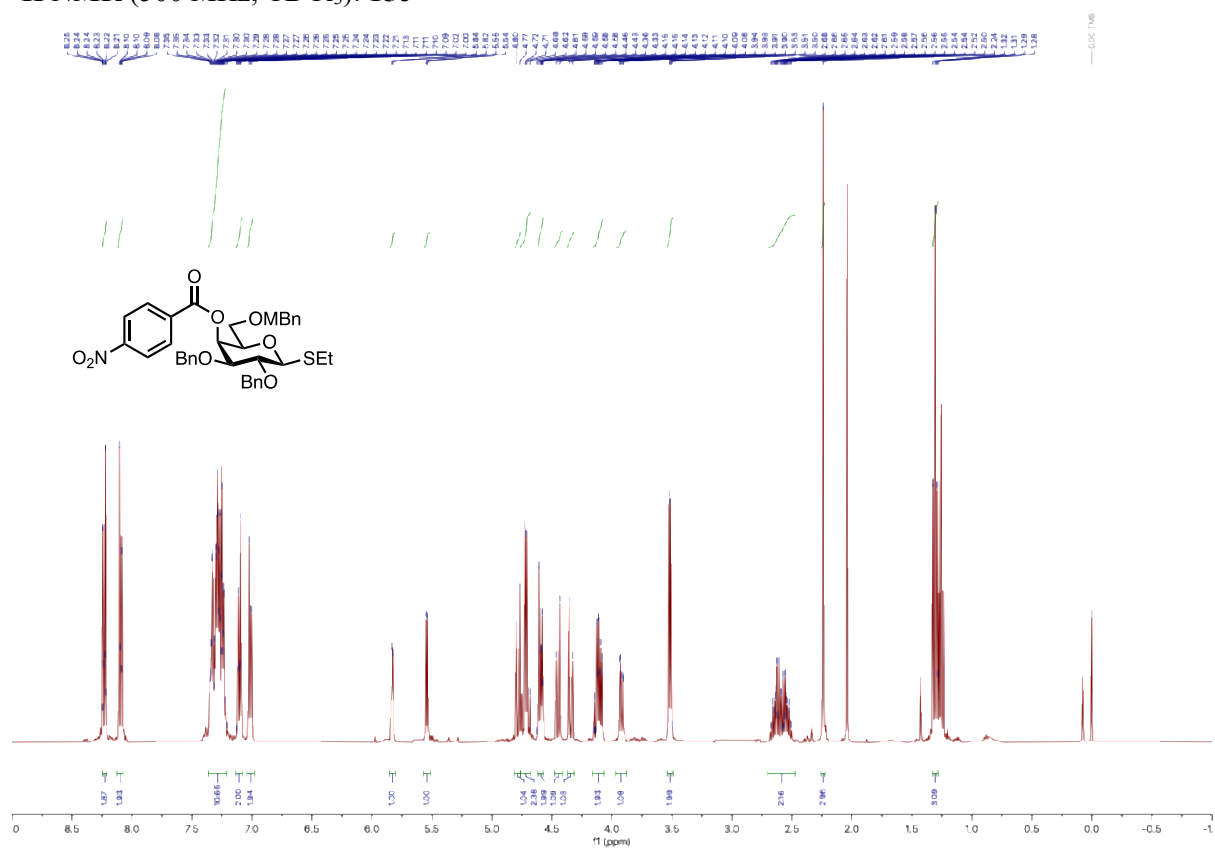
^1H , ^1H COSY (400 MHz, CDCl_3): S18



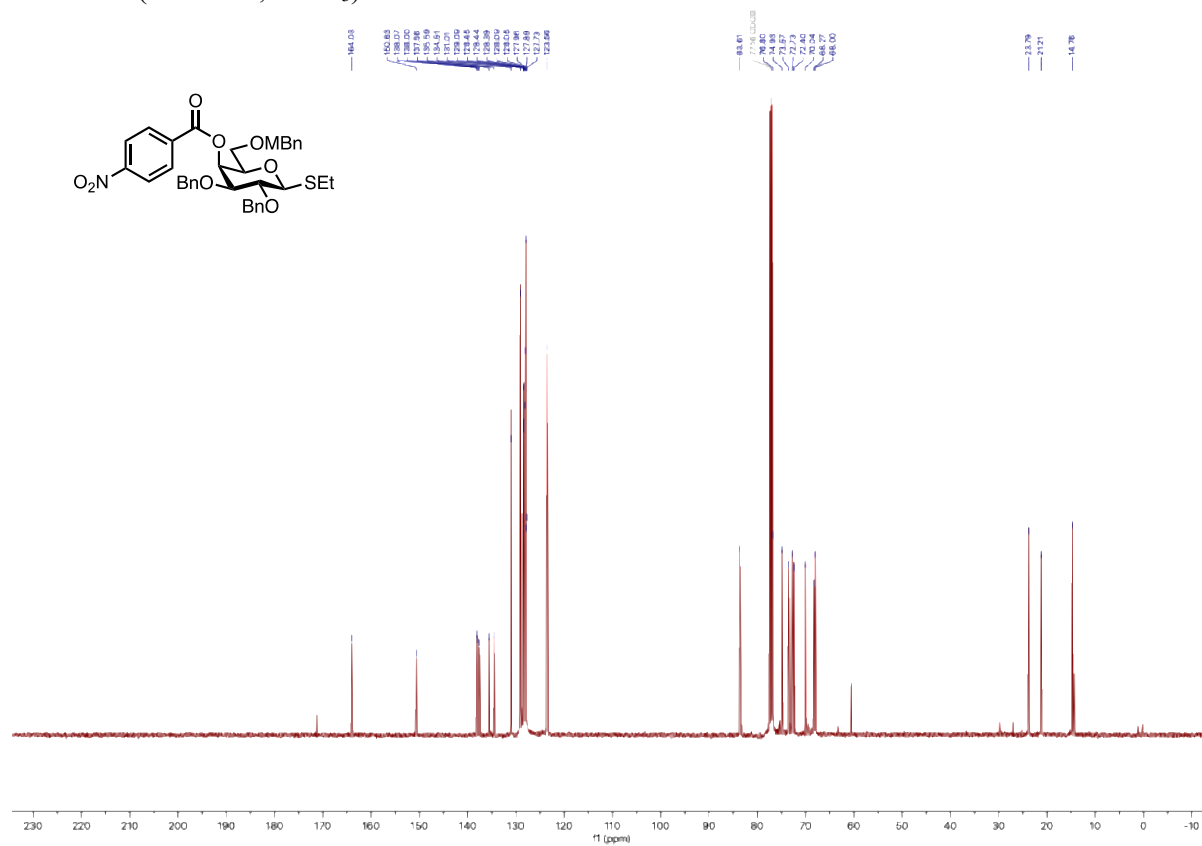
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **S18**



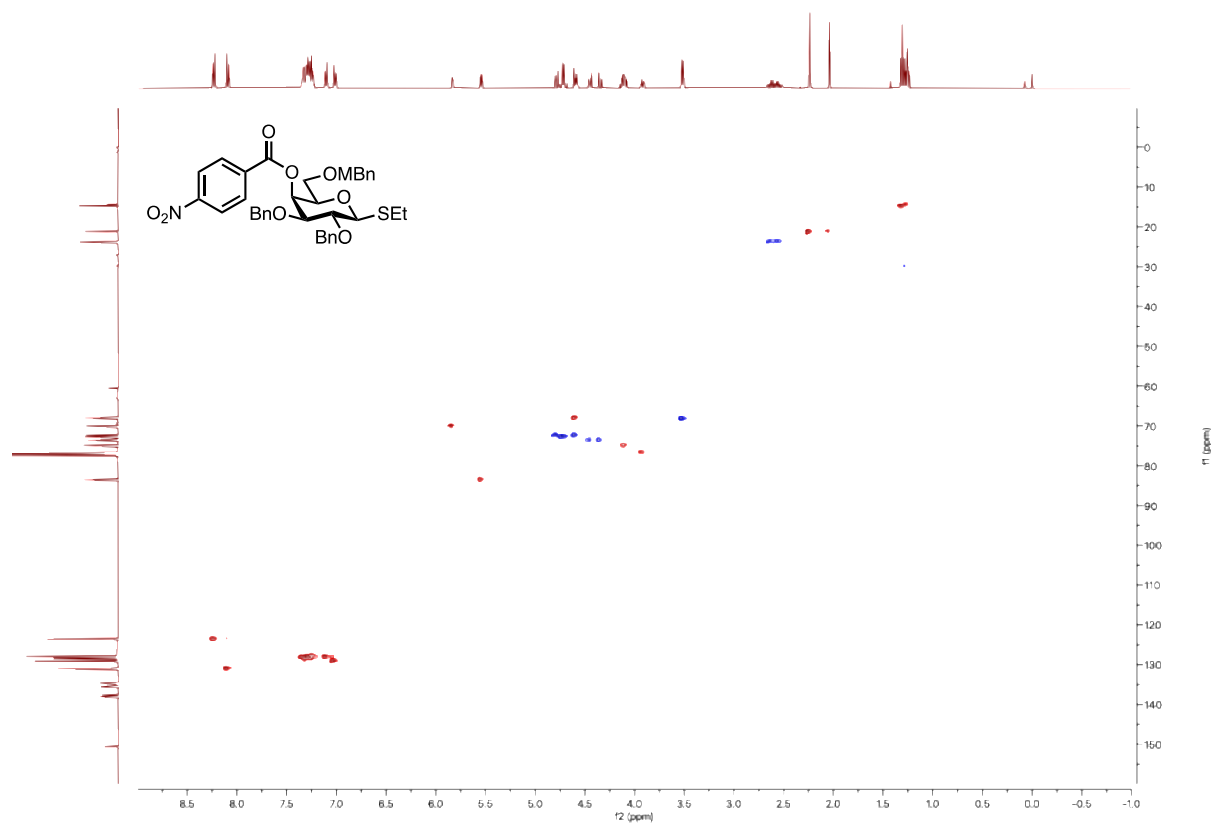
^1H NMR (500 MHz, CDCl_3): **15e**



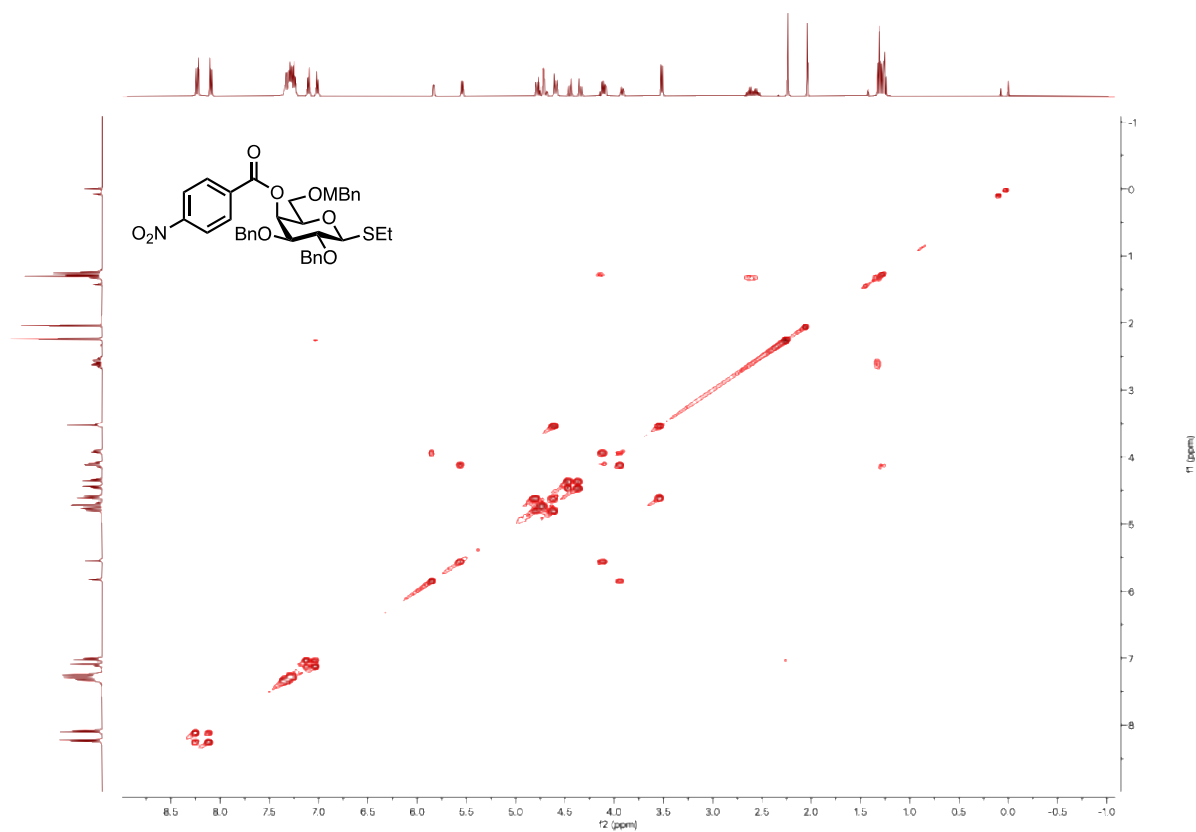
^{13}C NMR (126 MHz, CDCl_3): **15e**



^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): **15e**



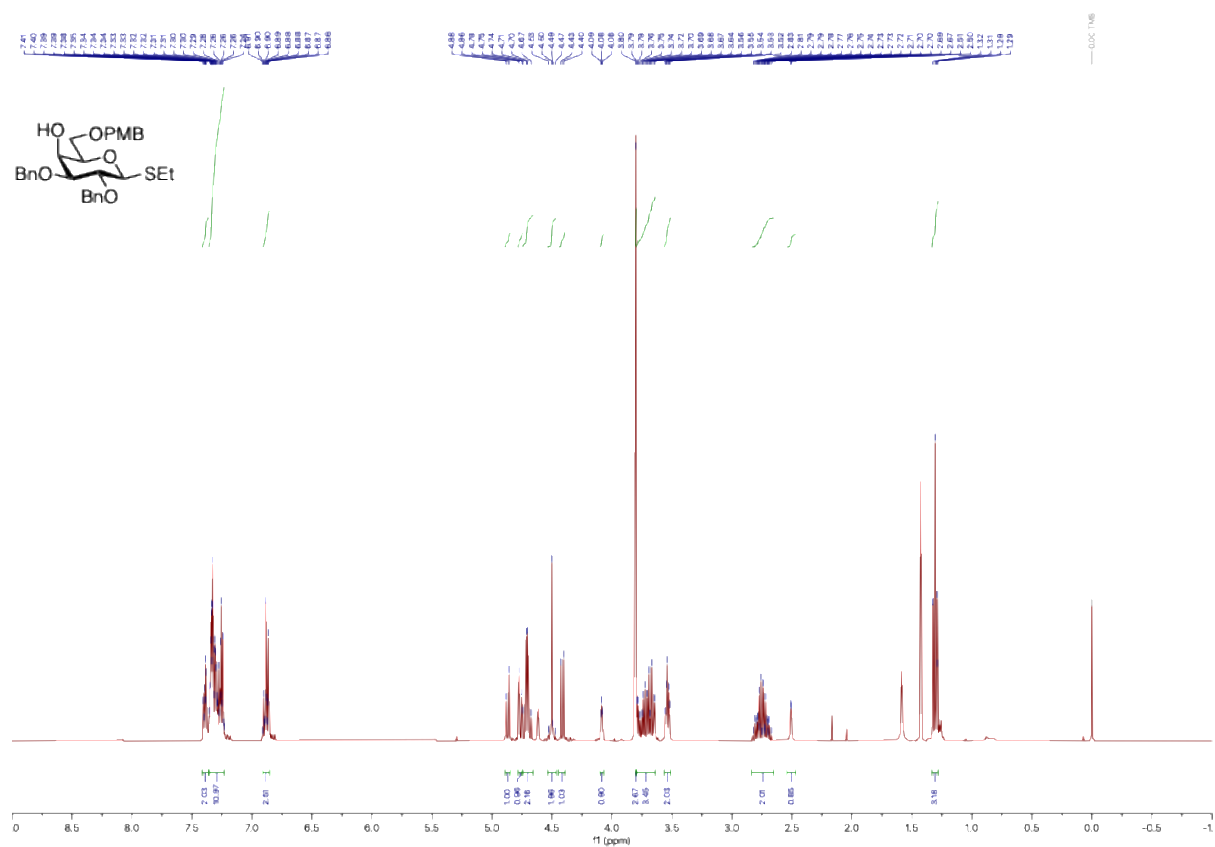
^1H , ^1H COSY (500 MHz, CDCl_3): **15e**



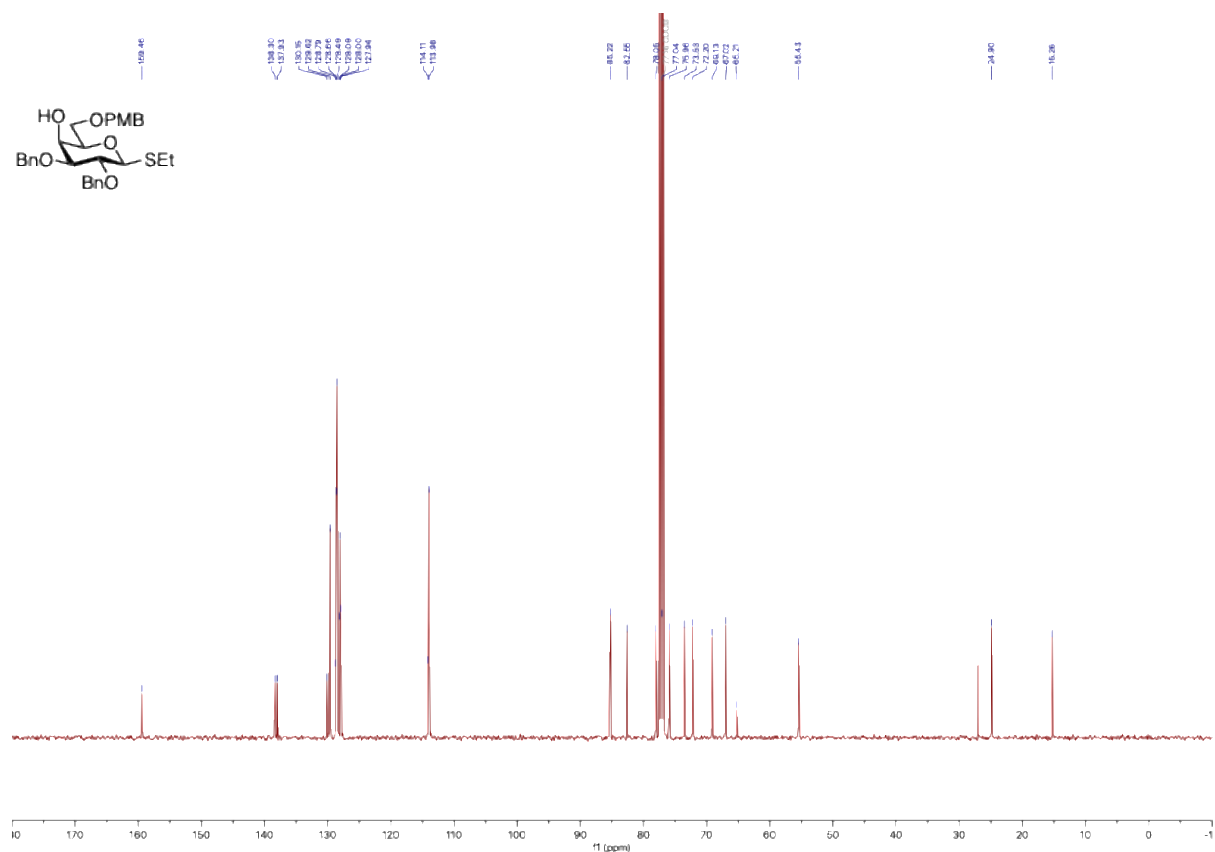
^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): **15e**



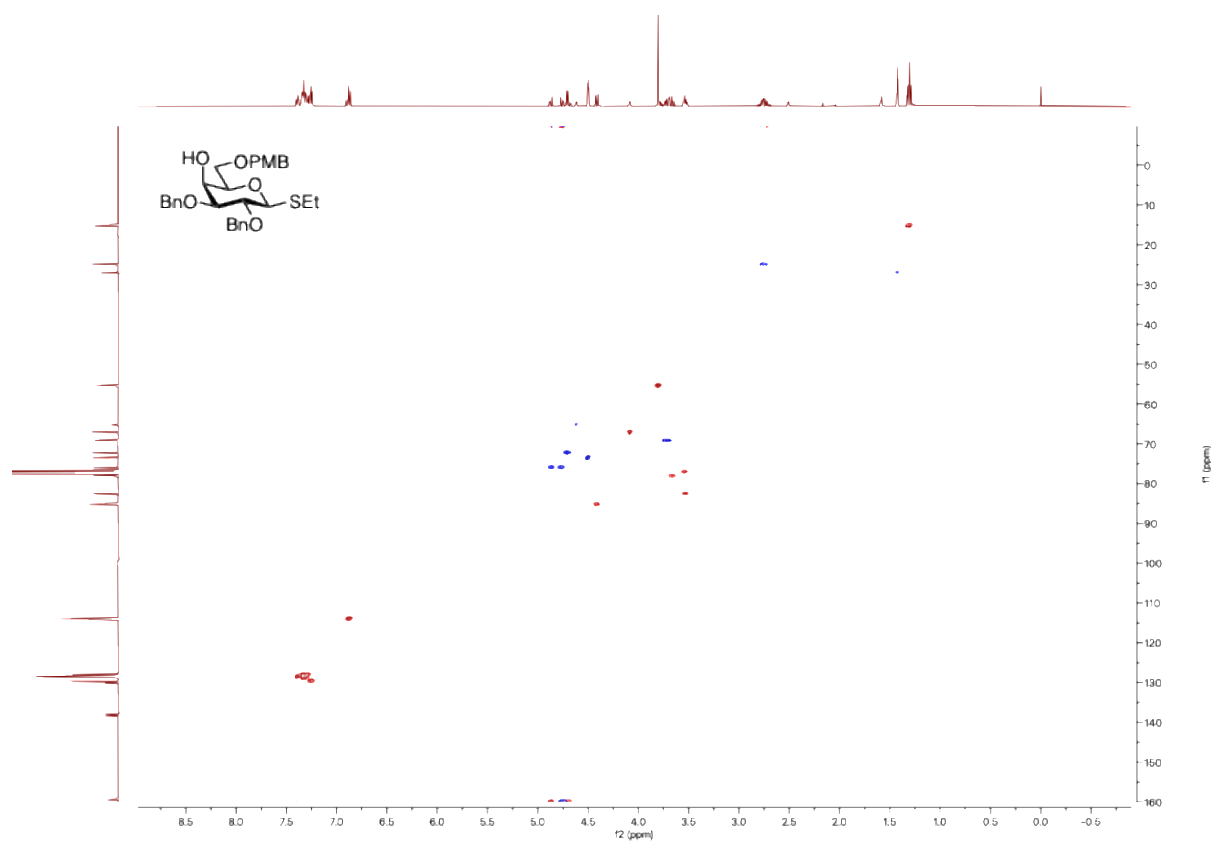
¹H NMR (400 MHz, CDCl₃): S19



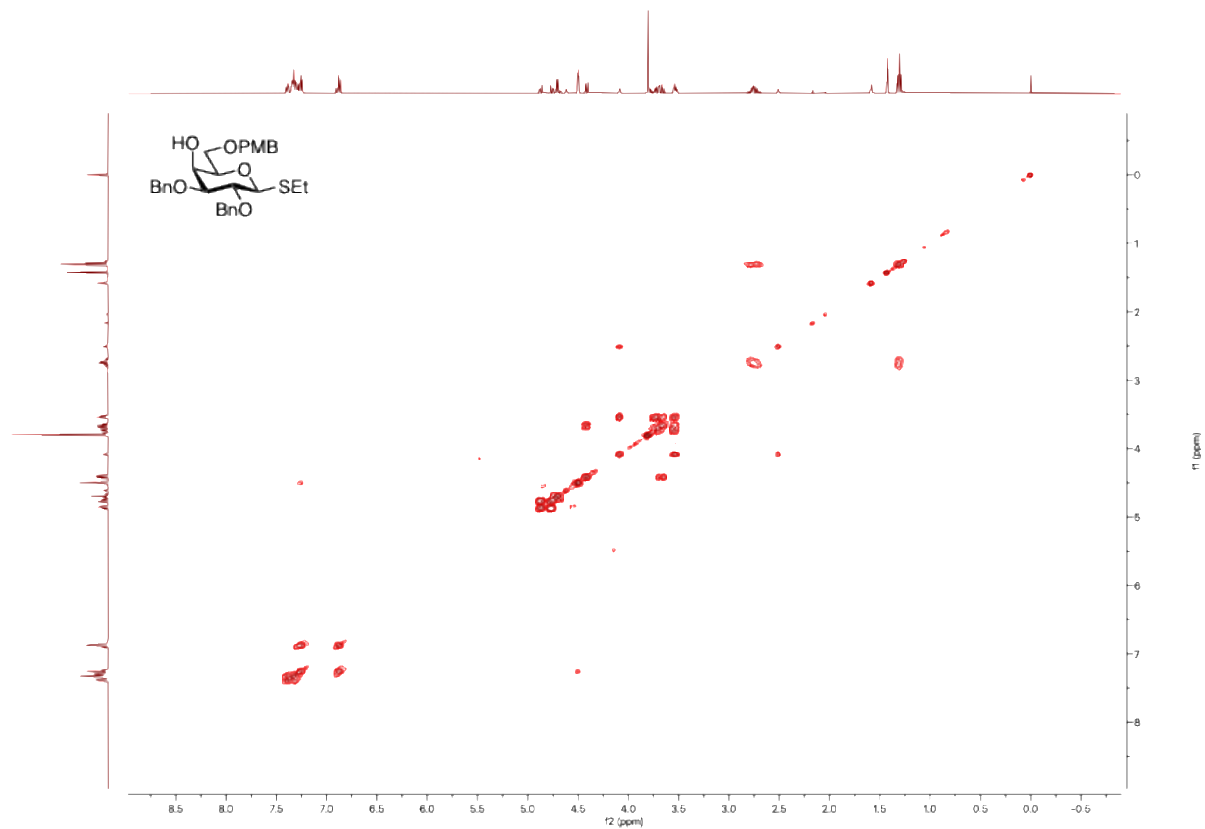
¹³C NMR (101 MHz, CDCl₃): S19



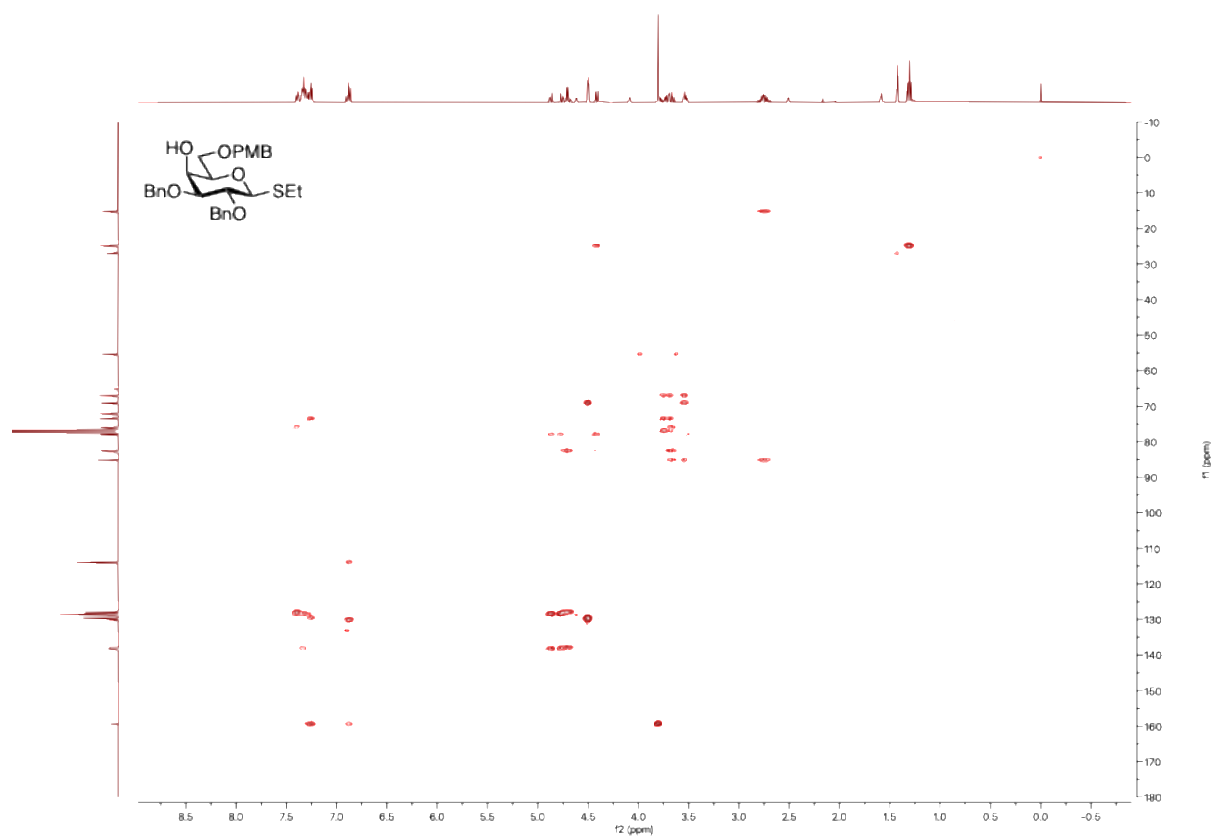
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **S19**



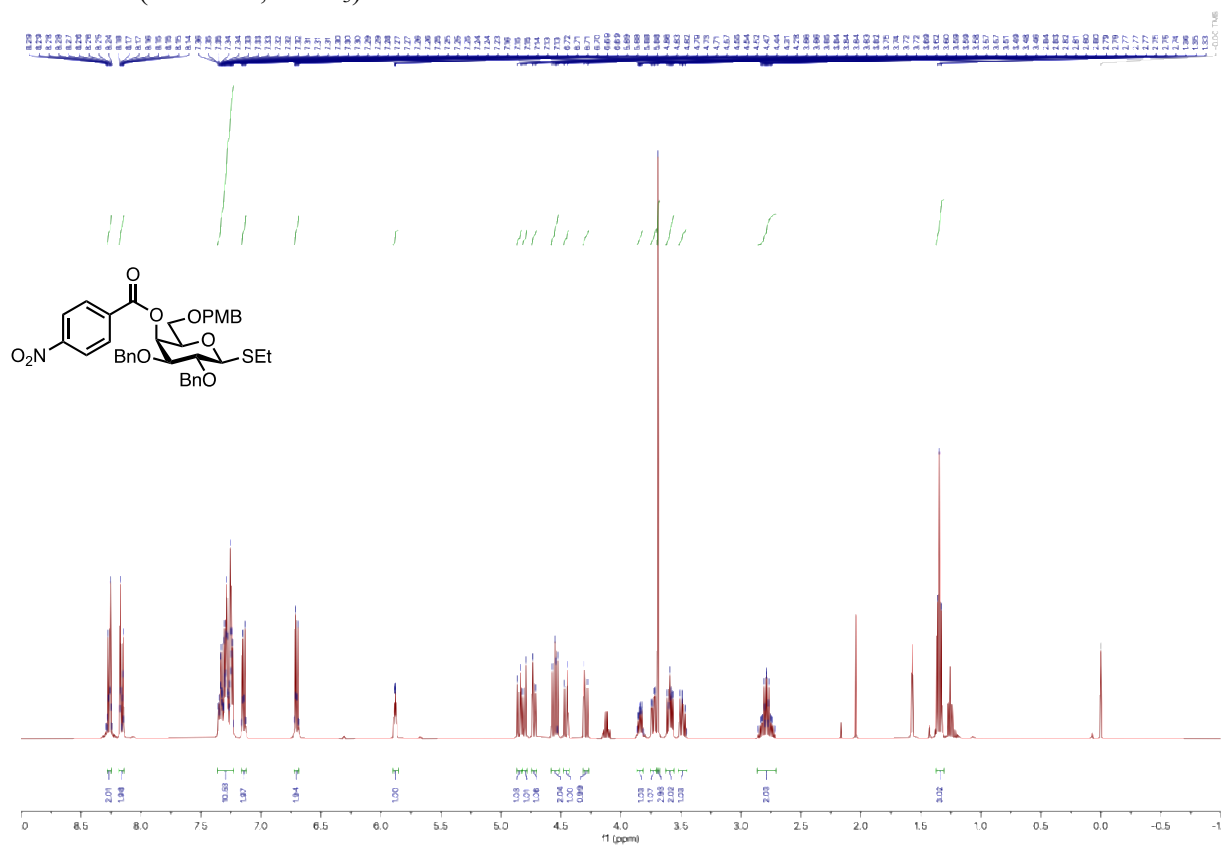
^1H , ^1H COSY (400 MHz, CDCl_3): **S19**



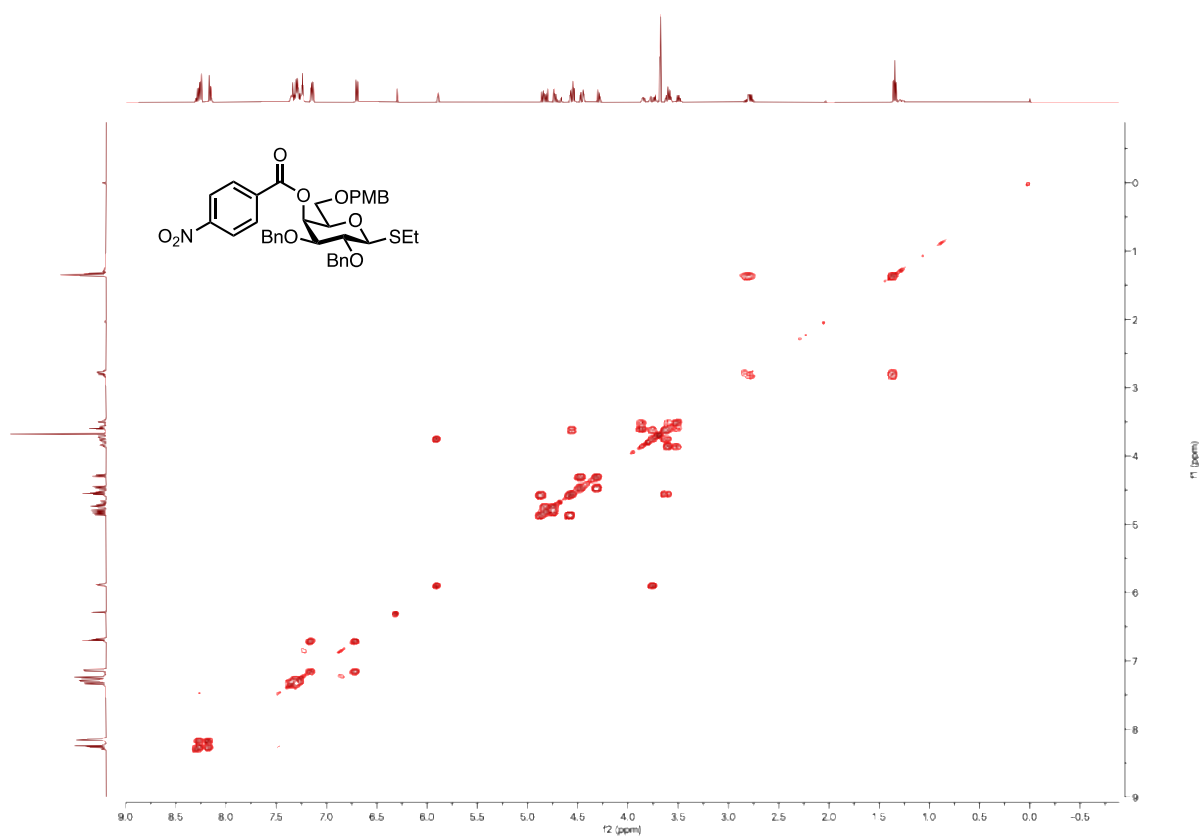
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **S19**



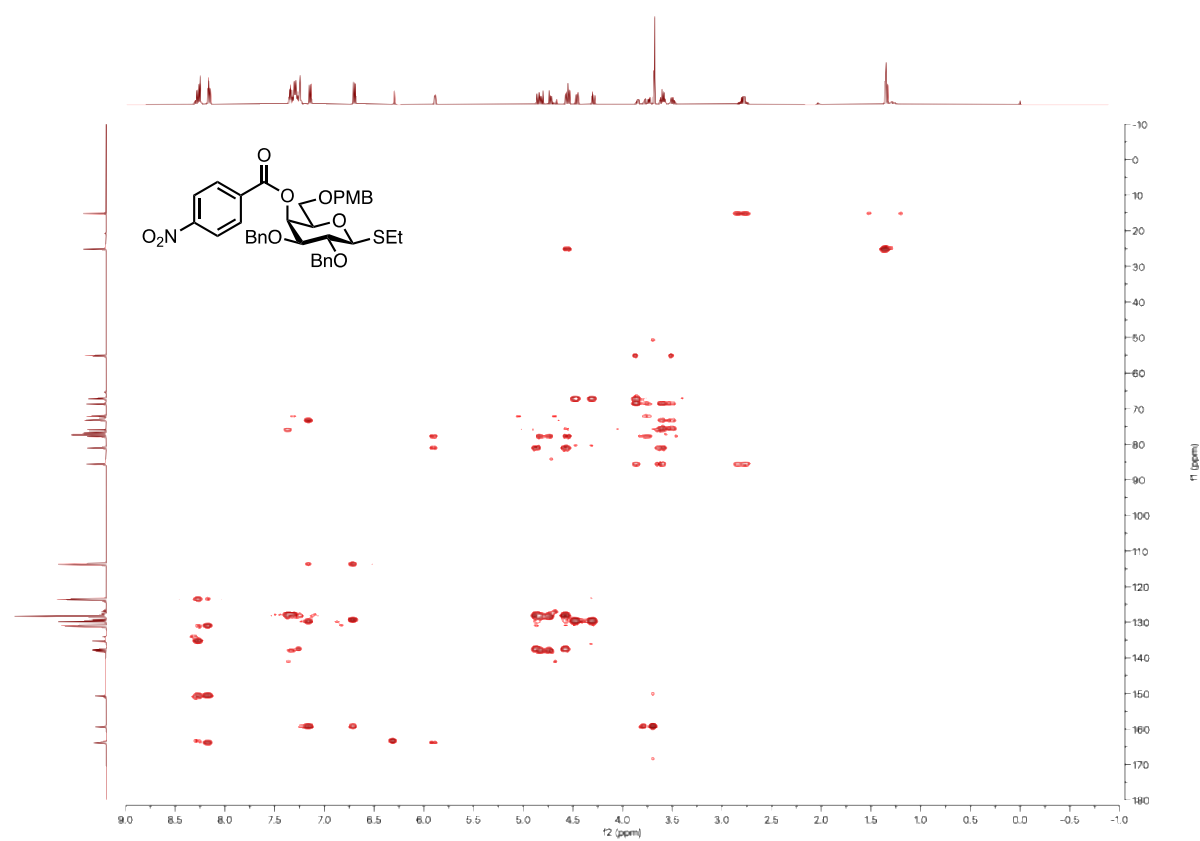
^1H NMR (400 MHz, CDCl_3): **15f**



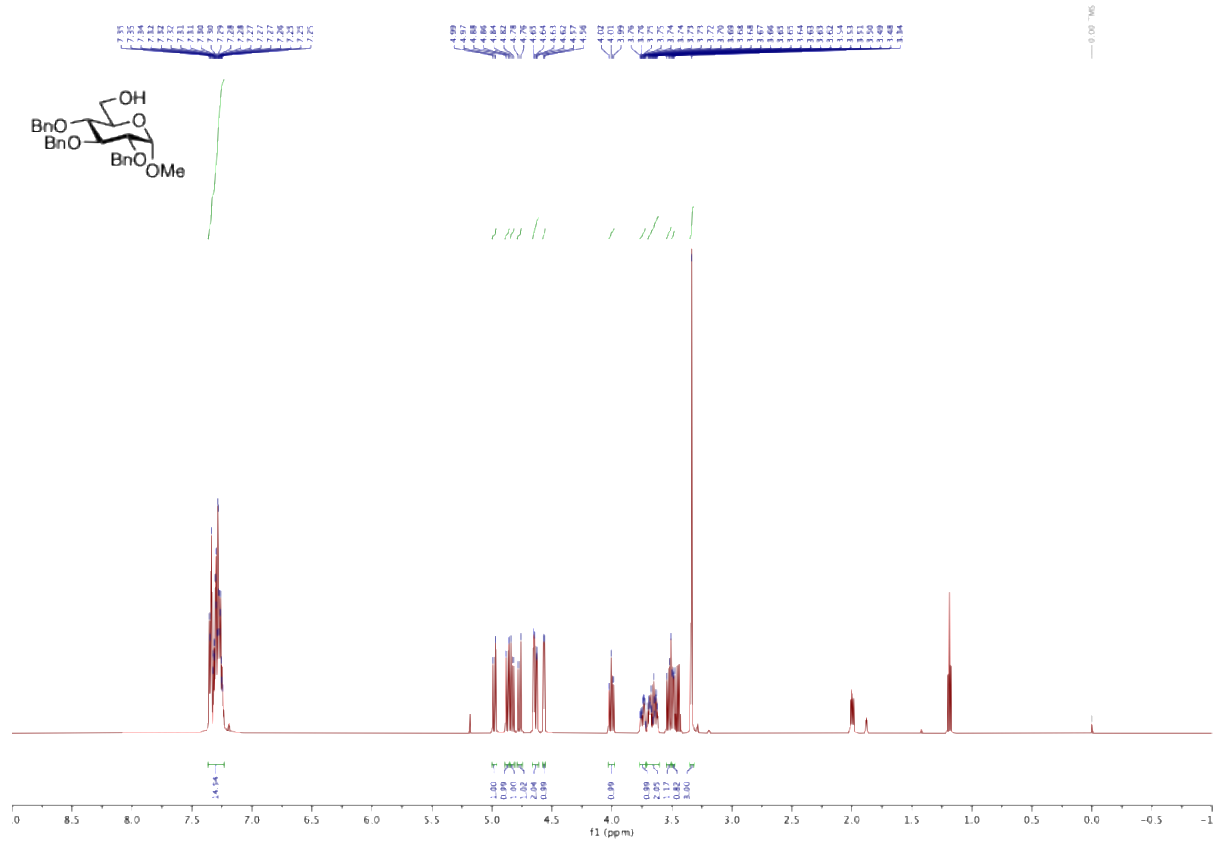
^1H , ^1H COSY (400 MHz, CDCl_3): **15f**



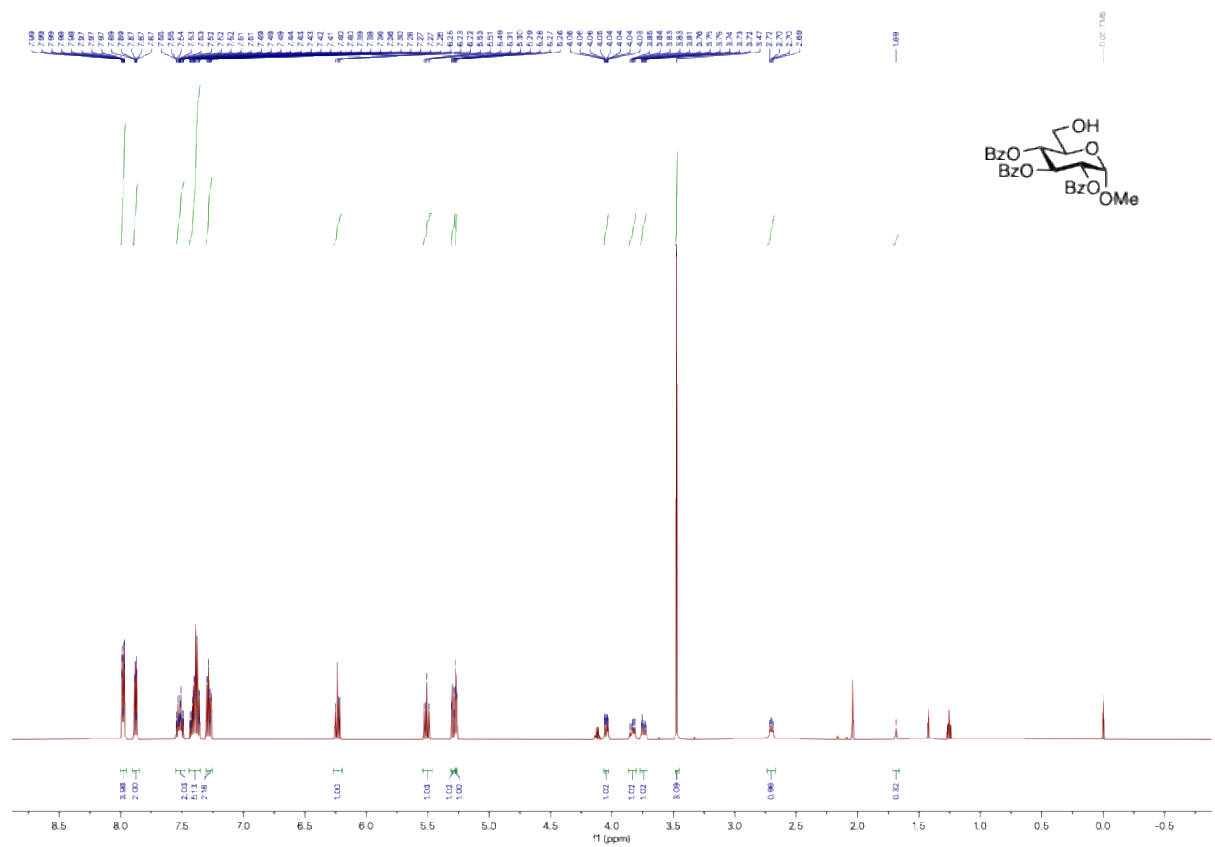
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **15f**



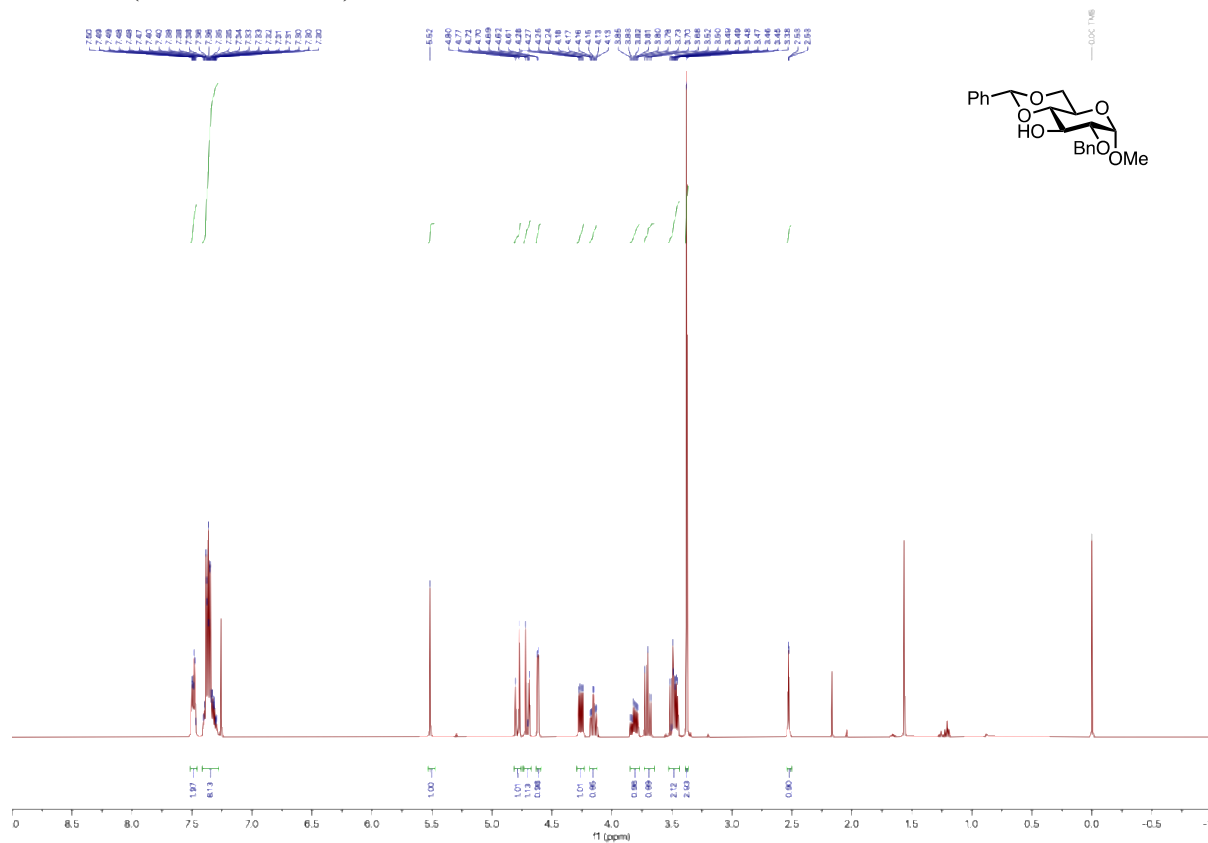
^1H NMR (400 MHz, CDCl_3): **5a**



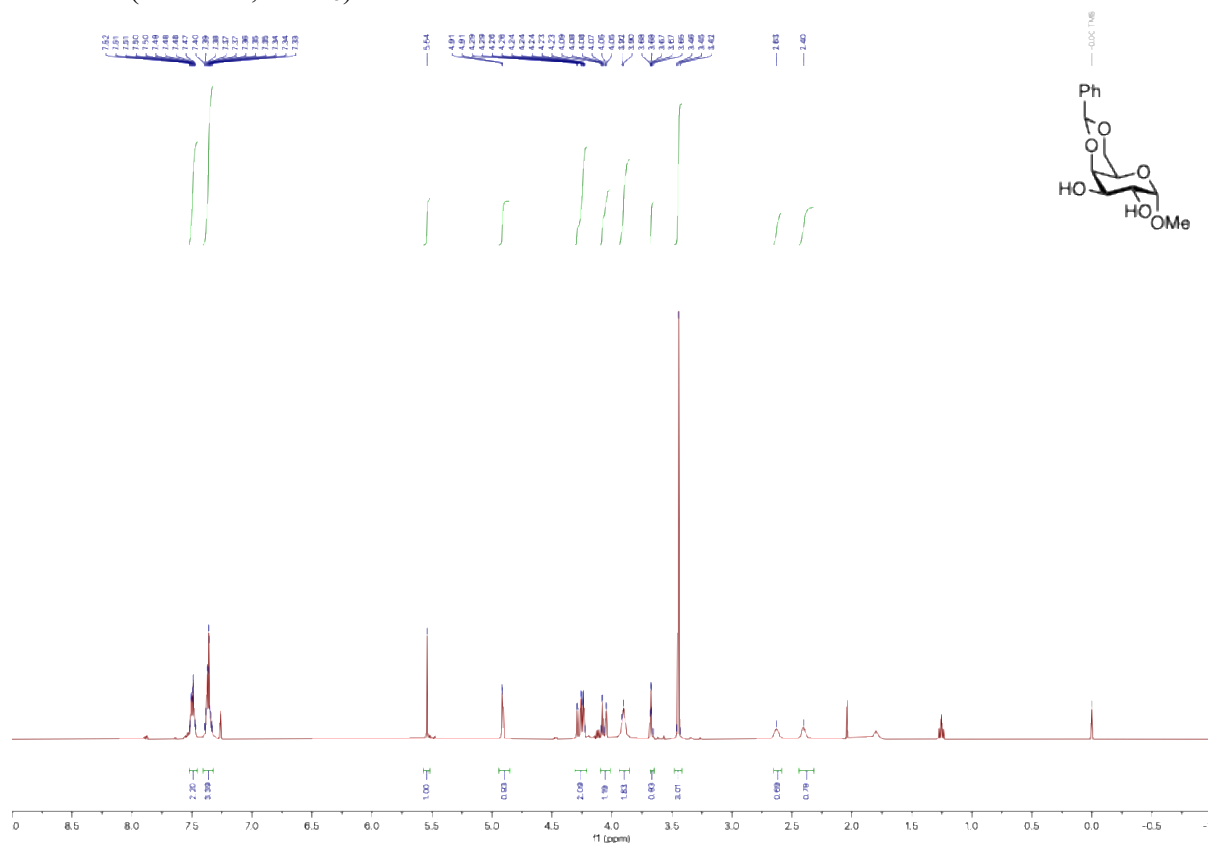
^1H NMR (500 MHz, CDCl_3): **5f**



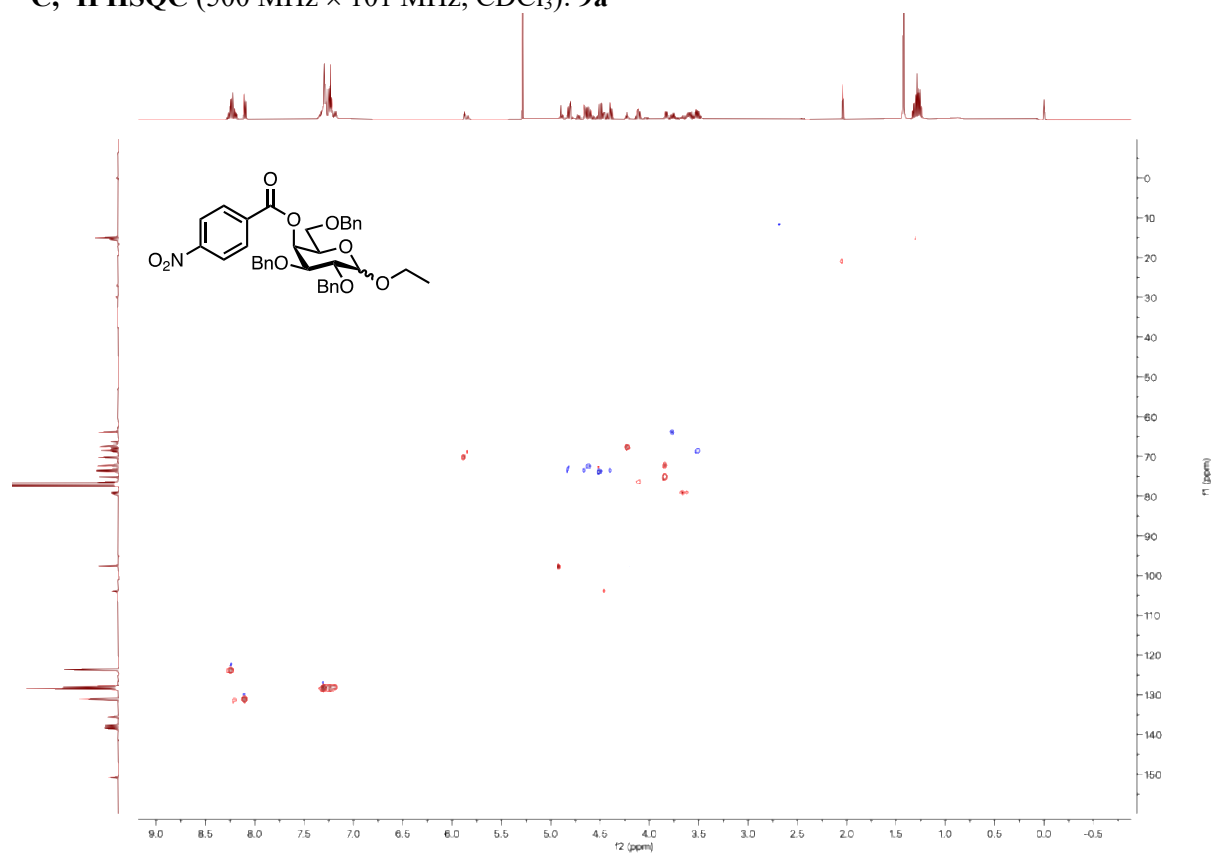
¹H NMR (400 MHz, CDCl₃): S10



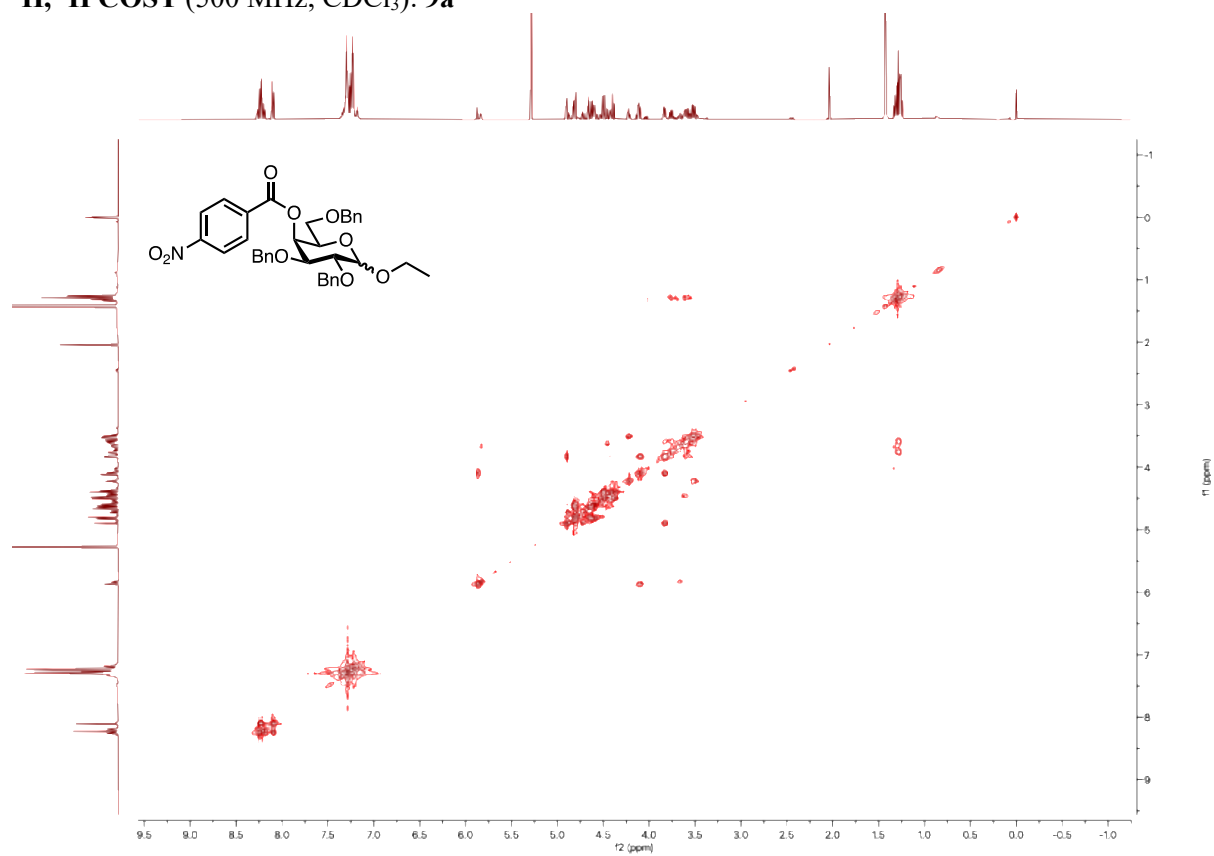
¹H NMR (400 MHz, CDCl₃): S4



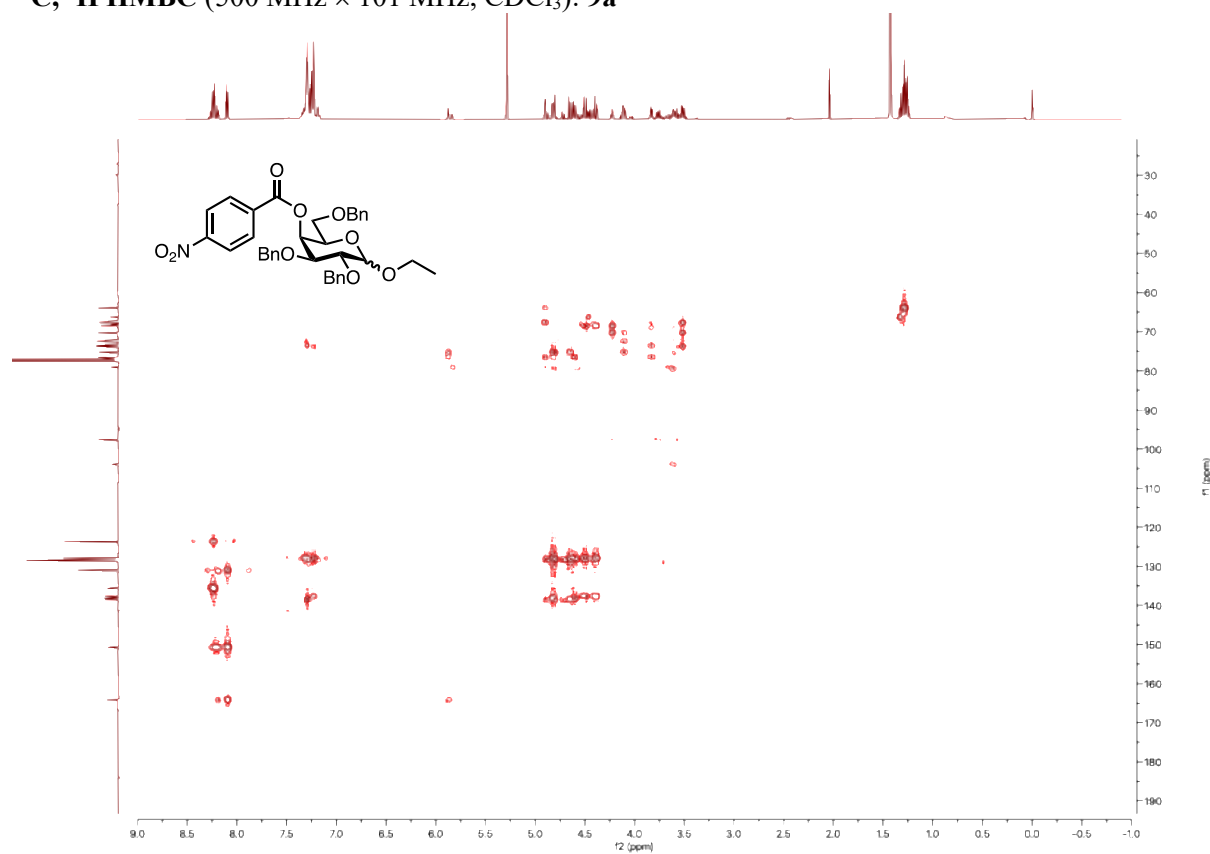
^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **9a**



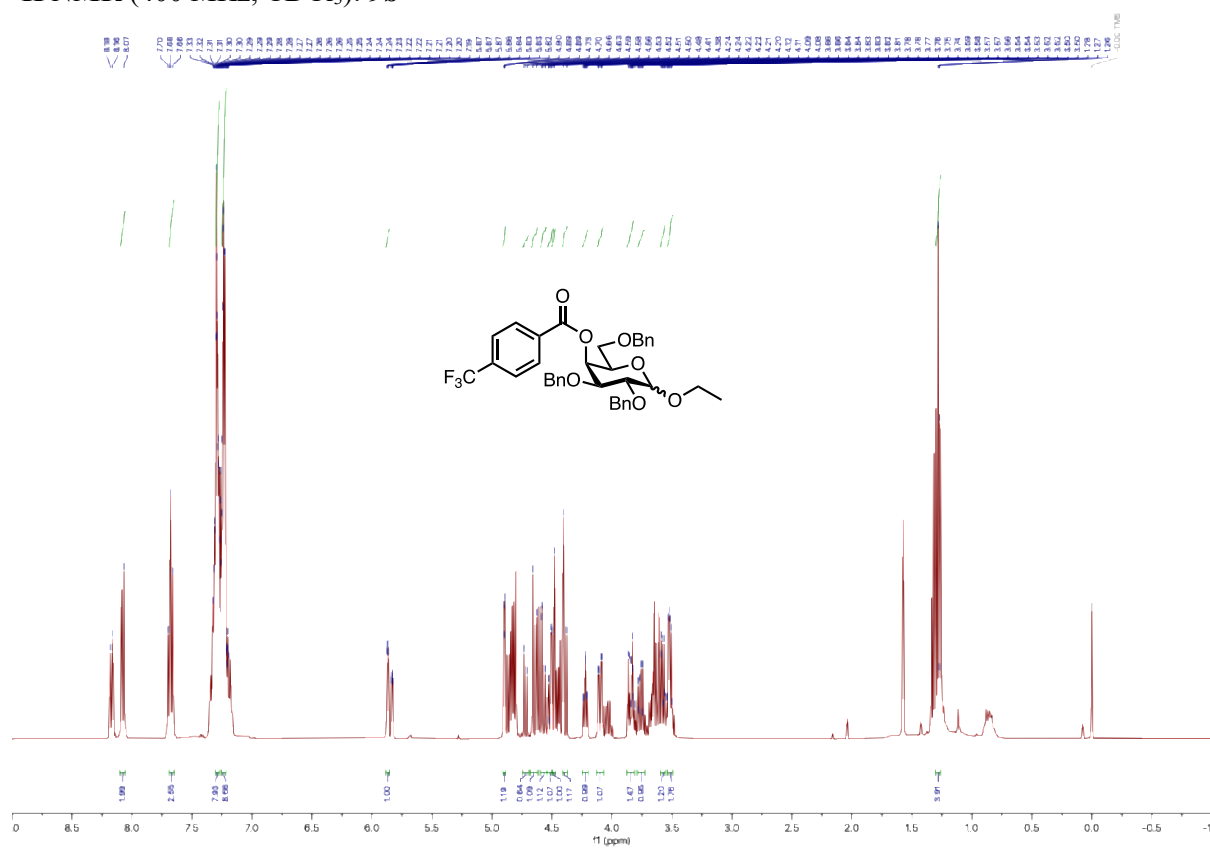
^1H , ^1H COSY (500 MHz, CDCl_3): **9a**



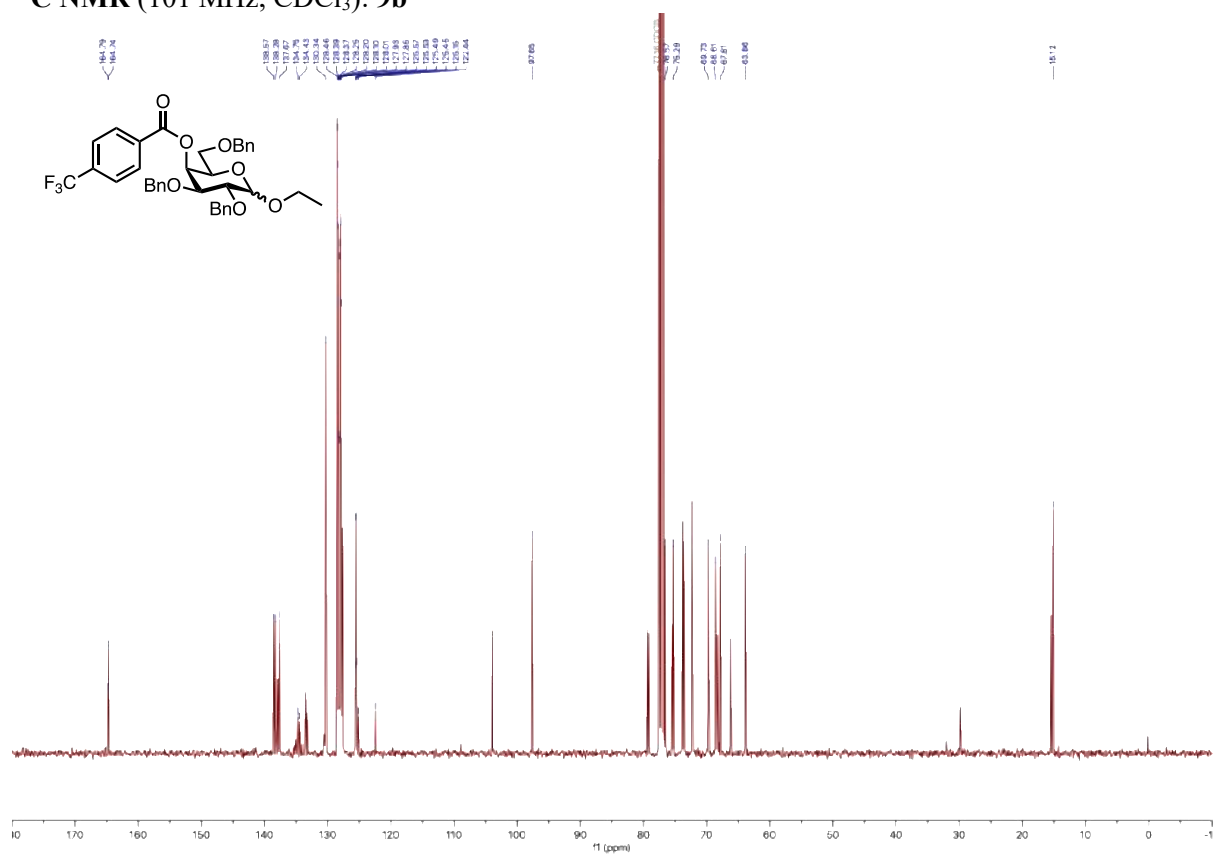
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): **9a**



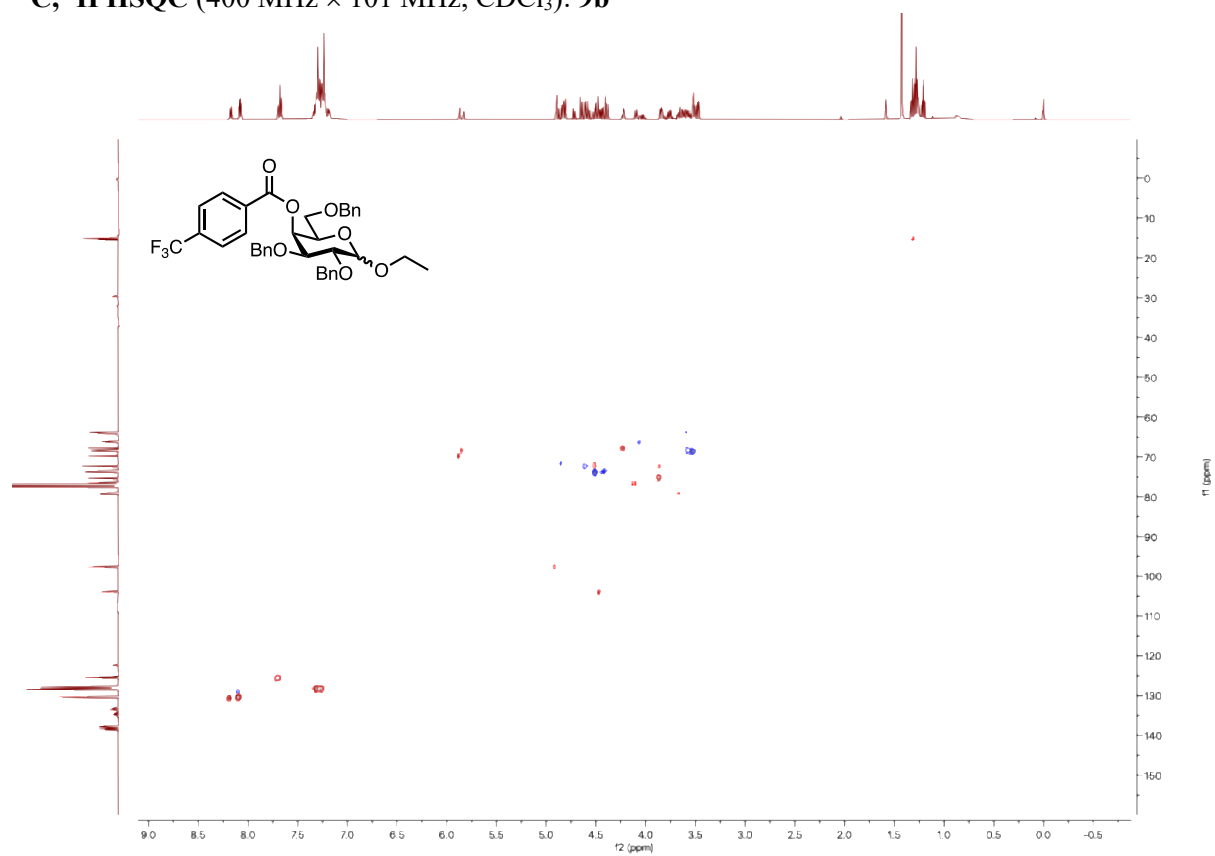
^1H NMR (400 MHz, CDCl_3): **9b**



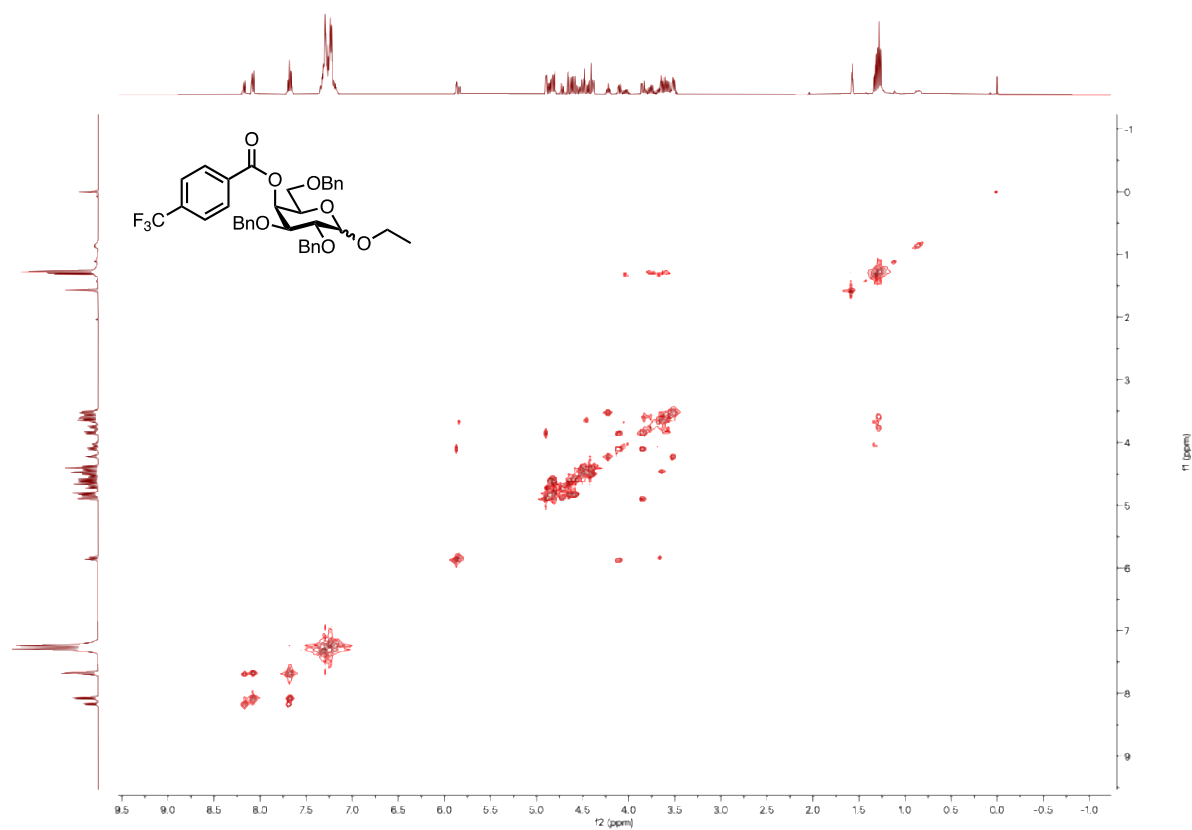
^{13}C NMR (101 MHz, CDCl_3): **9b**



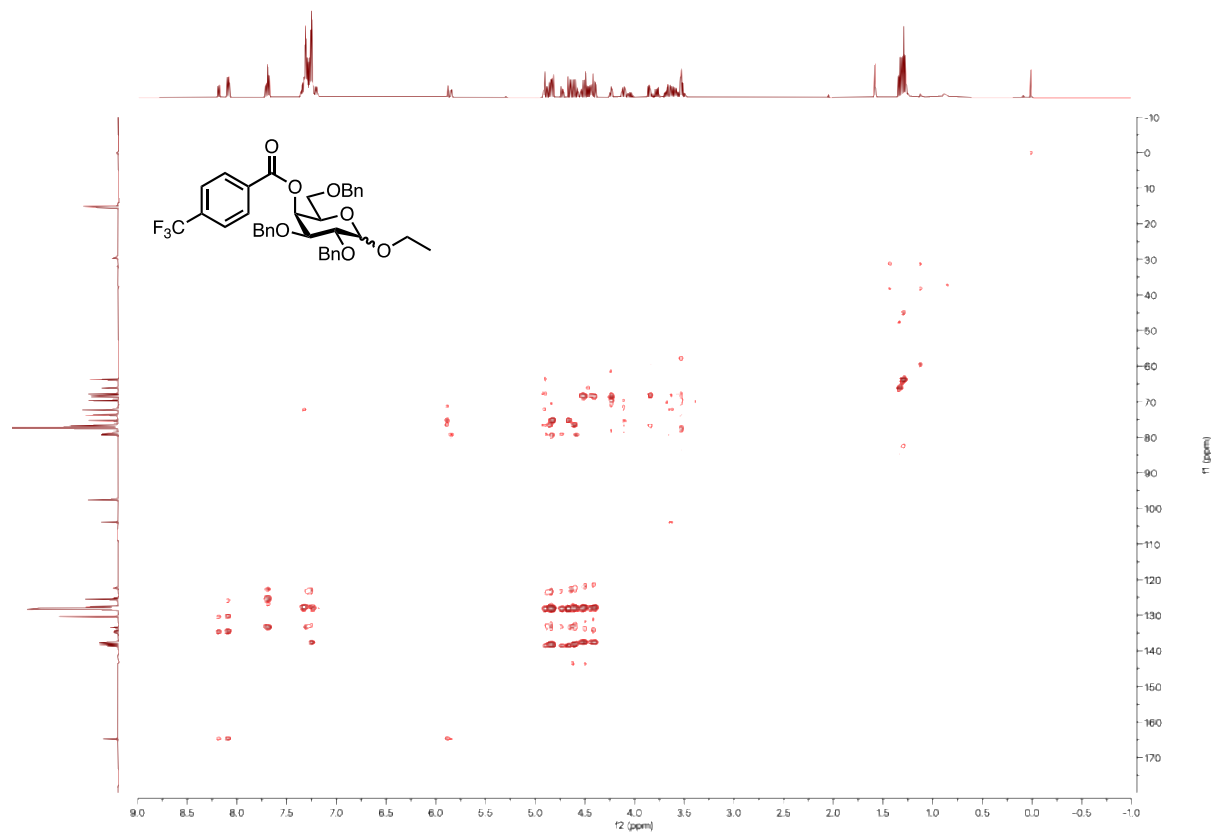
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9b**



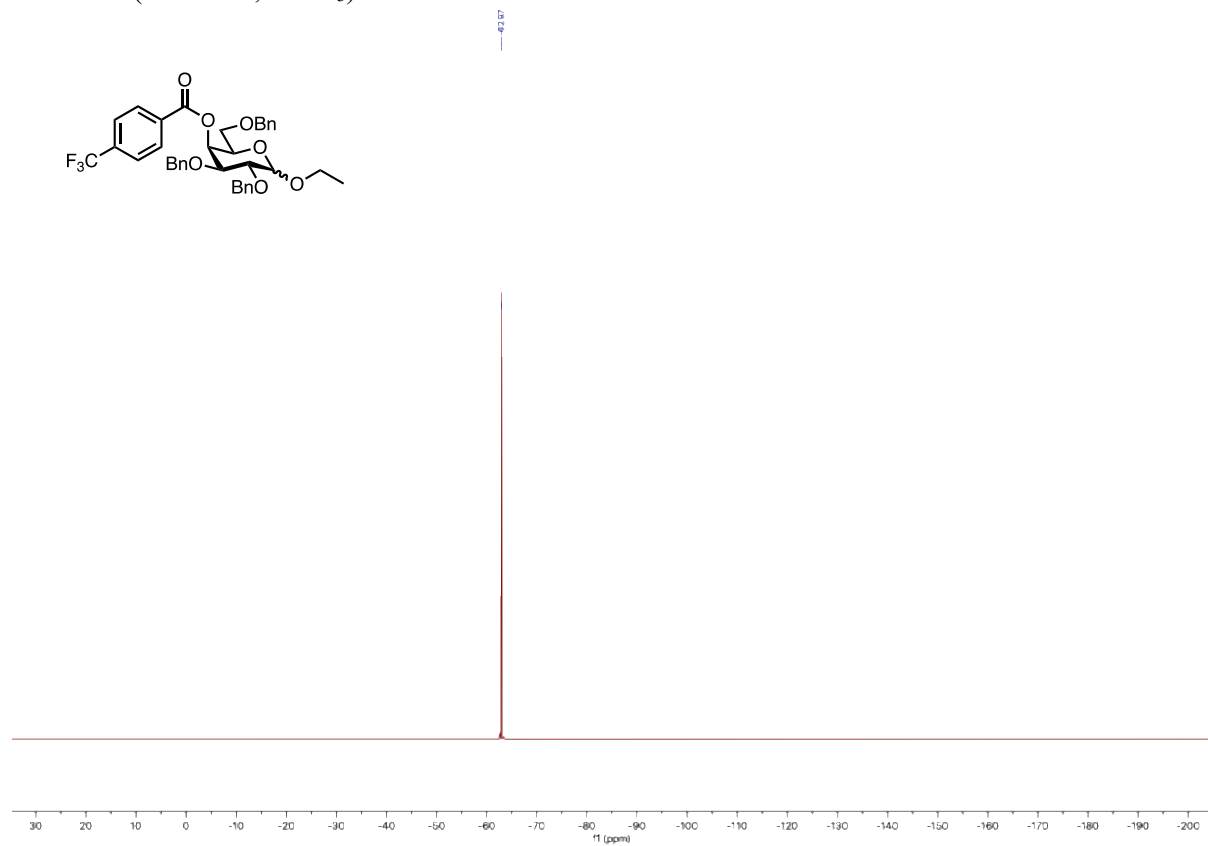
^1H , ^1H COSY (400 MHz, CDCl_3): **9b**



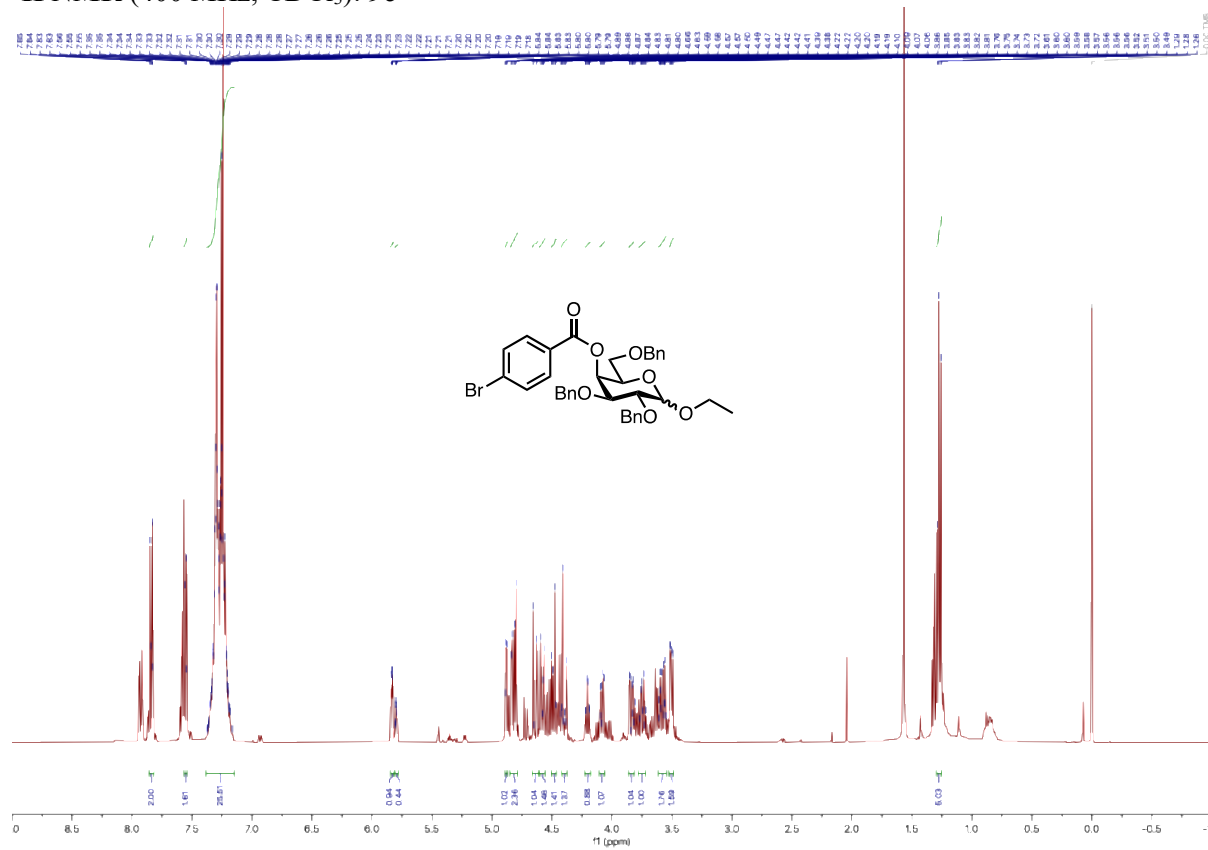
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **9b**



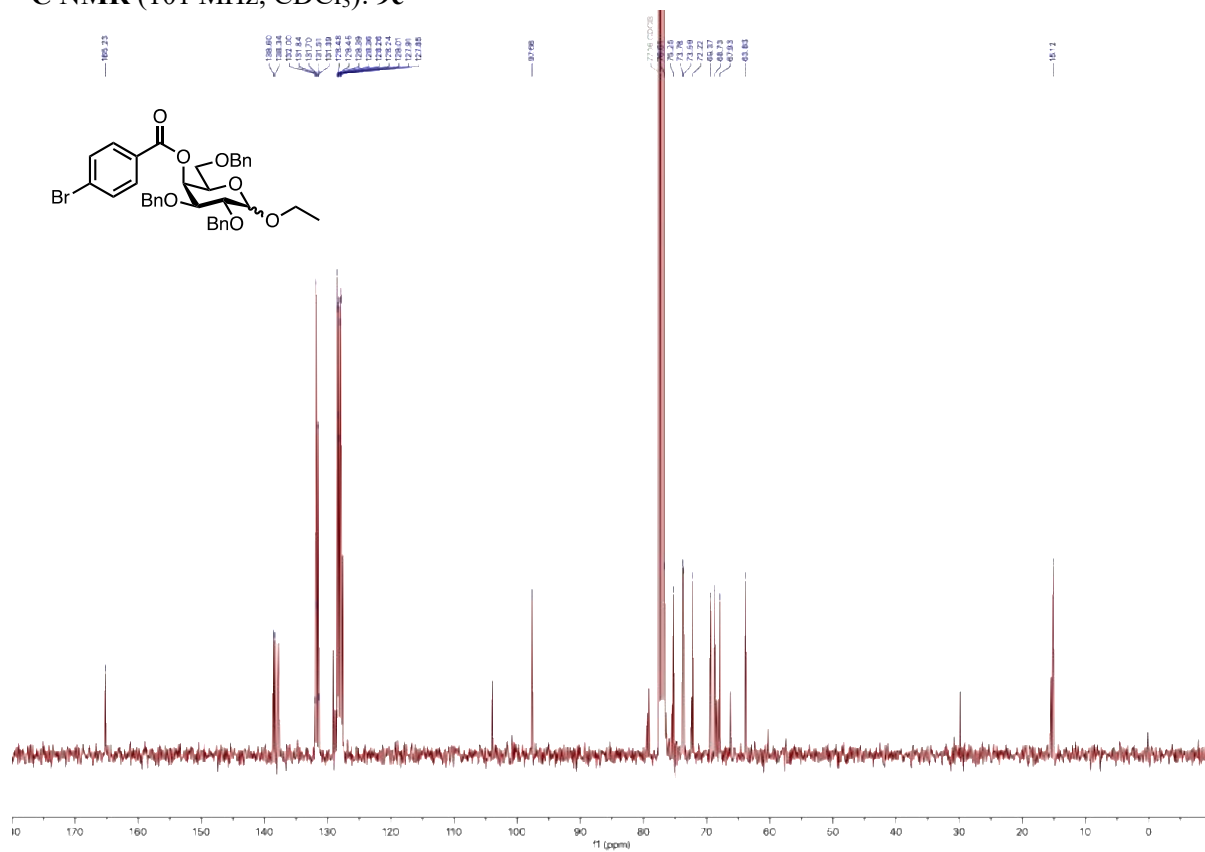
^{19}F NMR (376 MHz, CDCl_3): **9b**



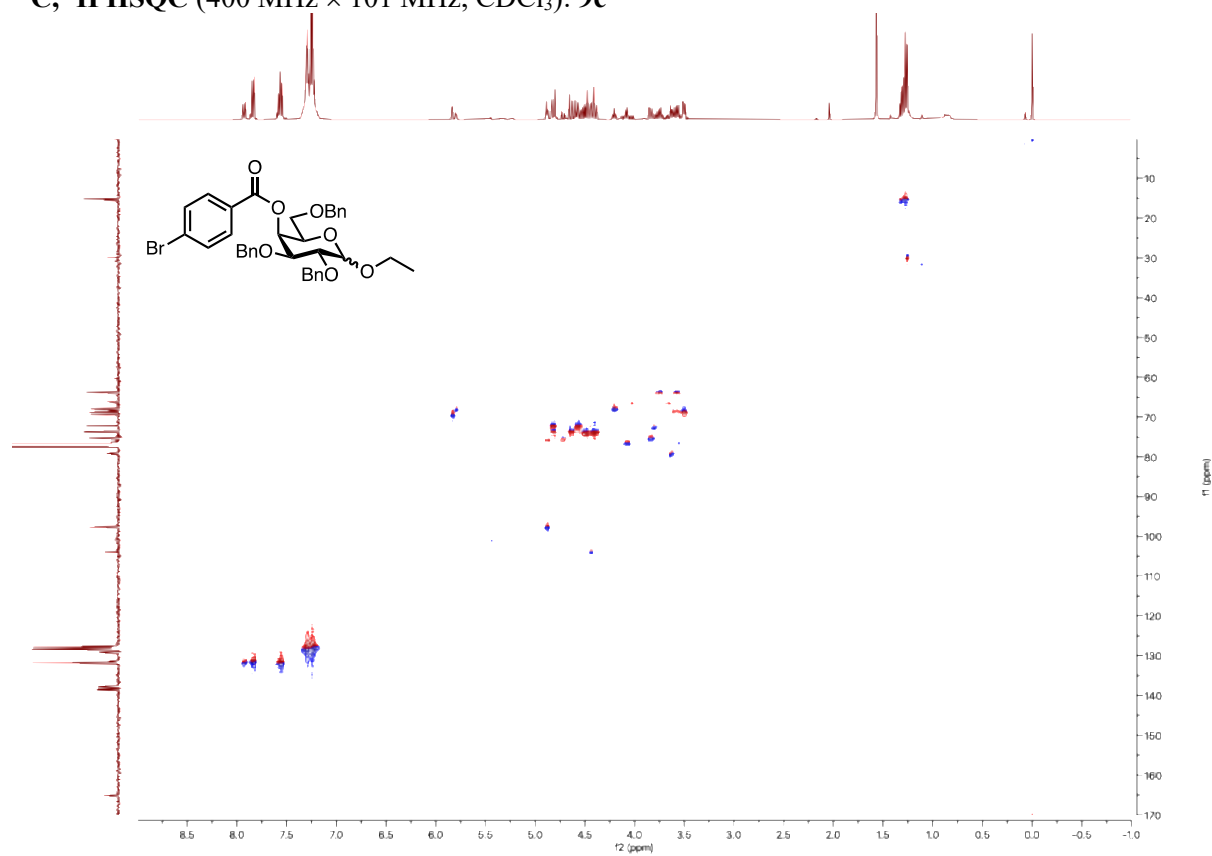
^1H NMR (400 MHz, CDCl_3): **9c**



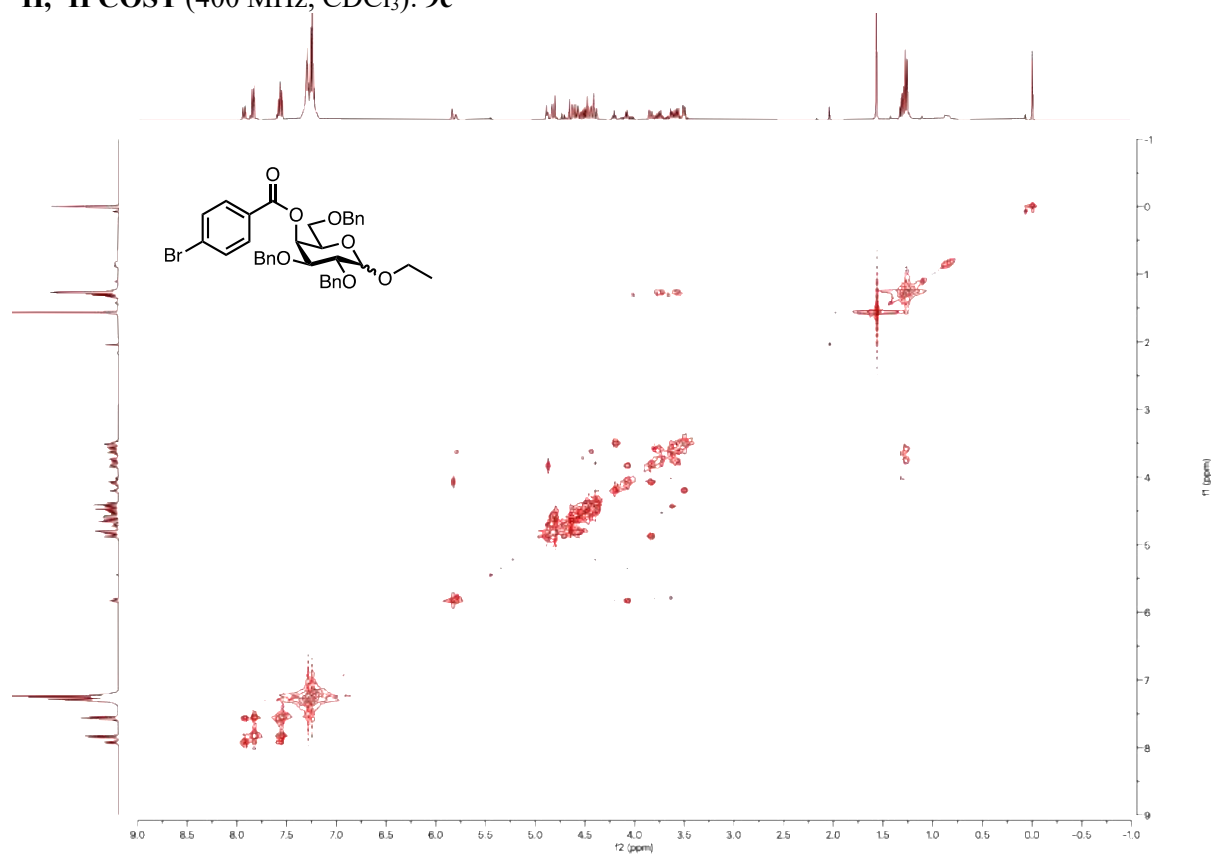
^{13}C NMR (101 MHz, CDCl_3): **9c**



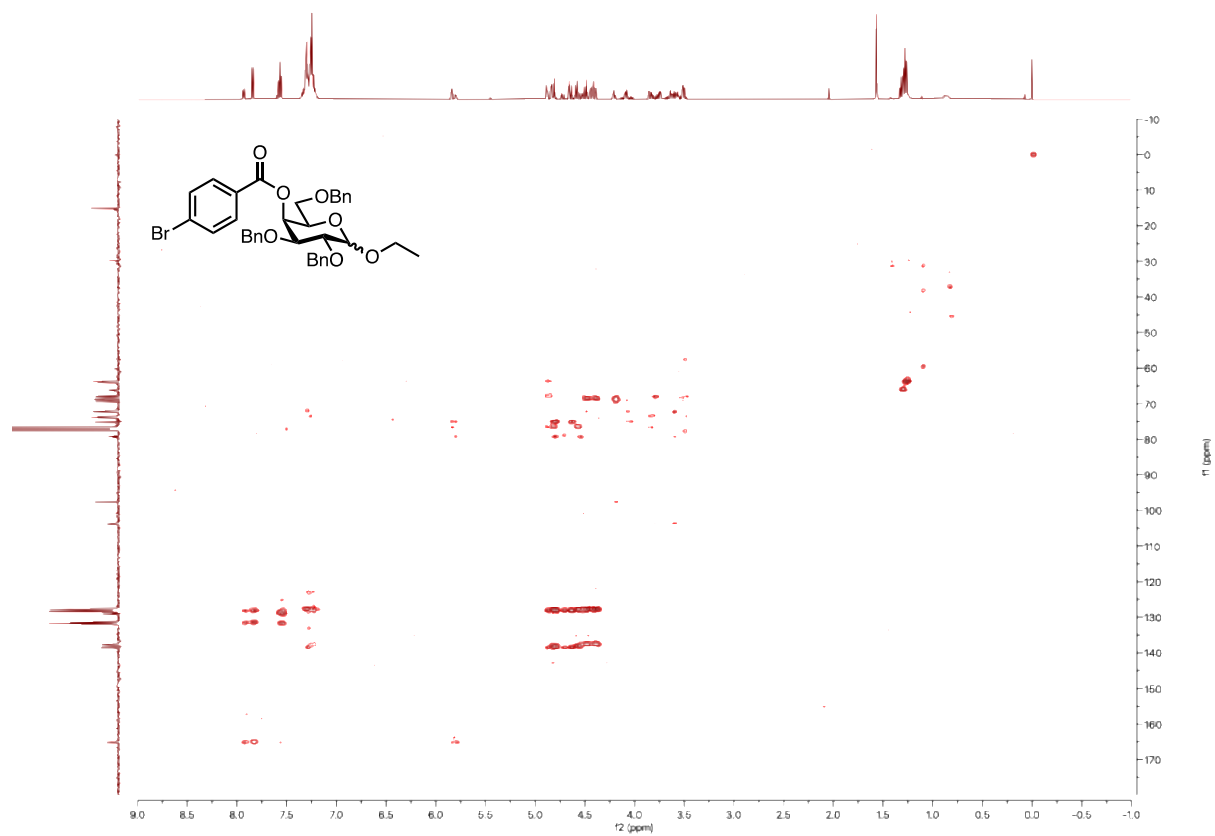
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9c**



^1H , ^1H COSY (400 MHz, CDCl_3): **9c**



^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **9c**



Chemical structure of compound 10 is shown above the spectrum. The structure is a substituted tetrahydropyran with a benzoyl group, a benzyl group, and an ethoxy group.

¹H NMR spectrum (CDCl₃) of compound 10. The x-axis represents the chemical shift in ppm, ranging from 0 to 8.5. The spectrum shows several peaks, with the following chemical shifts (ppm) listed below the spectrum:

- 7.900, 7.896, 7.758, 7.756, 7.754, 7.746, 7.744, 7.742, 7.741, 7.738, 7.736, 7.732, 7.731, 7.730, 7.728, 7.727, 7.726, 7.725, 7.724, 7.723, 7.722, 7.721, 7.720, 7.719, 7.718, 7.717, 7.716, 7.715, 7.714, 7.713, 7.712, 7.711, 7.710, 7.709, 7.708, 7.707, 7.706, 7.705, 7.704, 7.703, 7.702, 7.701, 7.700, 7.699, 7.698, 7.697, 7.696, 7.695, 7.694, 7.693, 7.692, 7.691, 7.690, 7.689, 7.688, 7.687, 7.686, 7.685, 7.684, 7.683, 7.682, 7.681, 7.680, 7.679, 7.678, 7.677, 7.676, 7.675, 7.674, 7.673, 7.672, 7.671, 7.670, 7.669, 7.668, 7.667, 7.666, 7.665, 7.664, 7.663, 7.662, 7.661, 7.660, 7.659, 7.658, 7.657, 7.656, 7.655, 7.654, 7.653, 7.652, 7.651, 7.650, 7.649, 7.648, 7.647, 7.646, 7.645, 7.644, 7.643, 7.642, 7.641, 7.640, 7.639, 7.638, 7.637, 7.636, 7.635, 7.634, 7.633, 7.632, 7.631, 7.630, 7.629, 7.628, 7.627, 7.626, 7.625, 7.624, 7.623, 7.622, 7.621, 7.620, 7.619, 7.618, 7.617, 7.616, 7.615, 7.614, 7.613, 7.612, 7.611, 7.610, 7.609, 7.608, 7.607, 7.606, 7.605, 7.604, 7.603, 7.602, 7.601, 7.600, 7.599, 7.598, 7.597, 7.596, 7.595, 7.594, 7.593, 7.592, 7.591, 7.590, 7.589, 7.588, 7.587, 7.586, 7.585, 7.584, 7.583, 7.582, 7.581, 7.580, 7.579, 7.578, 7.577, 7.576, 7.575, 7.574, 7.573, 7.572, 7.571, 7.570, 7.569, 7.568, 7.567, 7.566, 7.565, 7.564, 7.563, 7.562, 7.561, 7.560, 7.559, 7.558, 7.557, 7.556, 7.555, 7.554, 7.553, 7.552, 7.551, 7.550, 7.549, 7.548, 7.547, 7.546, 7.545, 7.544, 7.543, 7.542, 7.541, 7.540, 7.539, 7.538, 7.537, 7.536, 7.535, 7.534, 7.533, 7.532, 7.531, 7.530, 7.529, 7.528, 7.527, 7.526, 7.525, 7.524, 7.523, 7.522, 7.521, 7.520, 7.519, 7.518, 7.517, 7.516, 7.515, 7.514, 7.513, 7.512, 7.511, 7.510, 7.509, 7.508, 7.507, 7.506, 7.505, 7.504, 7.503, 7.502, 7.501, 7.500, 7.499, 7.498, 7.497, 7.496, 7.495, 7.494, 7.493, 7.492, 7.491, 7.490, 7.489, 7.488, 7.487, 7.486, 7.485, 7.484, 7.483, 7.482, 7.481, 7.480, 7.479, 7.478, 7.477, 7.476, 7.475, 7.474, 7.473, 7.472, 7.471, 7.470, 7.469, 7.468, 7.467, 7.466, 7.465, 7.464, 7.463, 7.462, 7.461, 7.460, 7.459, 7.458, 7.457, 7.456, 7.455, 7.454, 7.453, 7.452, 7.451, 7.450, 7.449, 7.448, 7.447, 7.446, 7.445, 7.444, 7.443, 7.442, 7.441, 7.440, 7.439, 7.438, 7.437, 7.436, 7.435, 7.434, 7.433, 7.432, 7.431, 7.430, 7.429, 7.428, 7.427, 7.426, 7.425, 7.424, 7.423, 7.422, 7.421, 7.420, 7.419, 7.418, 7.417, 7.416, 7.415, 7.414, 7.413, 7.412, 7.411, 7.410, 7.409, 7.408, 7.407, 7.406, 7.405, 7.404, 7.403, 7.402, 7.401, 7.400, 7.399, 7.398, 7.397, 7.396, 7.395, 7.394, 7.393, 7.392, 7.391, 7.390, 7.389, 7.388, 7.387, 7.386, 7.385, 7.384, 7.383, 7.382, 7.381, 7.380, 7.379, 7.378, 7.377, 7.376, 7.375, 7.374, 7.373, 7.372, 7.371, 7.370, 7.369, 7.368, 7.367, 7.366, 7.365, 7.364, 7.363, 7.362, 7.361, 7.360, 7.359, 7.358, 7.357, 7.356, 7.355, 7.354, 7.353, 7.352, 7.351, 7.350, 7.349, 7.348, 7.347, 7.346, 7.345, 7.344, 7.343, 7.342, 7.341, 7.340, 7.339, 7.338, 7.337, 7.336, 7.335, 7.334, 7.333, 7.332, 7.331, 7.330, 7.329, 7.328, 7.327, 7.326, 7.325, 7.324, 7.323, 7.322, 7.321, 7.320, 7.319, 7.318, 7.317, 7.316, 7.315, 7.314, 7.313, 7.312, 7.311, 7.310, 7.309, 7.308, 7.307, 7.306, 7.305, 7.304, 7.303, 7.302, 7.301, 7.300, 7.299, 7.298, 7.297, 7.296, 7.295, 7.294, 7.293, 7.292, 7.291, 7.290, 7.289, 7.288, 7.287, 7.286, 7.285, 7.284, 7.283, 7.282, 7.281, 7.280, 7.279, 7.278, 7.277, 7.276, 7.275, 7.274, 7.273, 7.272, 7.271, 7.270, 7.269, 7.268, 7.267, 7.266, 7.265, 7.264, 7.263, 7.262, 7.261, 7.260, 7.259, 7.258, 7.257, 7.256, 7.255, 7.254, 7.253, 7.252, 7.251, 7.250, 7.249, 7.248, 7.247, 7.246, 7.245, 7.244, 7.243, 7.242, 7.241, 7.240, 7.239, 7.238, 7.237, 7.236, 7.235, 7.234, 7.233, 7.232, 7.231, 7.230, 7.229, 7.228, 7.227, 7.226, 7.225, 7.224, 7.223, 7.222, 7.221, 7.220, 7.219, 7.218, 7.217, 7.216, 7.215, 7.214, 7.213, 7.212, 7.211, 7.210, 7.209, 7.208, 7.207, 7.206, 7.205, 7.204, 7.203, 7.202, 7.201, 7.200, 7.199, 7.198, 7.197, 7.196, 7.195, 7.194, 7.193, 7.192, 7.191, 7.190, 7.189, 7.188, 7

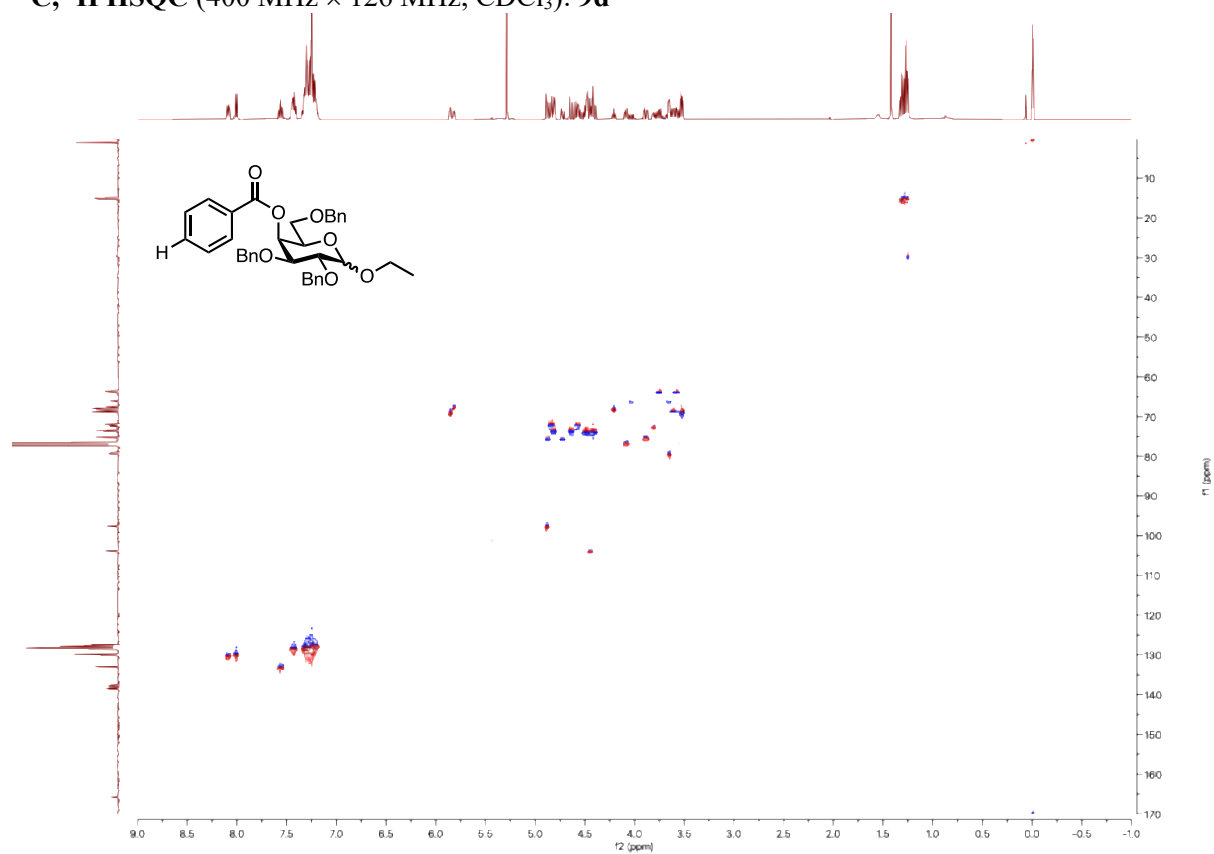
Chemical structure of compound 10:

CCO[C@H]1O[C@@H](OC(=O)c2ccc(C)cc2)[C@H](OC(=O)c3ccc(C)cc3)[C@@H](OC(=O)c4ccc(C)cc4)[C@H](OC(=O)c5ccc(C)cc5)[C@H]1O

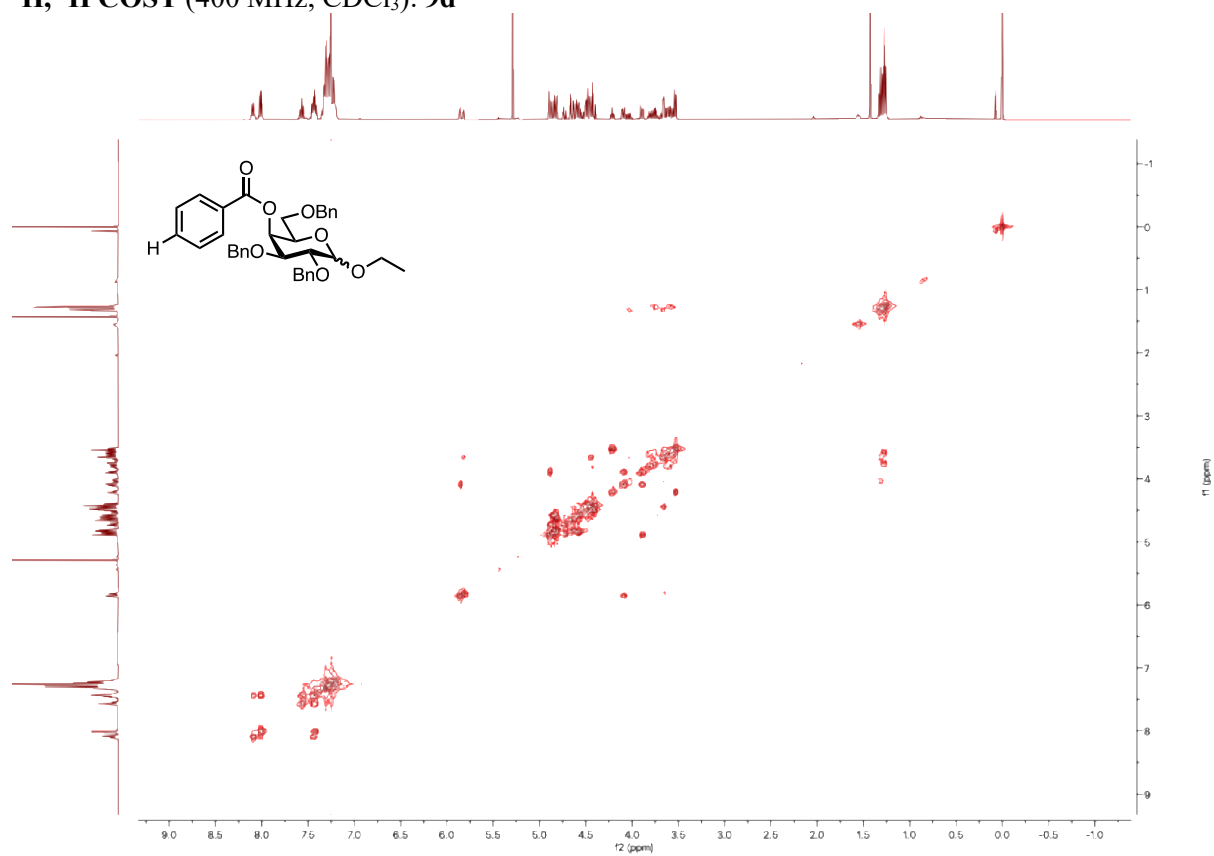
¹H NMR spectrum (CDCl₃):

- Chemical shift range:** 0 to 8 ppm.
- Peak assignments (ppm):**
 - 7.72, 7.64, 7.56, 7.48, 7.40, 7.32, 7.24, 7.16, 7.08, 6.99, 6.91, 6.83, 6.75, 6.67, 6.59, 6.51, 6.43, 6.35, 6.27, 6.19, 6.11, 6.03, 5.95, 5.87, 5.79, 5.71, 5.63, 5.55, 5.47, 5.39, 5.31, 5.23, 5.15, 5.07, 4.99, 4.91, 4.83, 4.75, 4.67, 4.59, 4.51, 4.43, 4.35, 4.27, 4.19, 4.11, 4.03, 3.95, 3.87, 3.79, 3.71, 3.63, 3.55, 3.47, 3.39, 3.31, 3.23, 3.15, 3.07, 2.99, 2.91, 2.83, 2.75, 2.67, 2.59, 2.51, 2.43, 2.35, 2.27, 2.19, 2.11, 2.03, 1.95, 1.87, 1.79, 1.71, 1.63, 1.55, 1.47, 1.39, 1.31, 1.23, 1.15, 1.07, 1.03, 1.01, 1.00, 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91, 0.90, 0.89, 0.88, 0.87, 0.86, 0.85, 0.84, 0.83, 0.82, 0.81, 0.80, 0.79, 0.78, 0.77, 0.76, 0.75, 0.74, 0.73, 0.72, 0.71, 0.70, 0.69, 0.68, 0.67, 0.66, 0.65, 0.64, 0.63, 0.62, 0.61, 0.60, 0.59, 0.58, 0.57, 0.56, 0.55, 0.54, 0.53, 0.52, 0.51, 0.50, 0.49, 0.48, 0.47, 0.46, 0.45, 0.44, 0.43, 0.42, 0.41, 0.40, 0.39, 0.38, 0.37, 0.36, 0.35, 0.34, 0.33, 0.32, 0.31, 0.30, 0.29, 0.28, 0.27, 0.26, 0.25, 0.24, 0.23, 0.22, 0.21, 0.20, 0.19, 0.18, 0.17, 0.16, 0.15, 0.14, 0.13, 0.12, 0.11, 0.10, 0.09, 0.08, 0.07, 0.06, 0.05, 0.04, 0.03, 0.02, 0.01, 0.00.

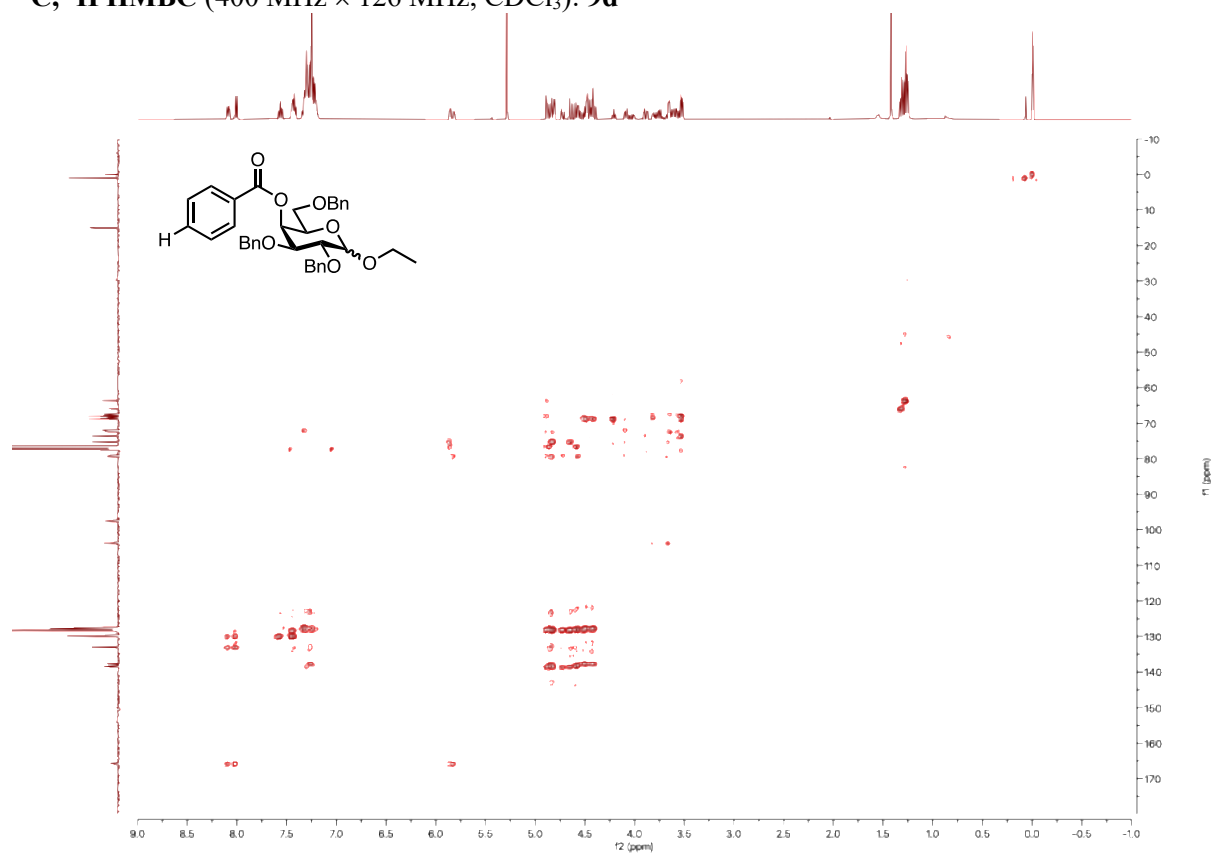
^{13}C , ^1H HSQC (400 MHz $\times$ 126 MHz, CDCl_3): **9d**



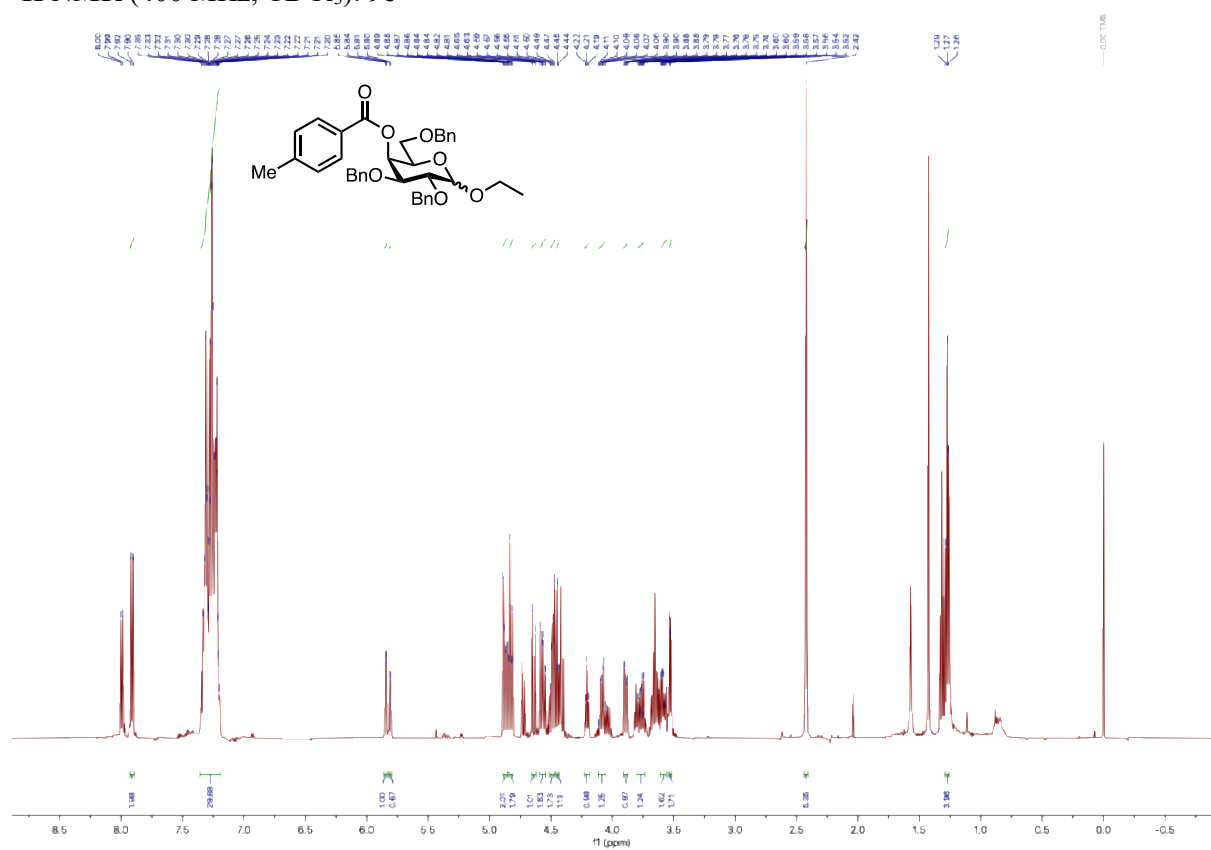
^1H , ^1H COSY (400 MHz, CDCl_3): **9d**



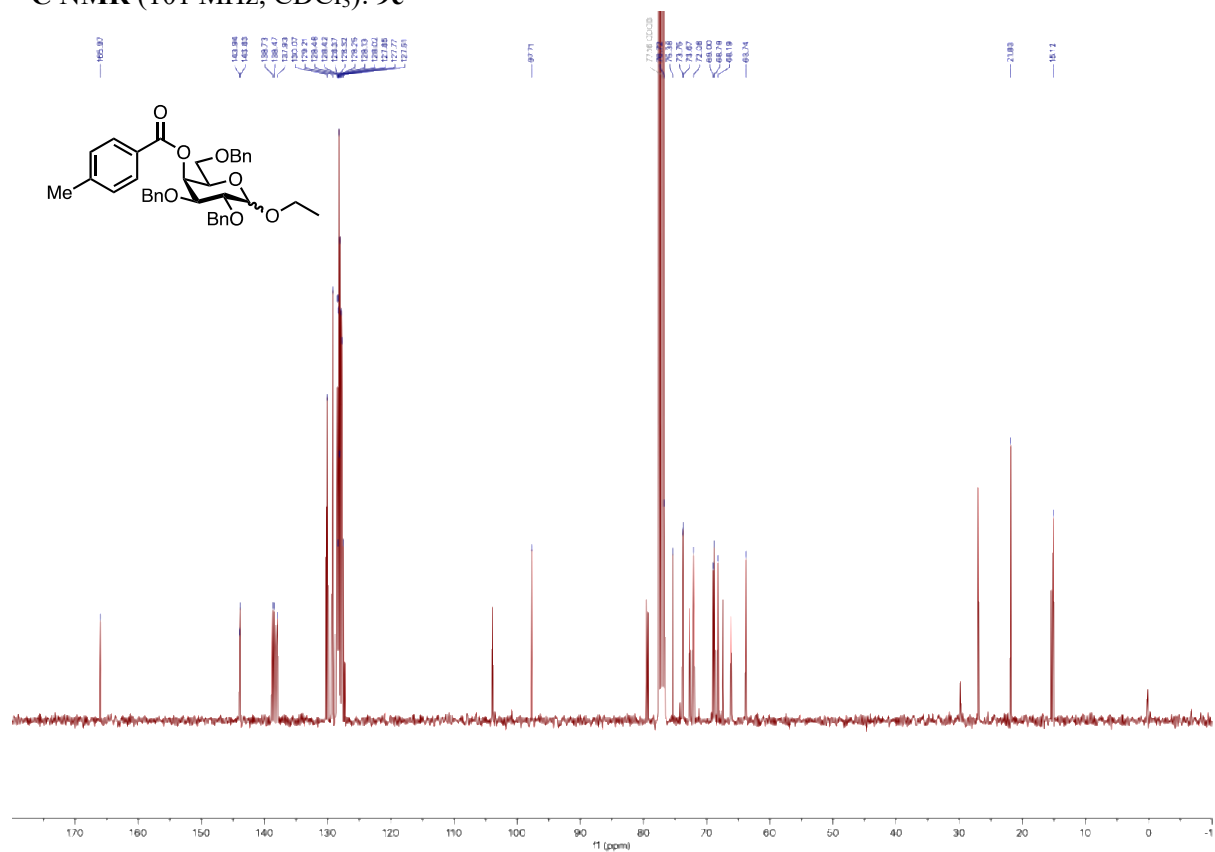
^{13}C , ^1H HMBC (400 MHz $\times$ 126 MHz, CDCl_3): **9d**



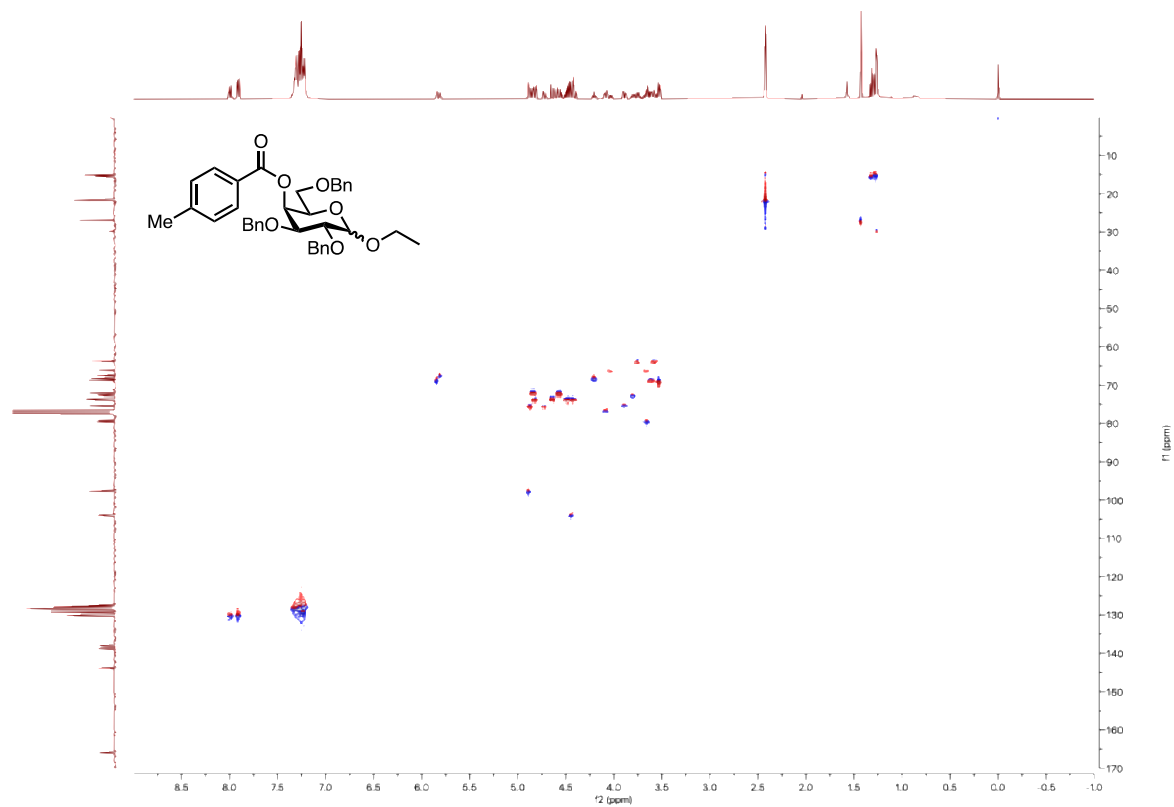
^1H NMR (400 MHz, CDCl_3): **9e**



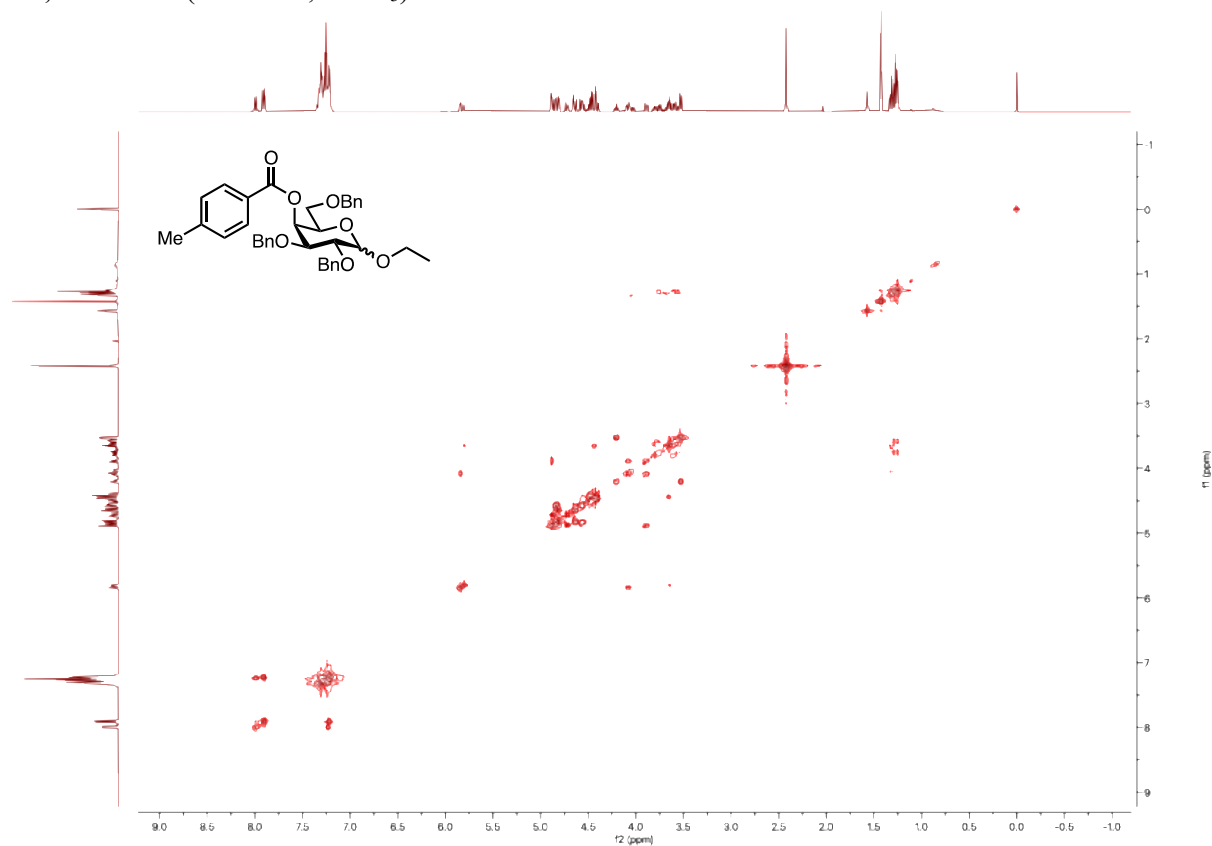
^{13}C NMR (101 MHz, CDCl_3): **9e**



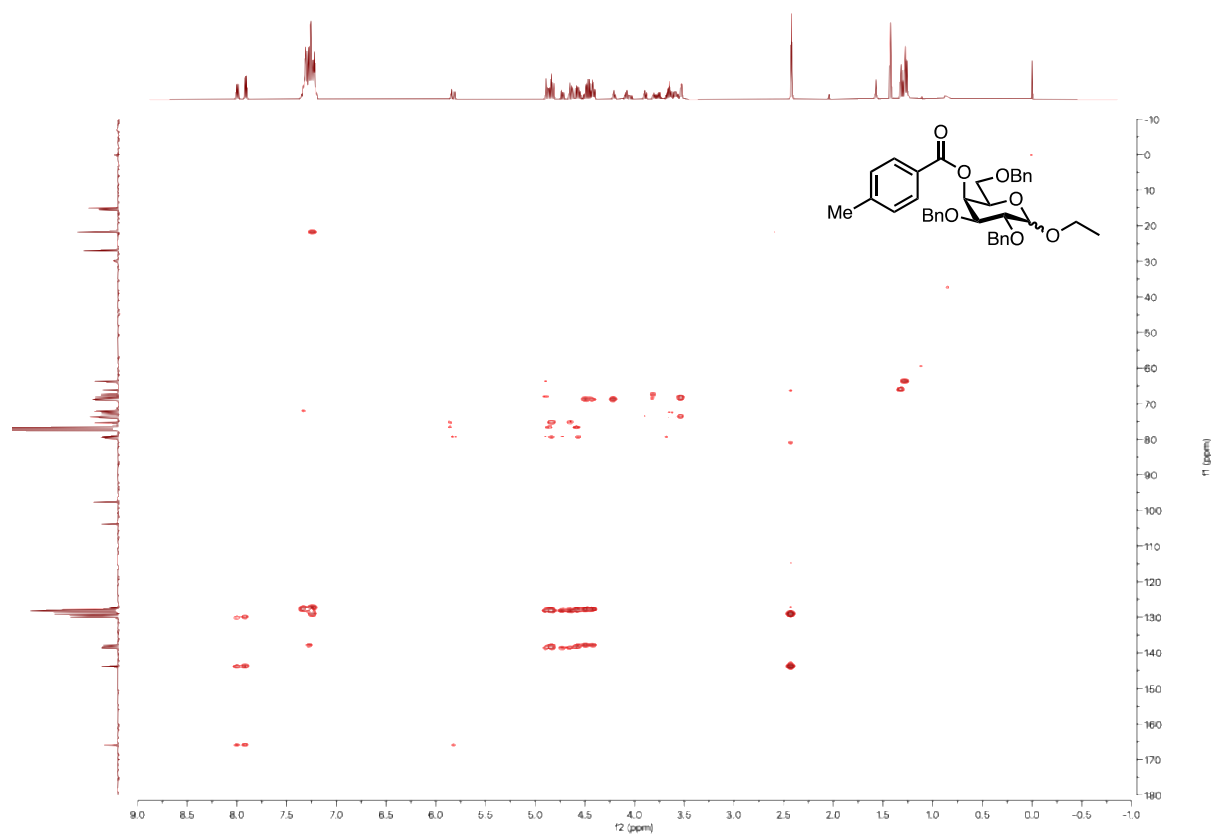
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9e**



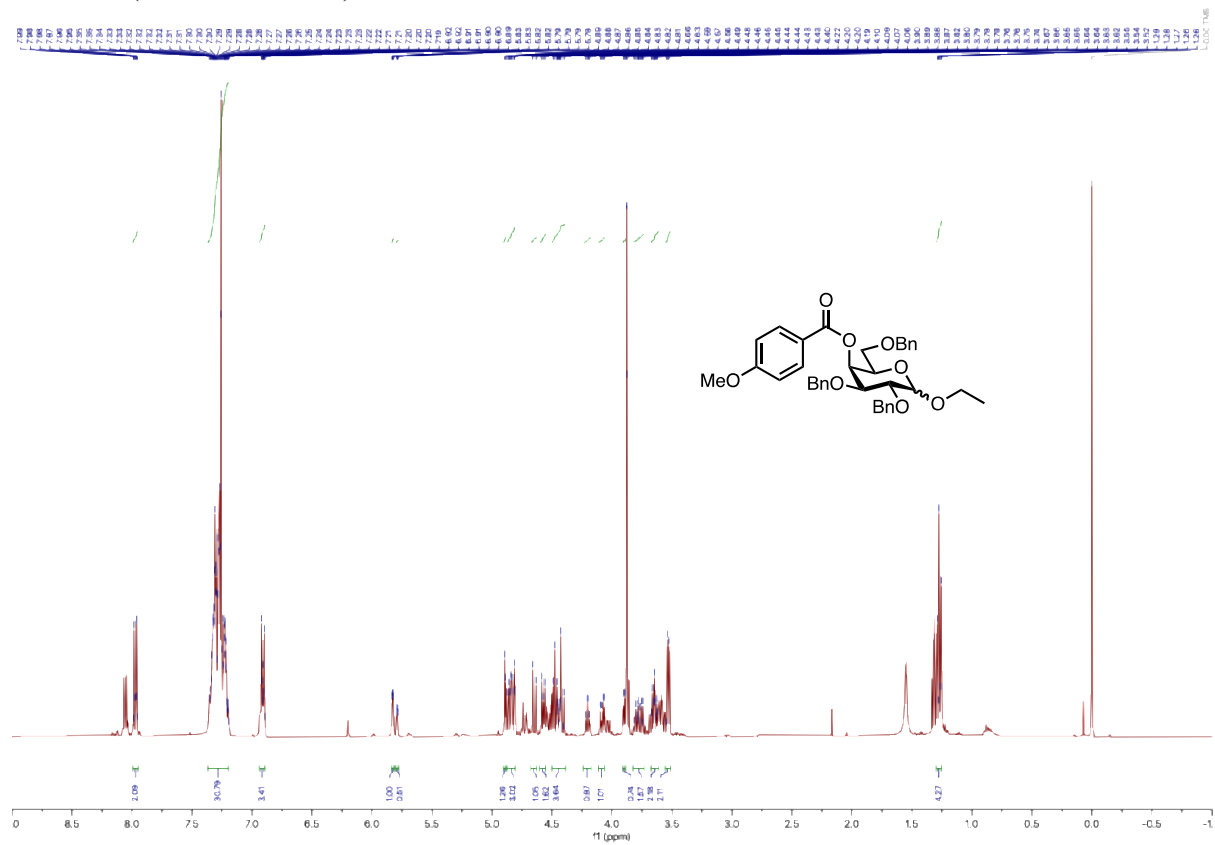
^1H , ^1H COSY (400 MHz, CDCl_3): **9e**



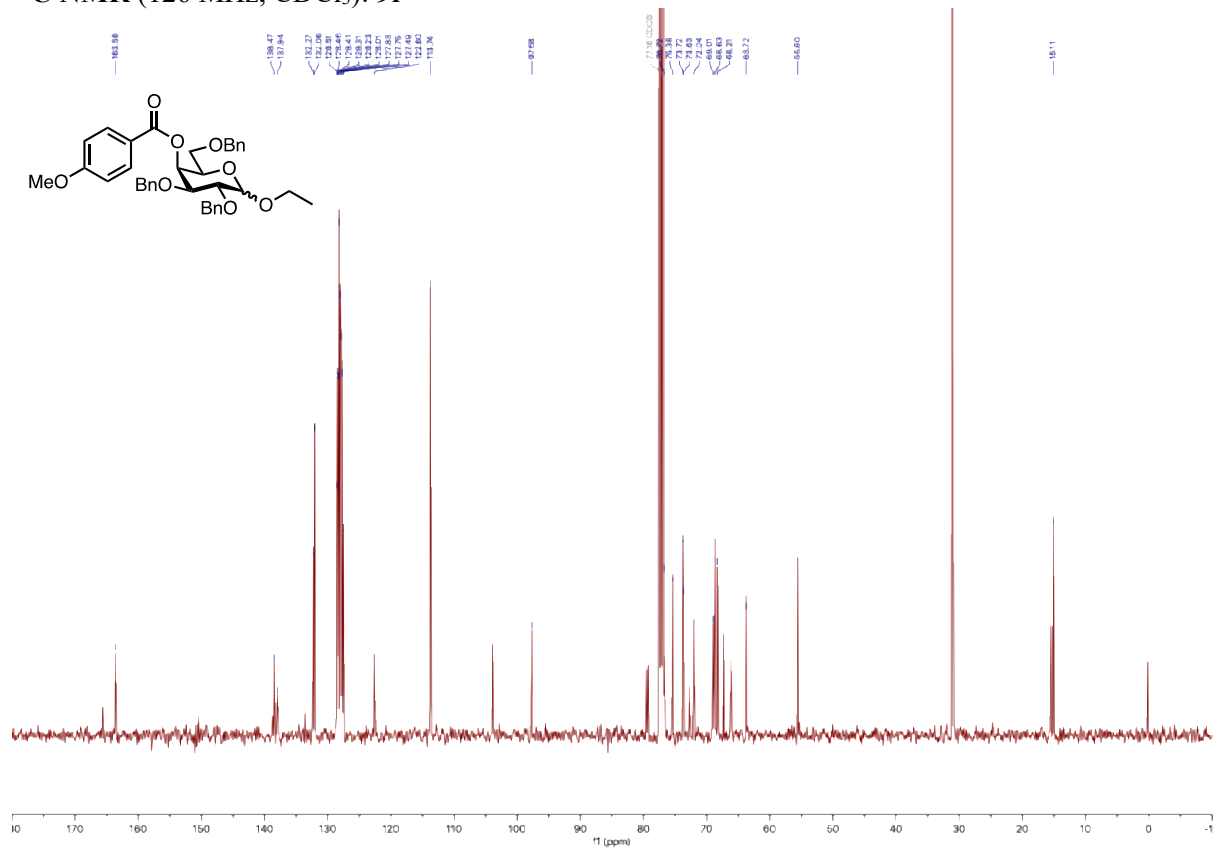
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **9e**



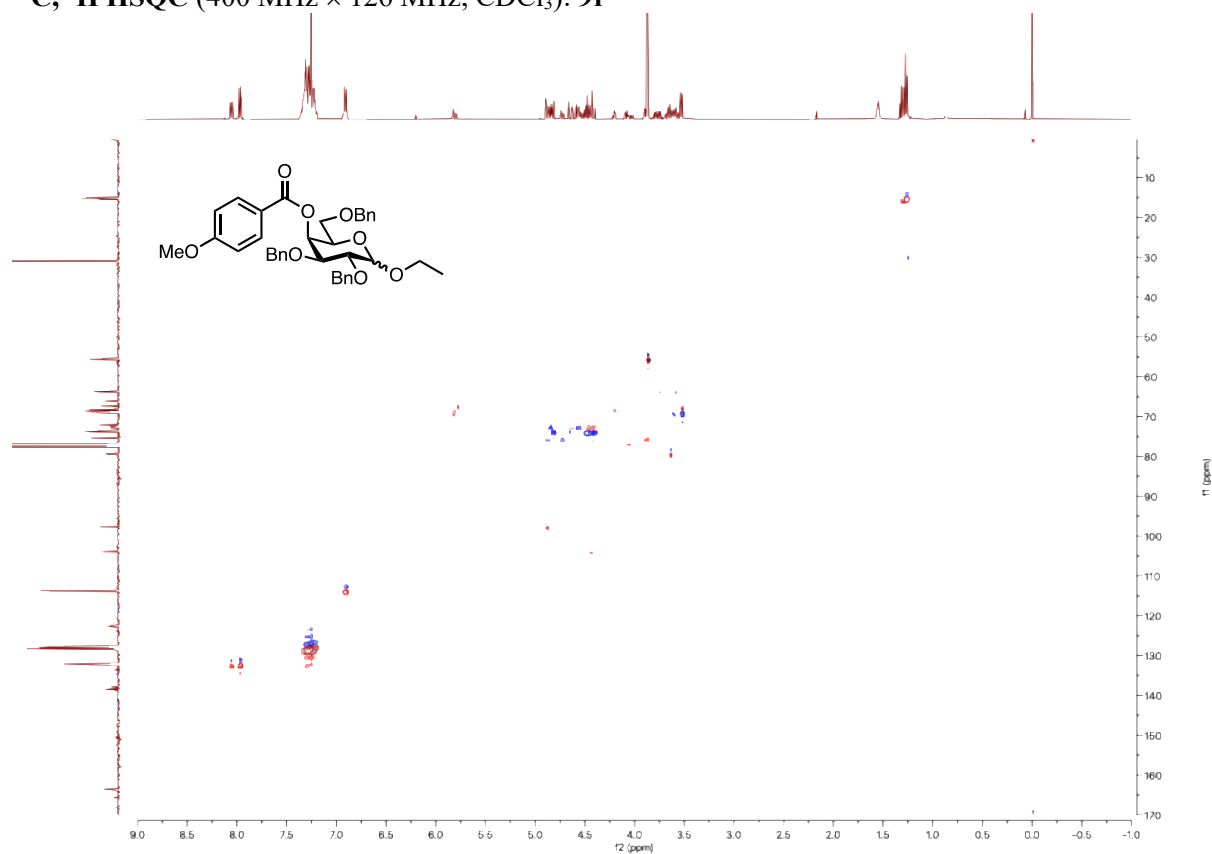
¹H NMR (400 MHz, CDCl₃): **9f**



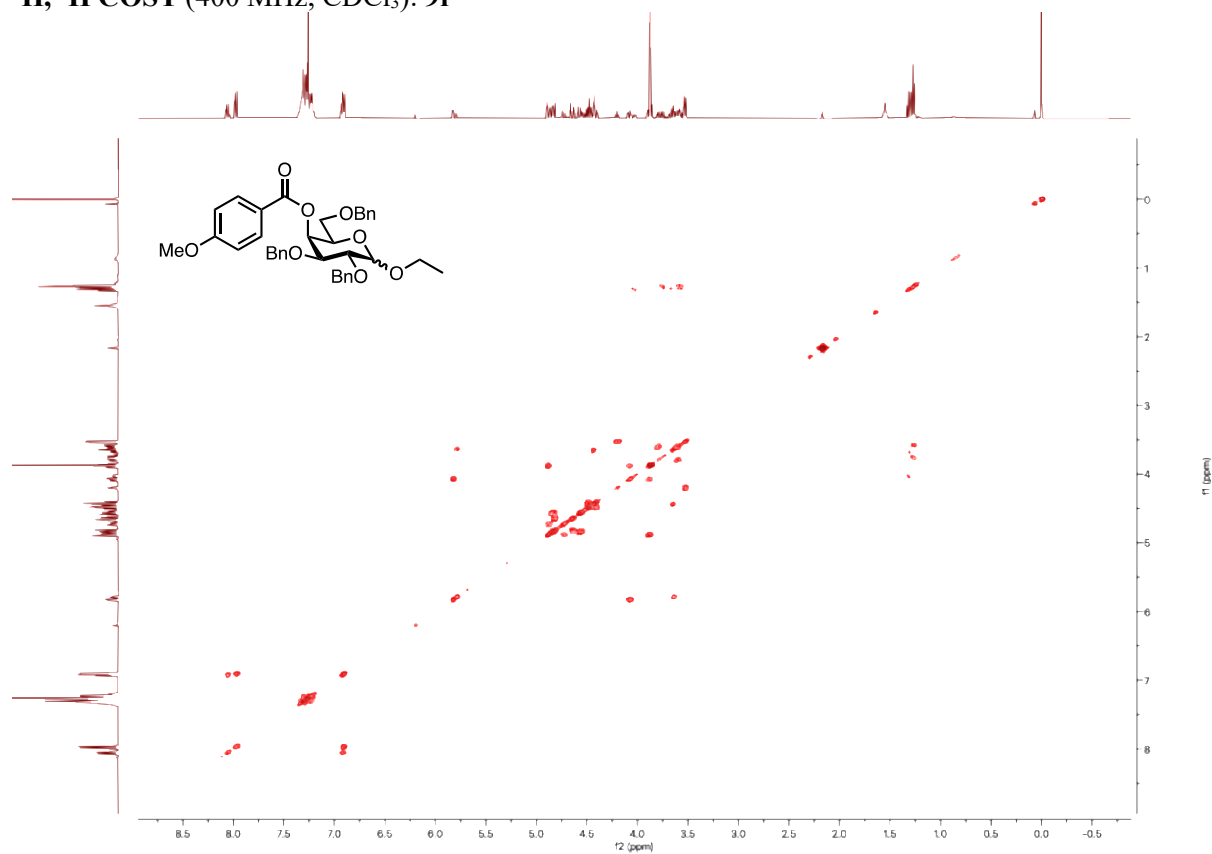
¹³C NMR (126 MHz, CDCl₃): **9f**



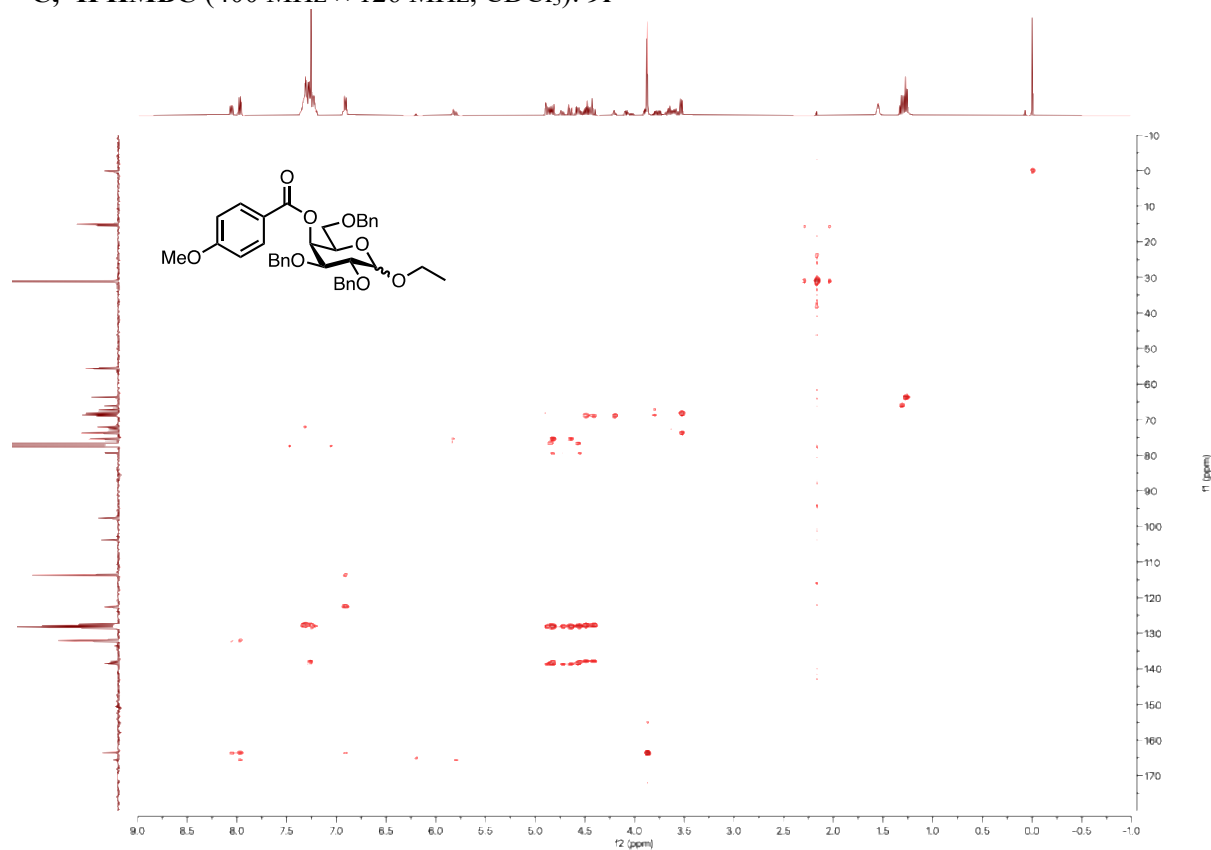
^{13}C , ^1H HSQC (400 MHz $\times$ 126 MHz, CDCl_3): **9f**



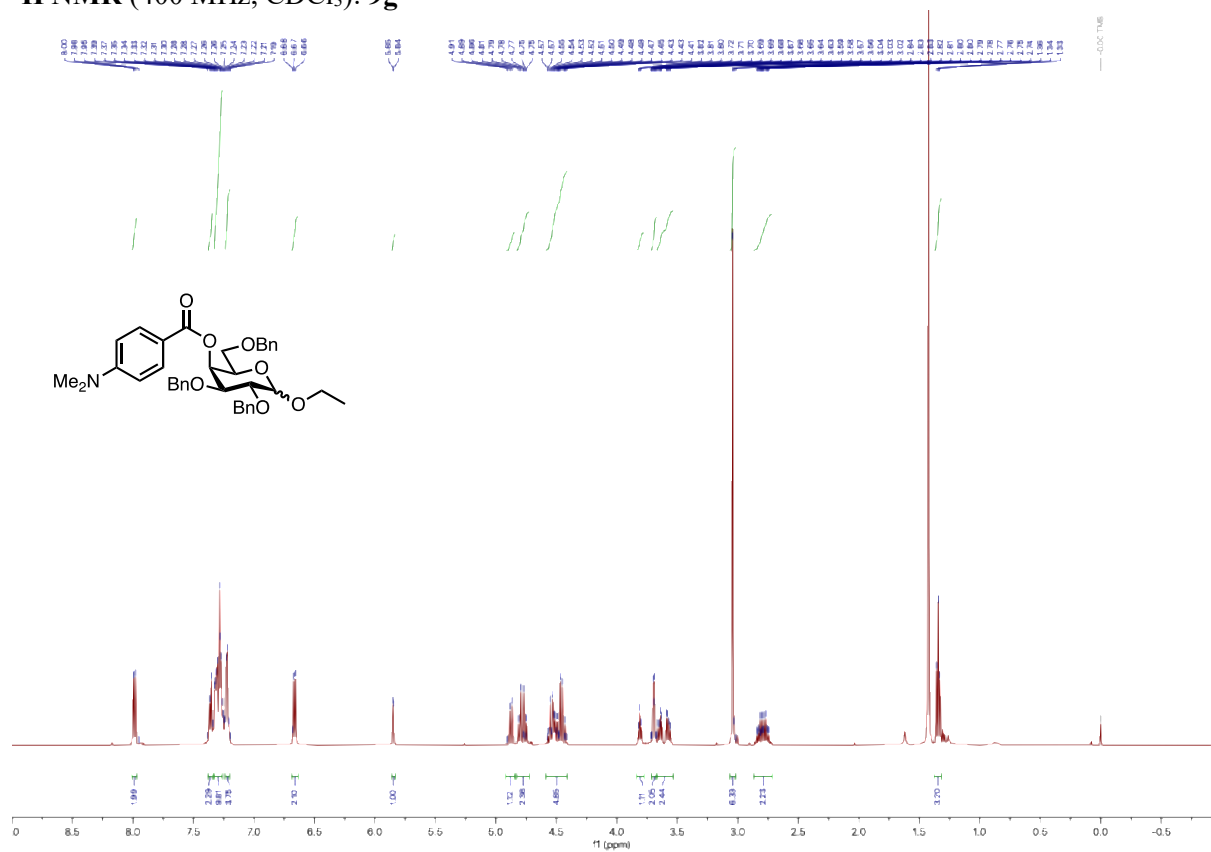
^1H , ^1H COSY (400 MHz, CDCl_3): **9f**



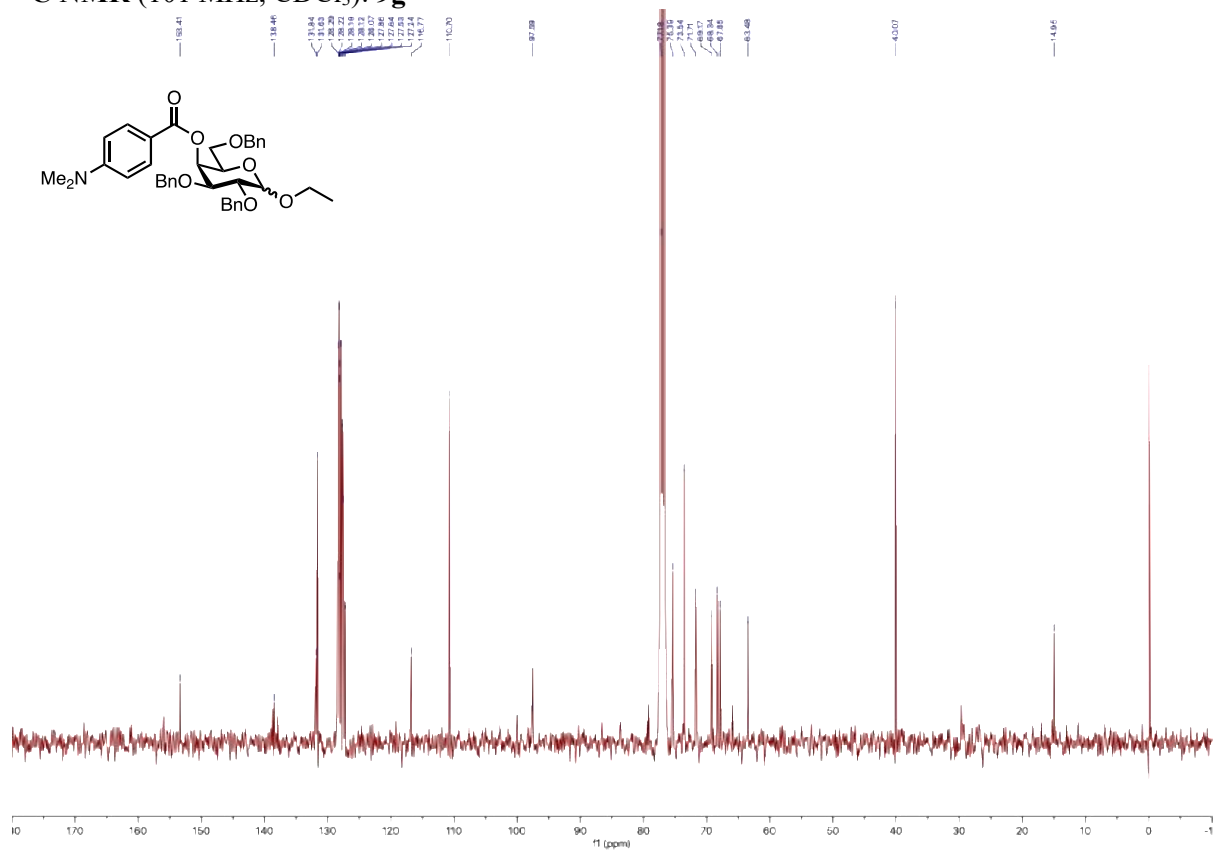
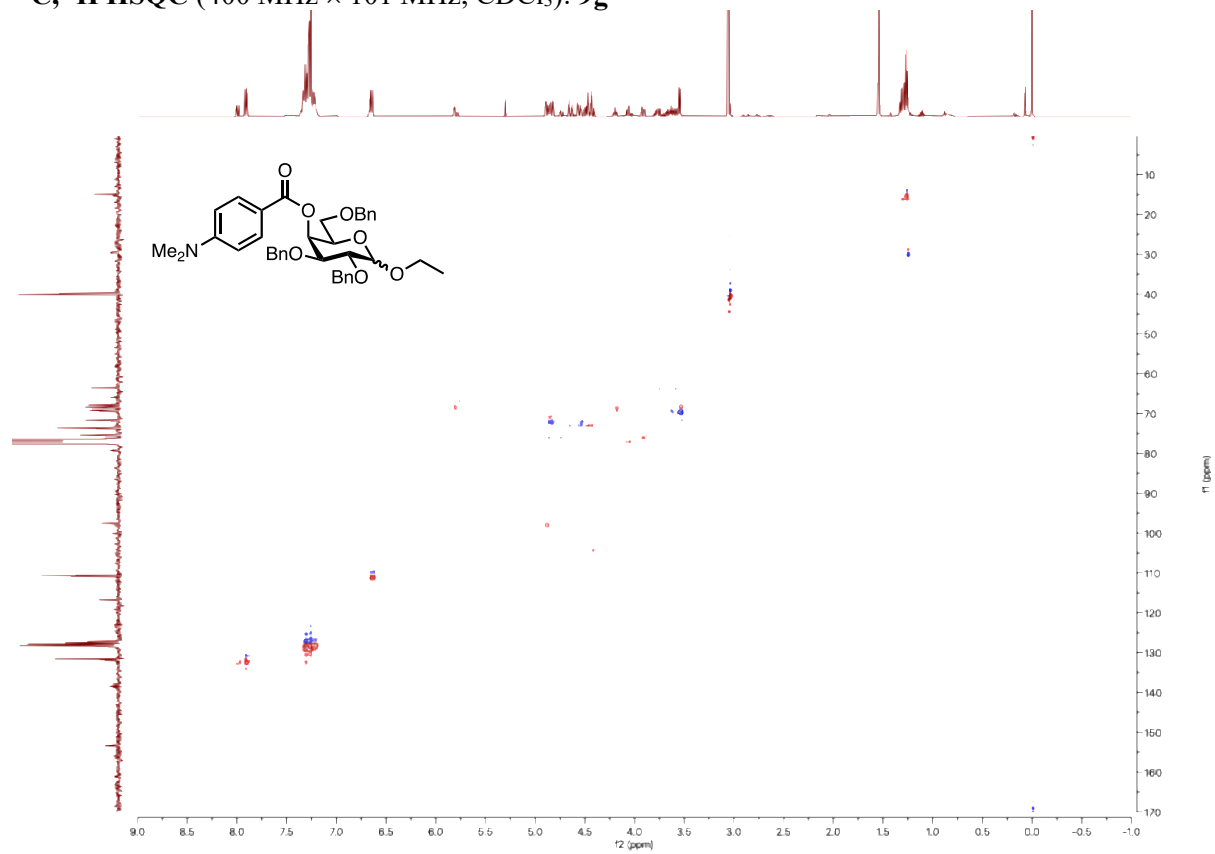
^{13}C , ^1H HMBC (400 MHz $\times$ 126 MHz, CDCl_3): **9f**



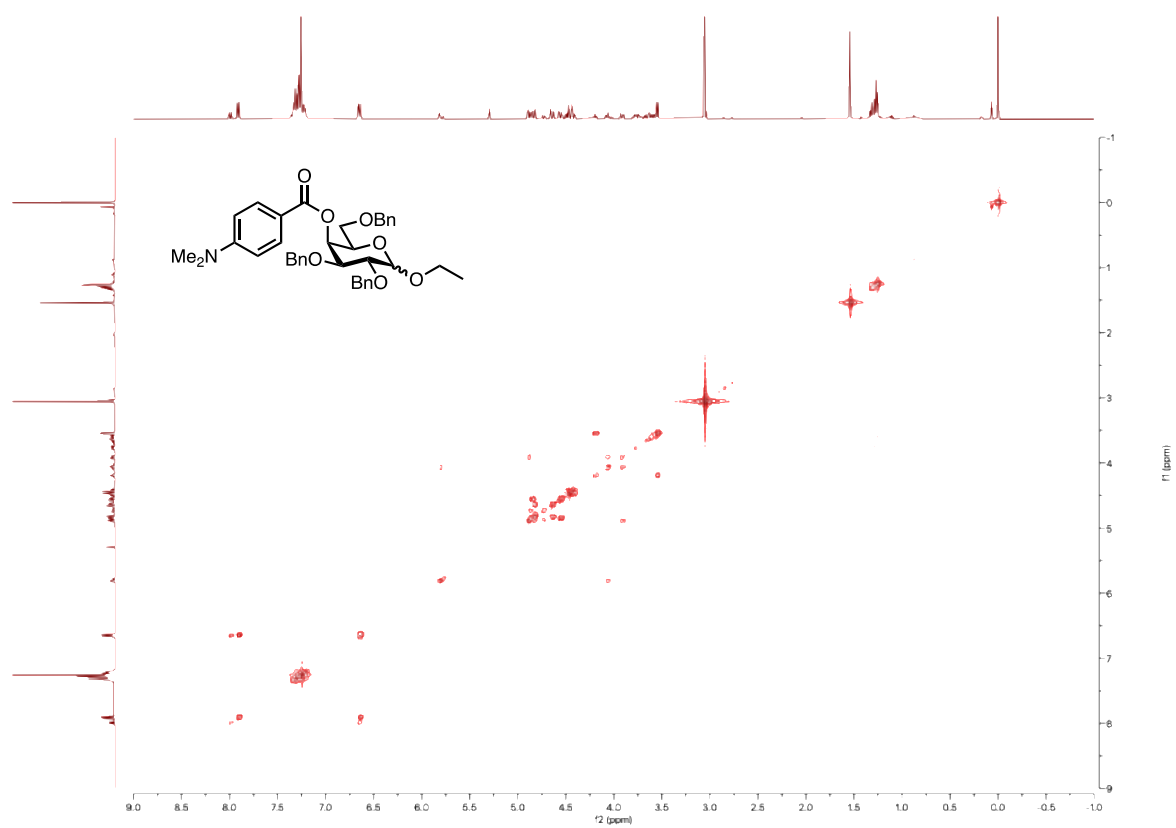
^1H NMR (400 MHz, CDCl_3): **9g**



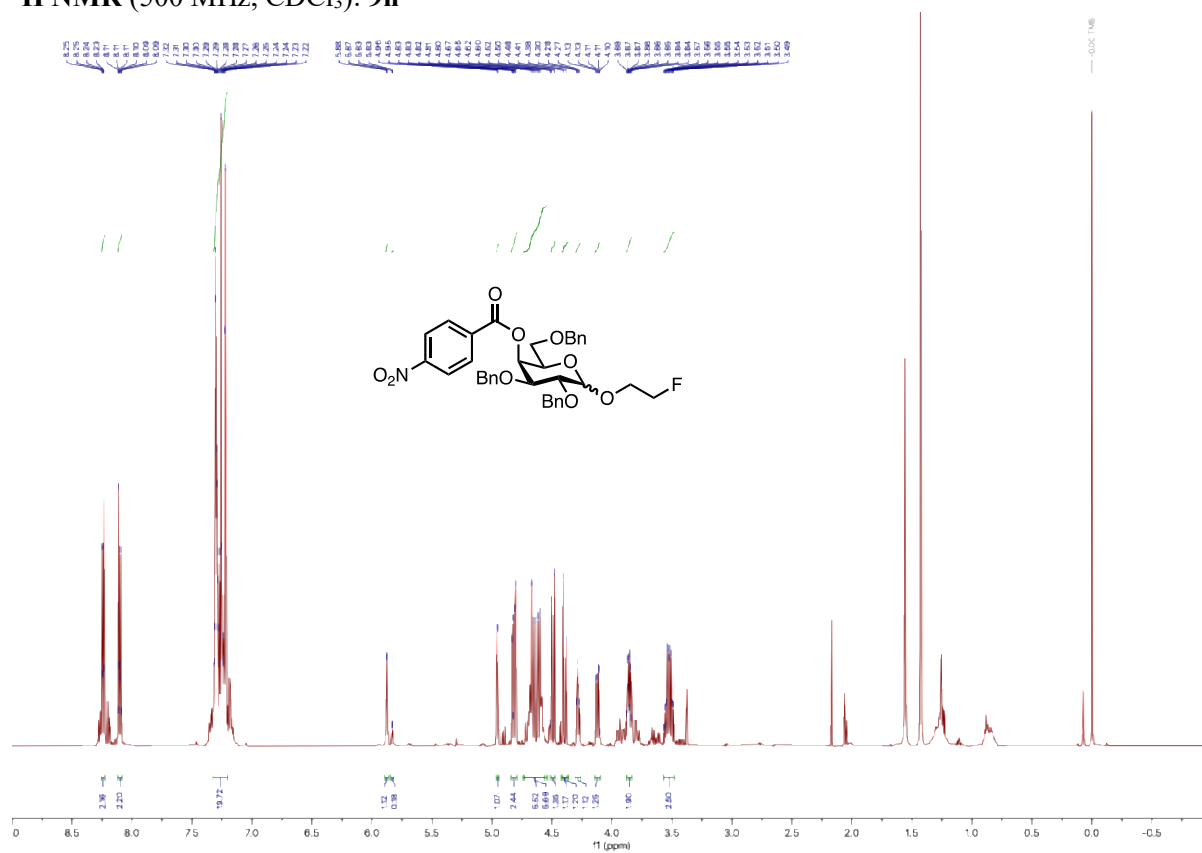
¹³C NMR (101 MHz, CDCl₃): **9g**

 $^{13}\text{C}, ^1\text{H}$ HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9g**

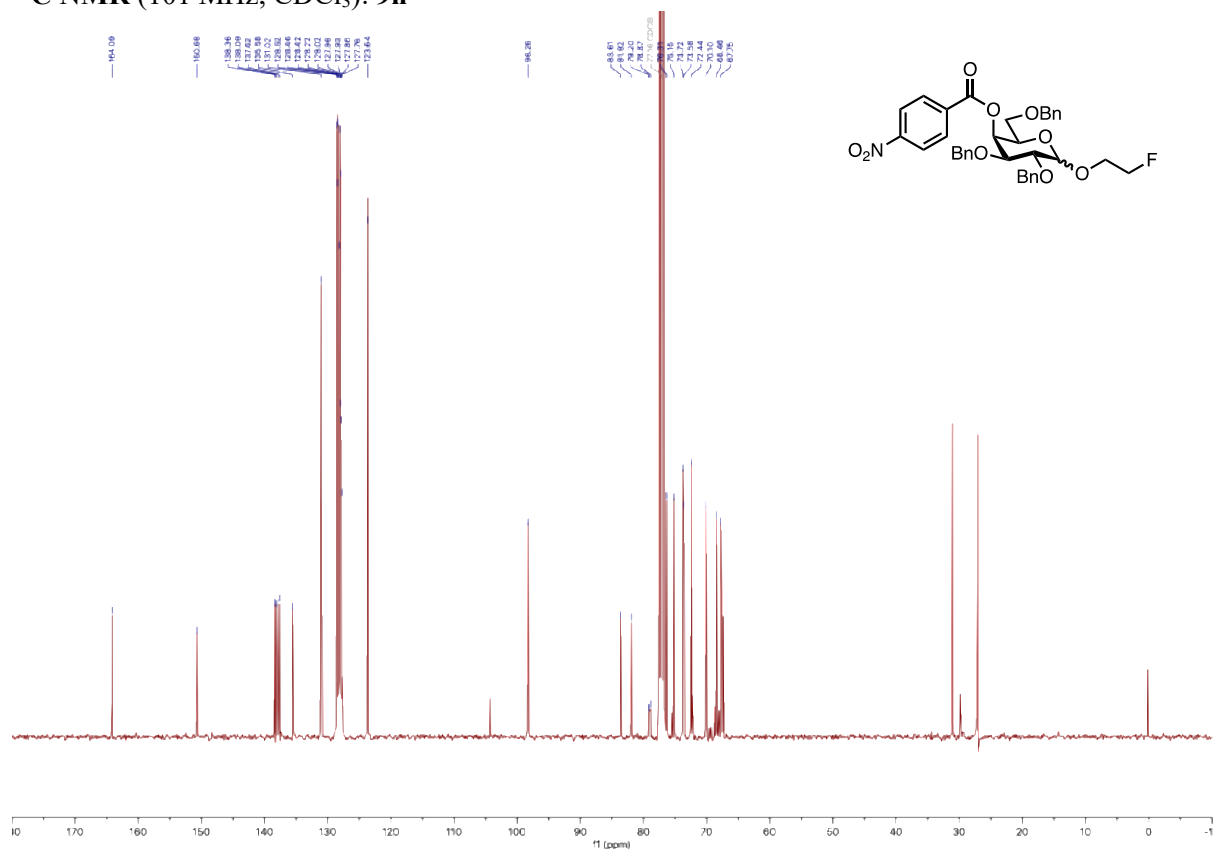
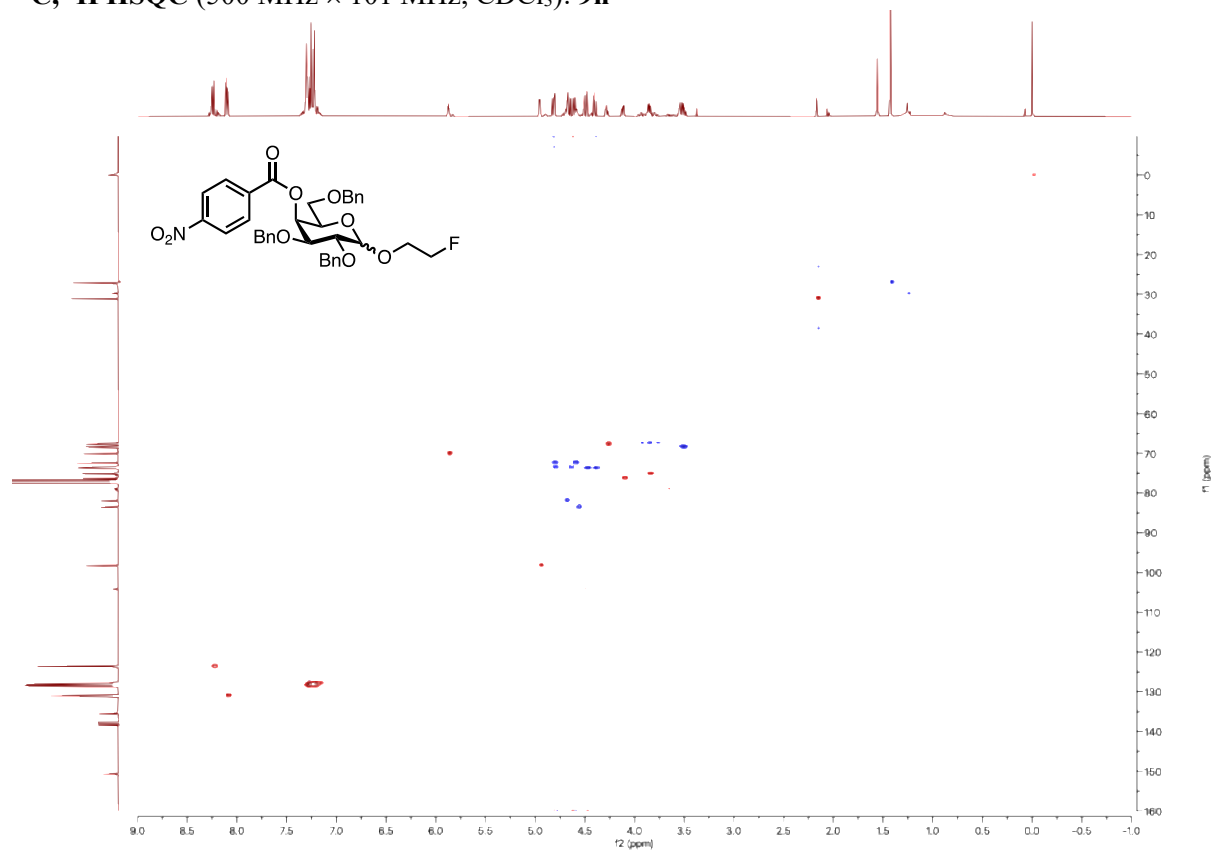
^1H , ^1H COSY (400 MHz, CDCl_3): **9g**



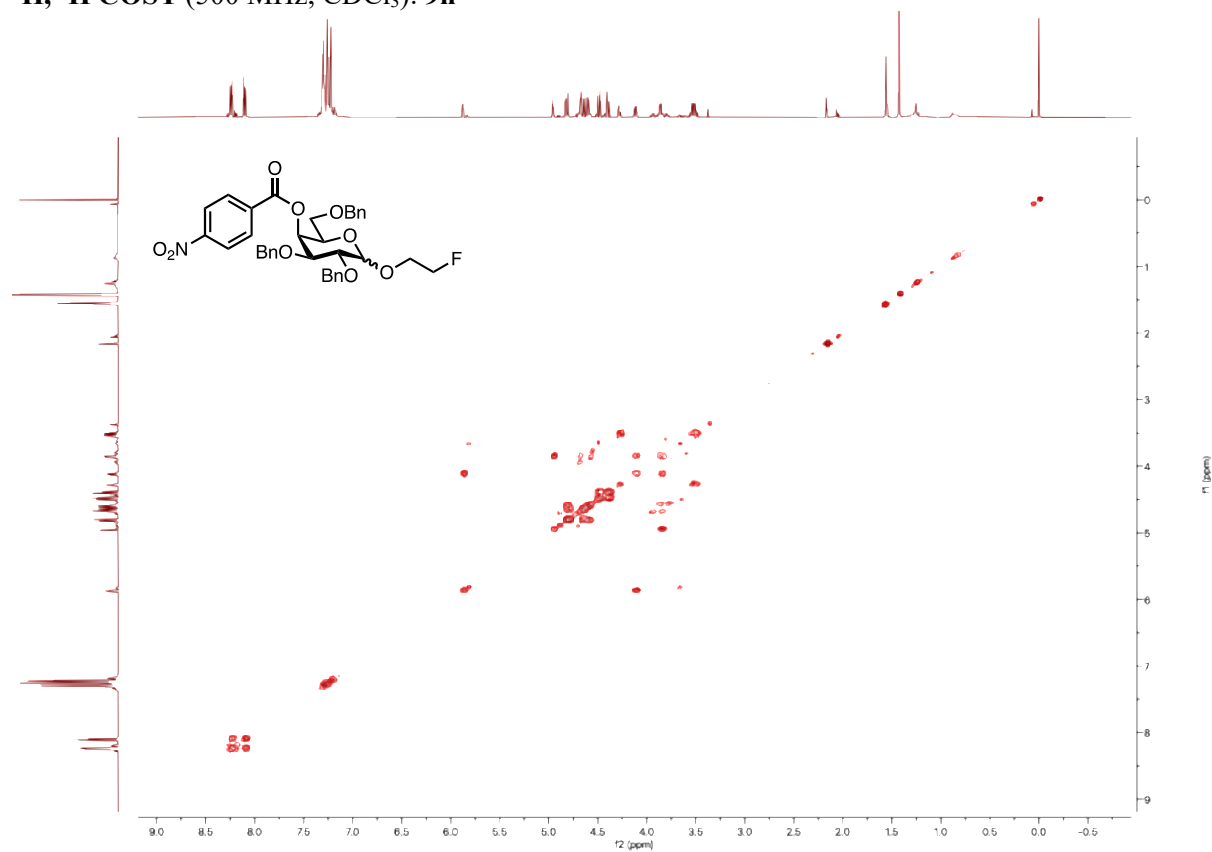
^1H NMR (500 MHz, CDCl_3): **9h**



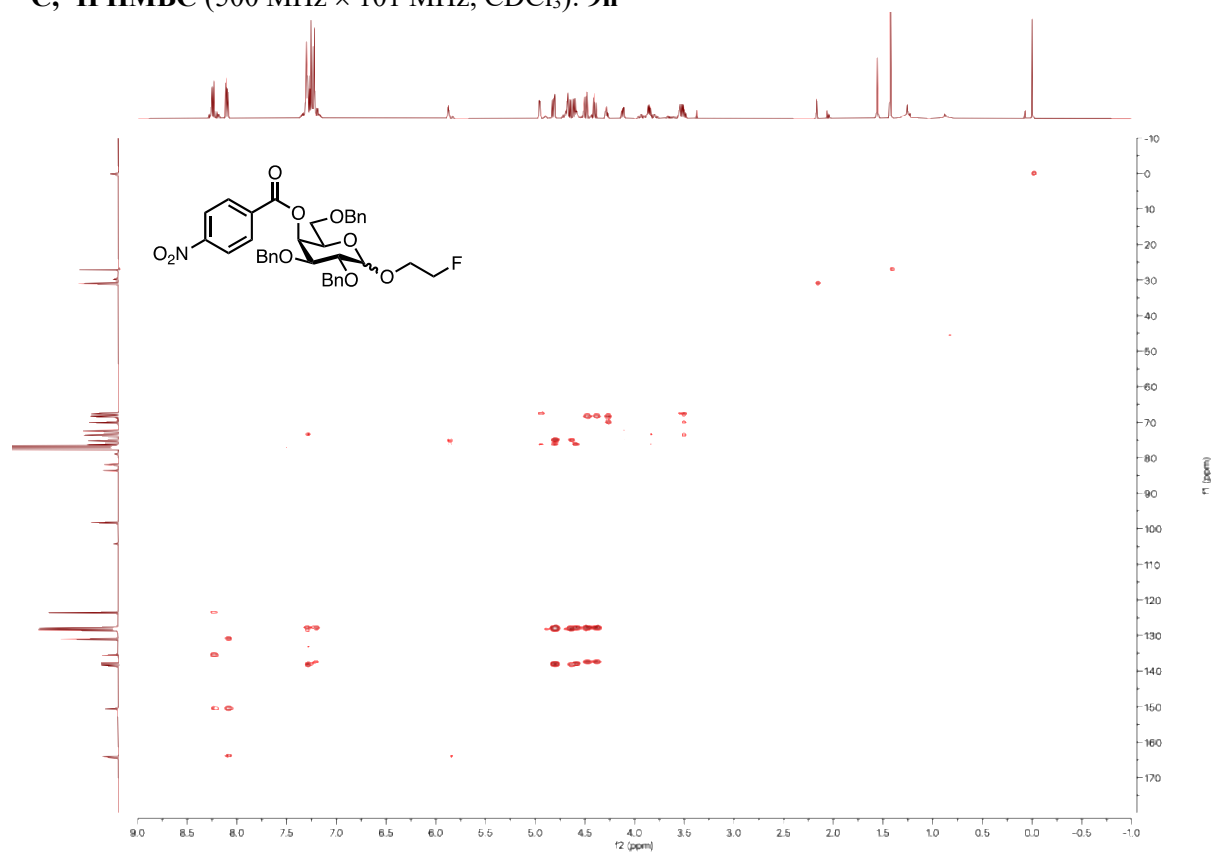
¹³C NMR (101 MHz, CDCl₃): **9h**

 ^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **9h**

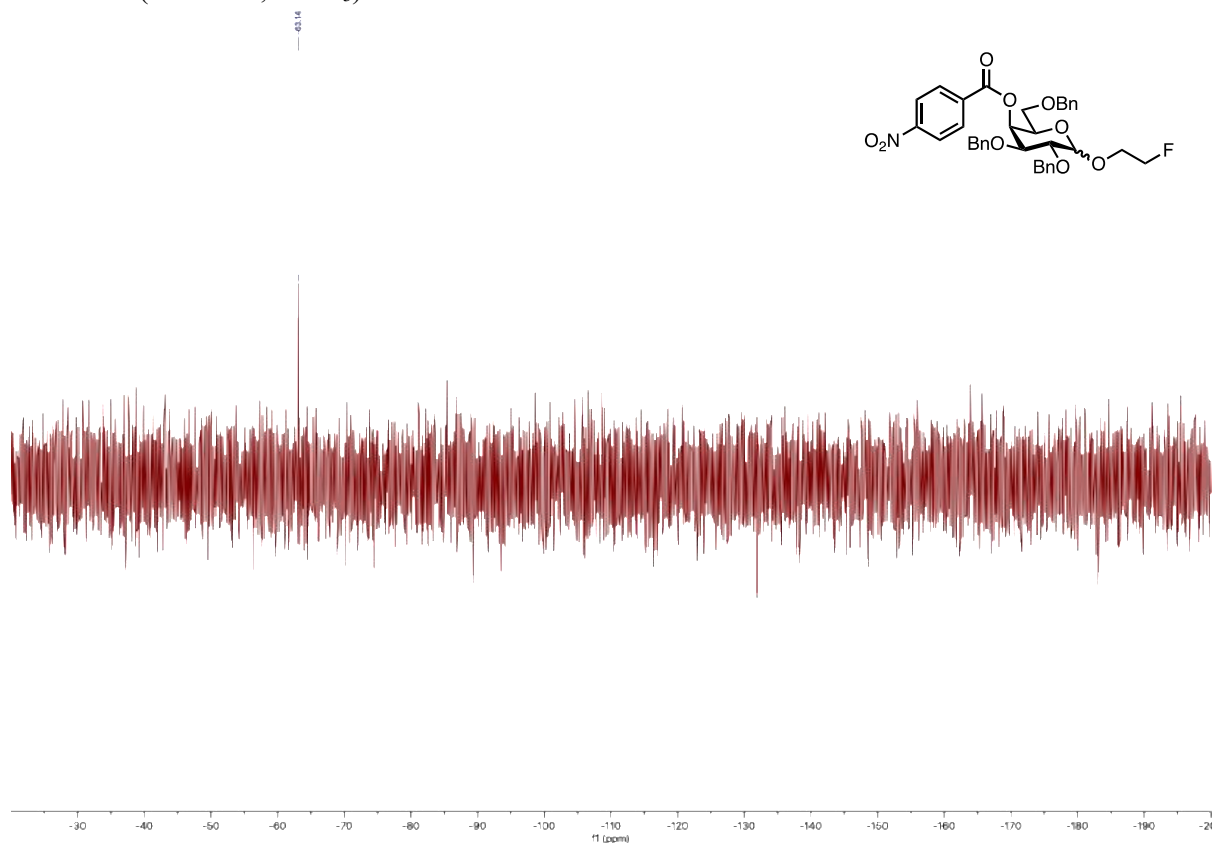
^1H , ^1H COSY (500 MHz, CDCl_3): 9h



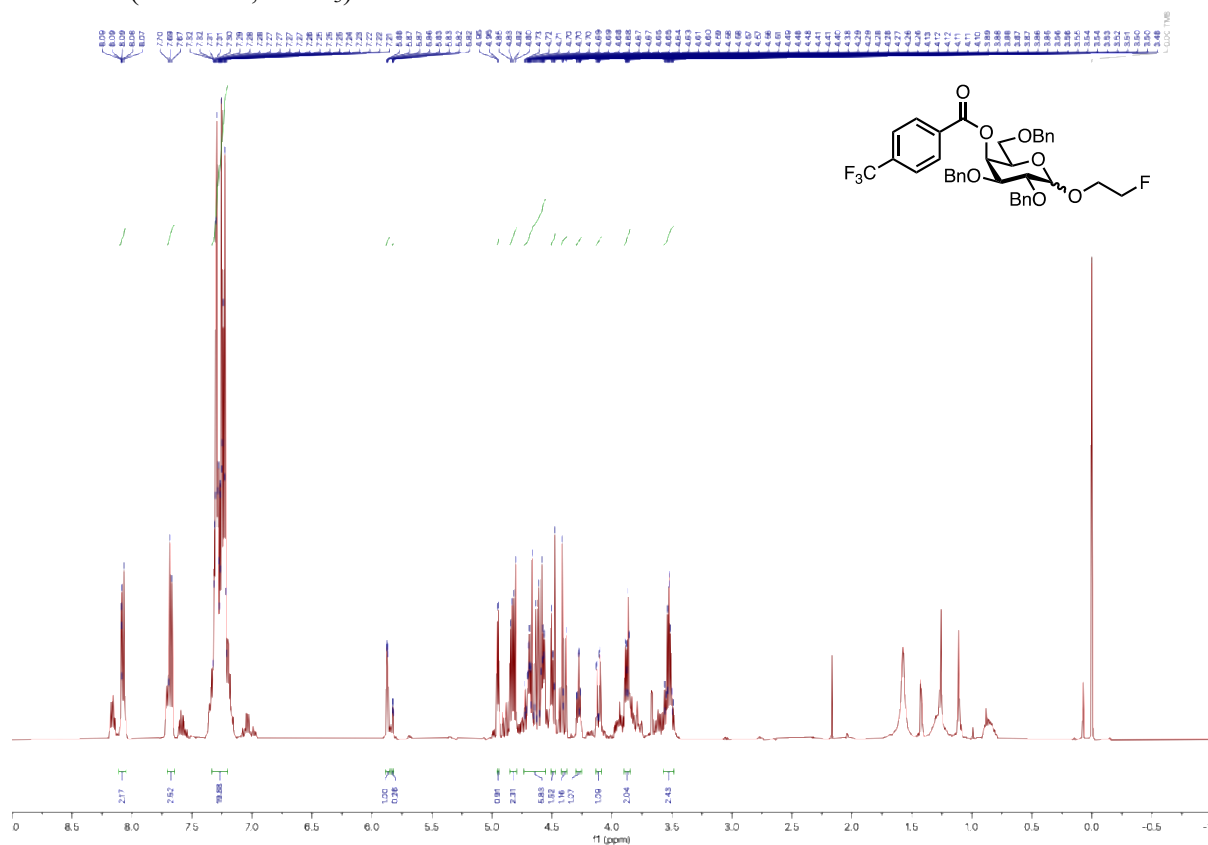
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): 9h



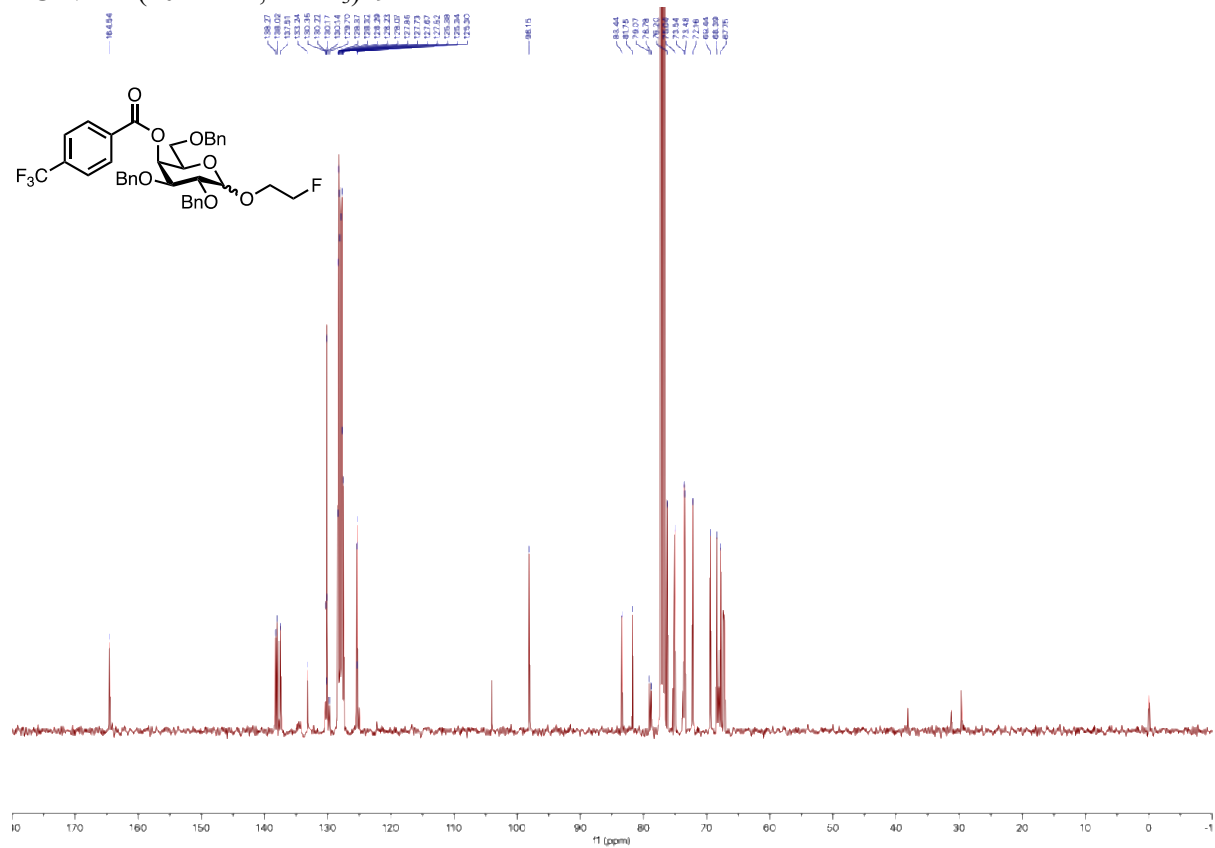
^{19}F NMR (376 MHz, CDCl_3): **9h**



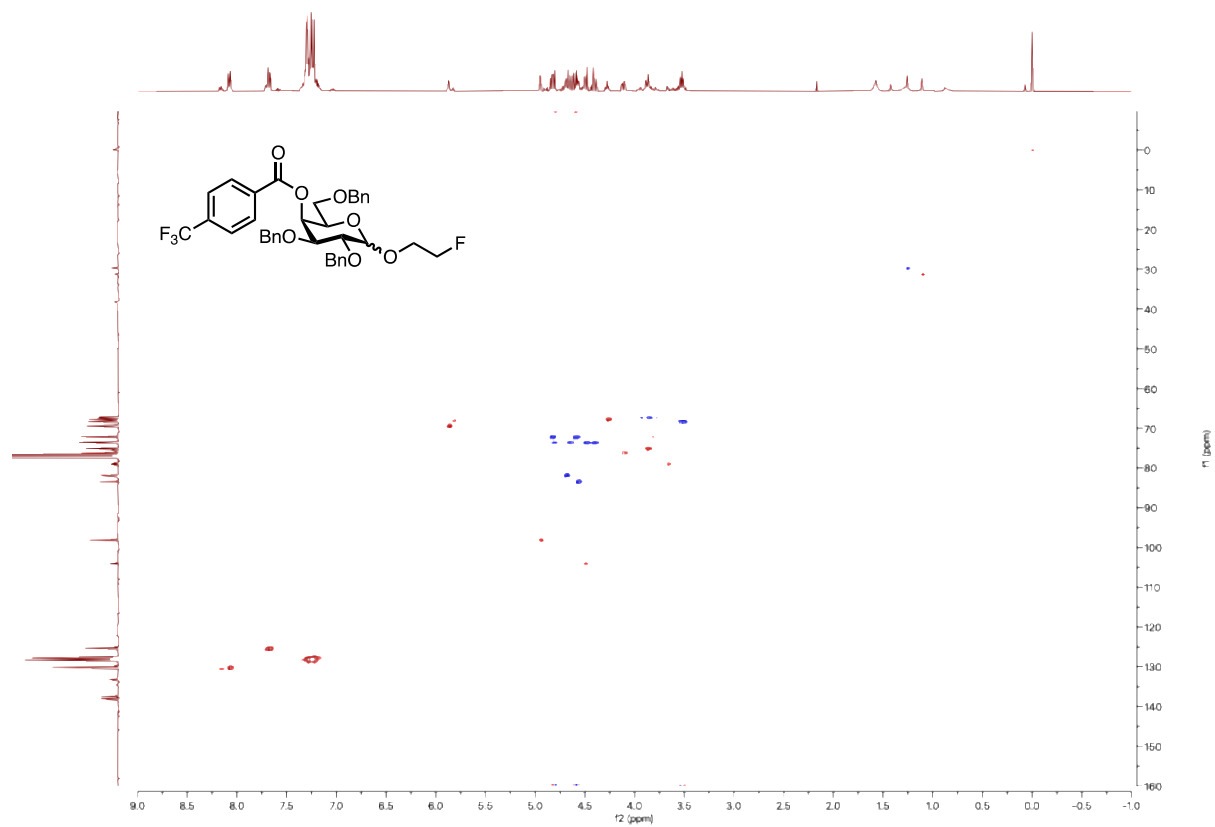
^1H NMR (400 MHz, CDCl_3): **9i**



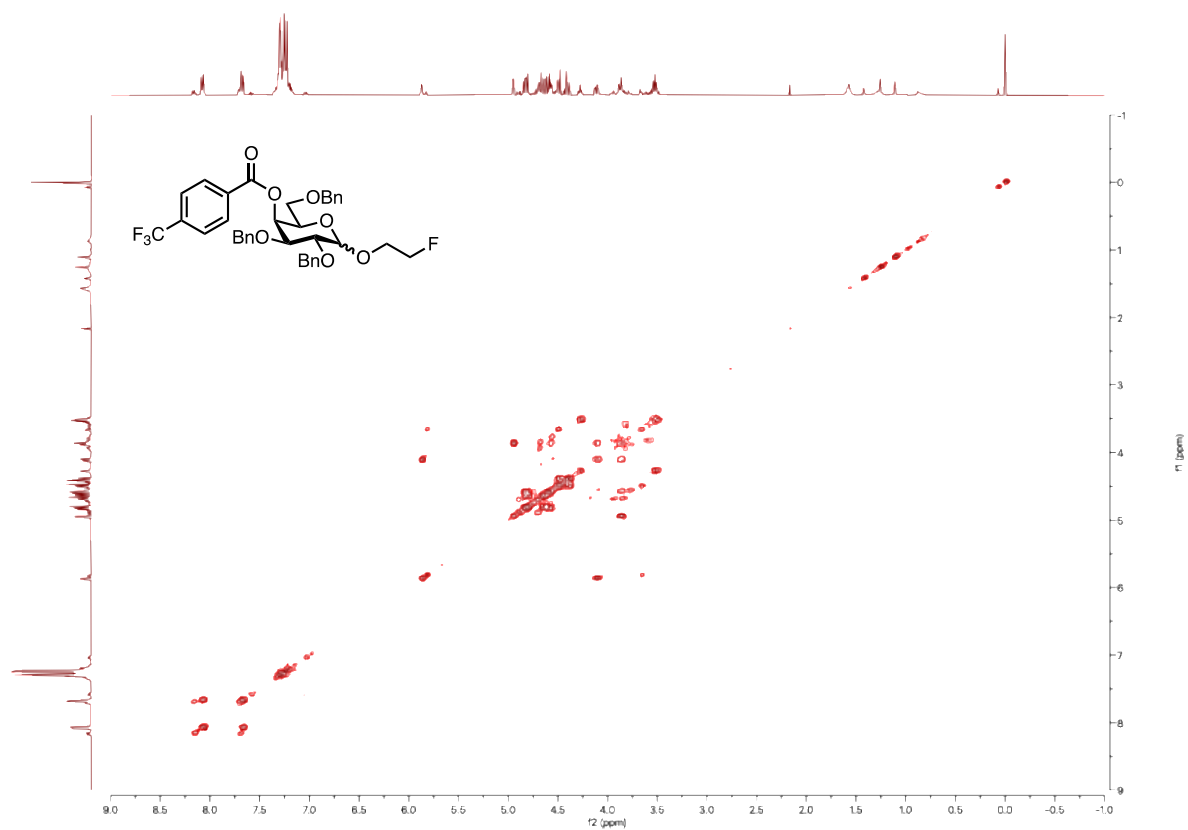
^{13}C NMR (101 MHz, CDCl_3): **9i**



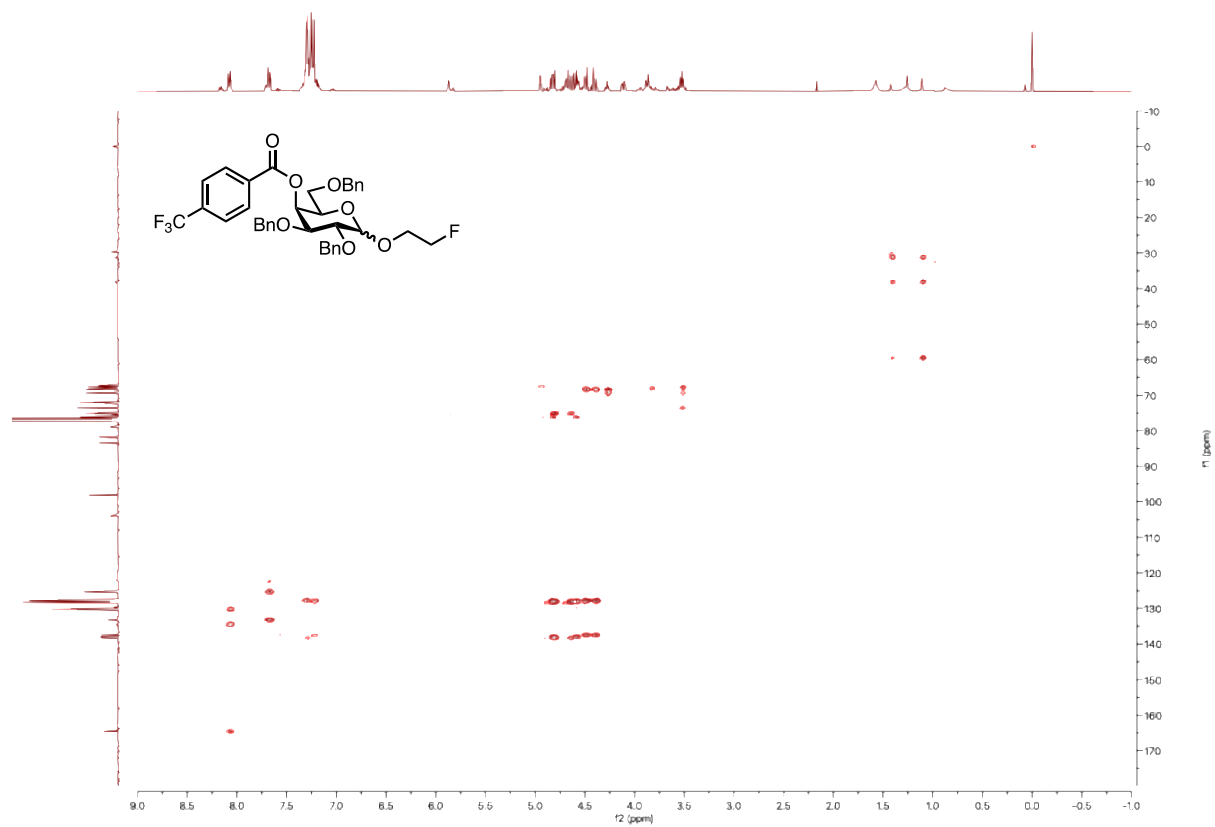
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9i**



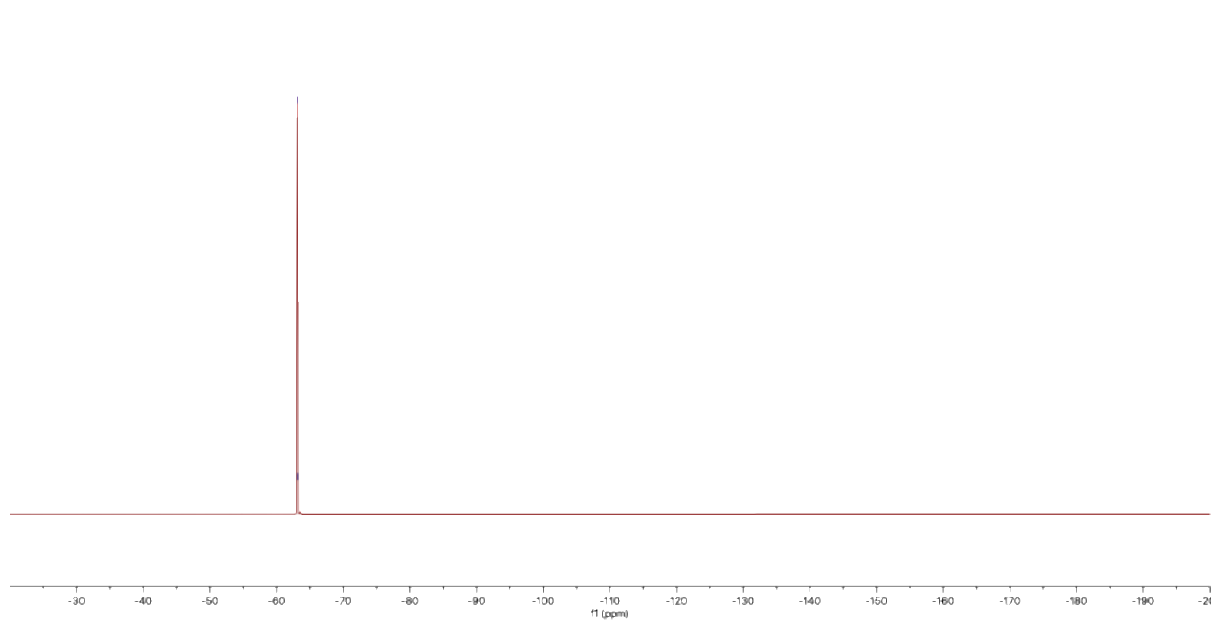
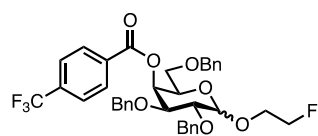
^1H , ^1H COSY (400 MHz, CDCl_3): **9i**



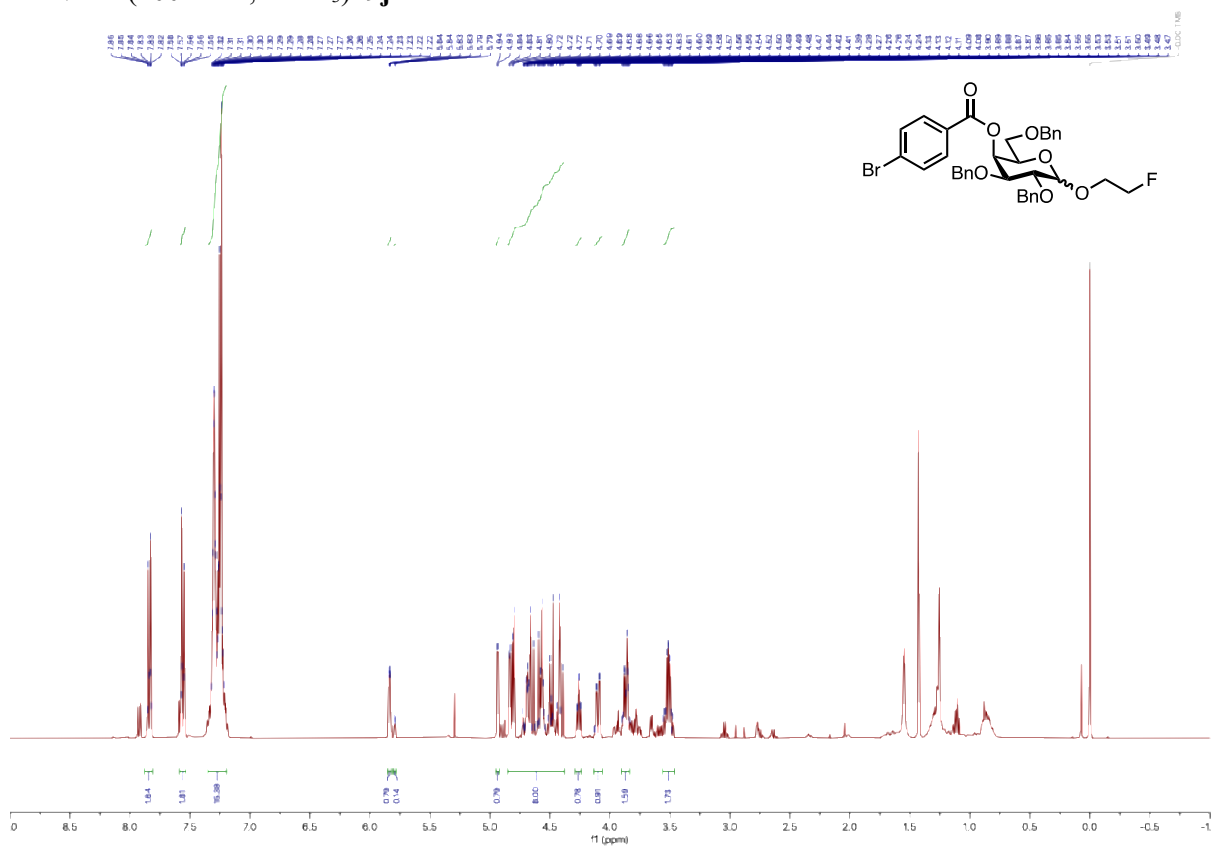
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **9i**



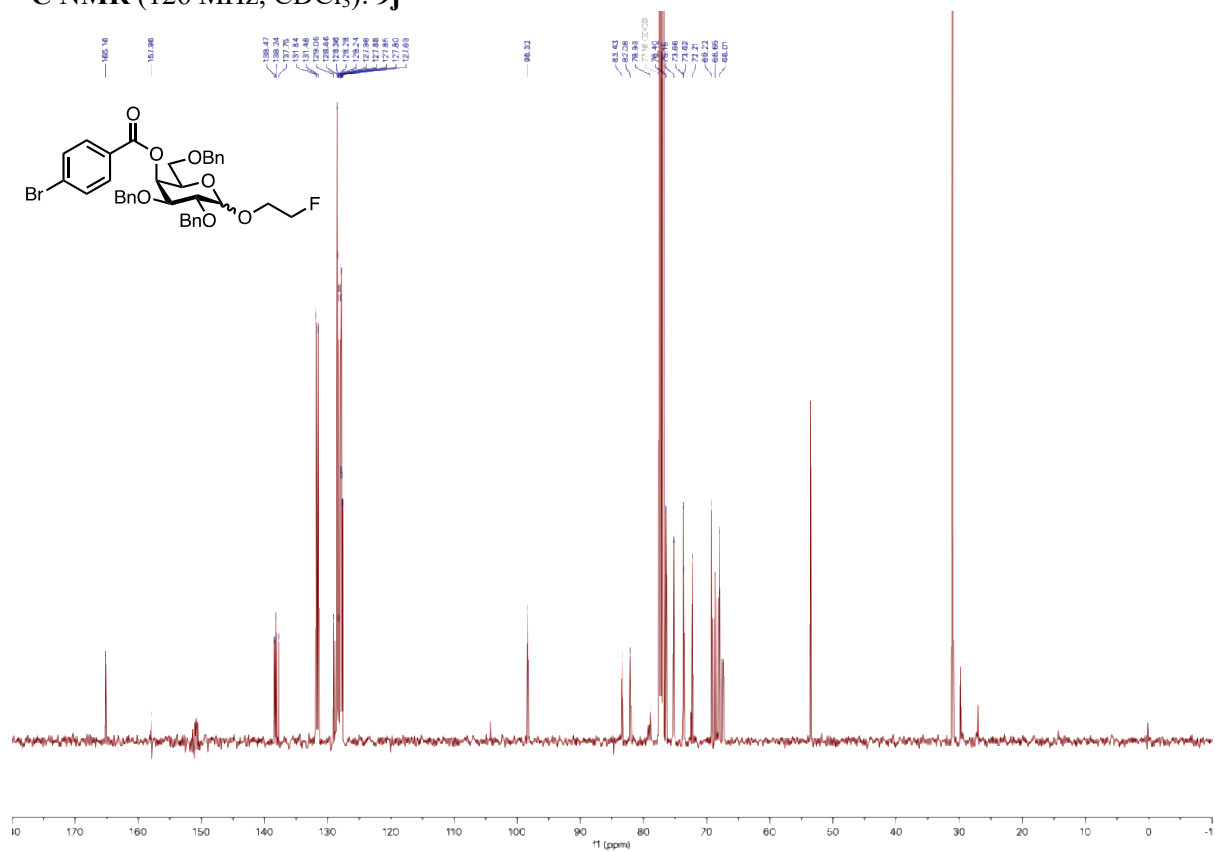
^{19}F NMR (376 MHz, CDCl_3): **9i**



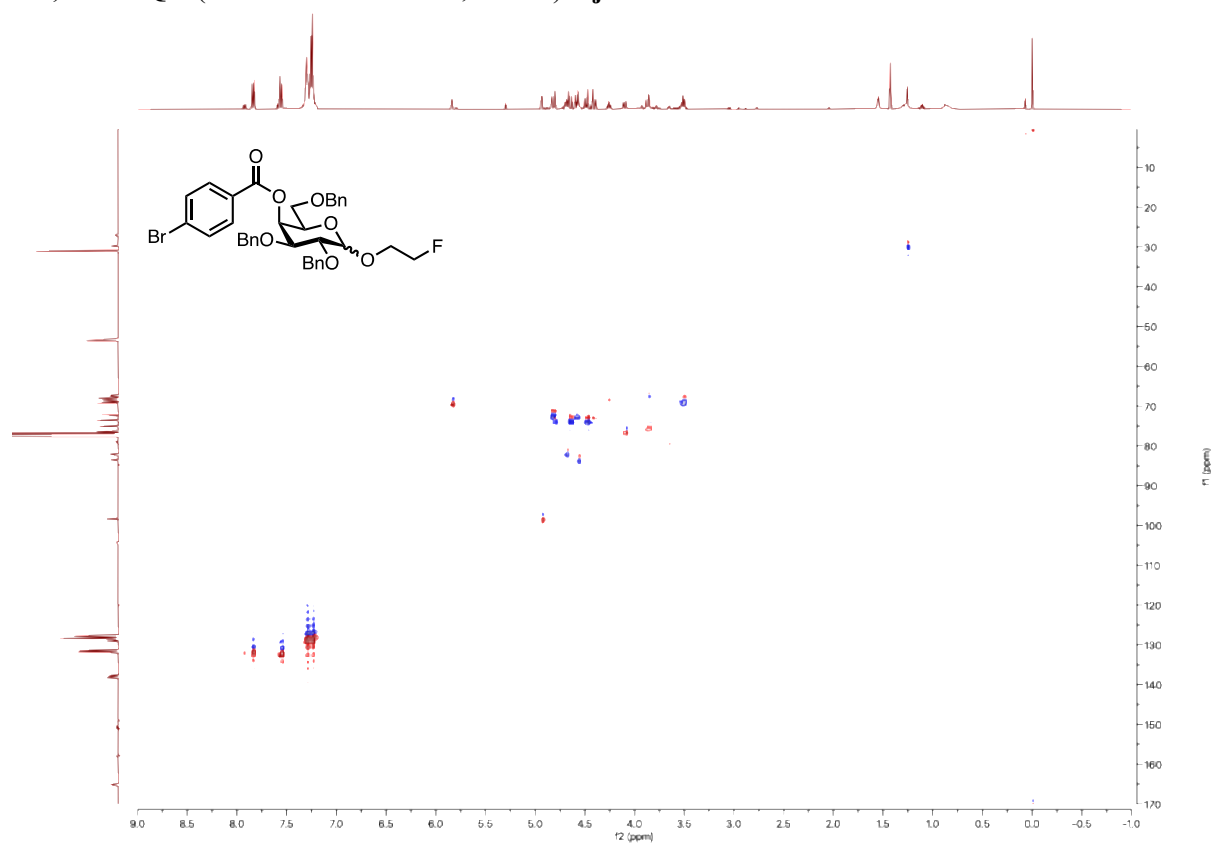
^1H NMR (400 MHz, CDCl_3): **9j**



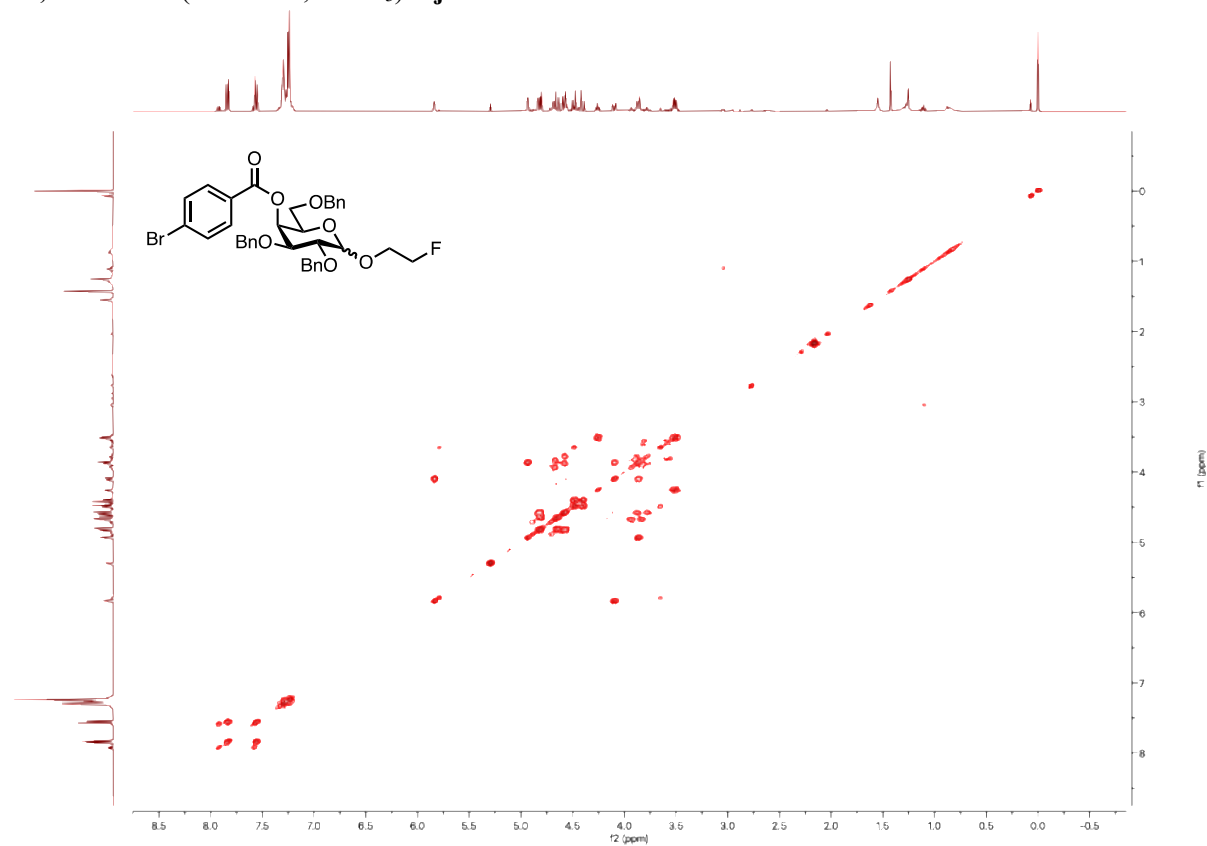
^{13}C NMR (126 MHz, CDCl_3): **9j**



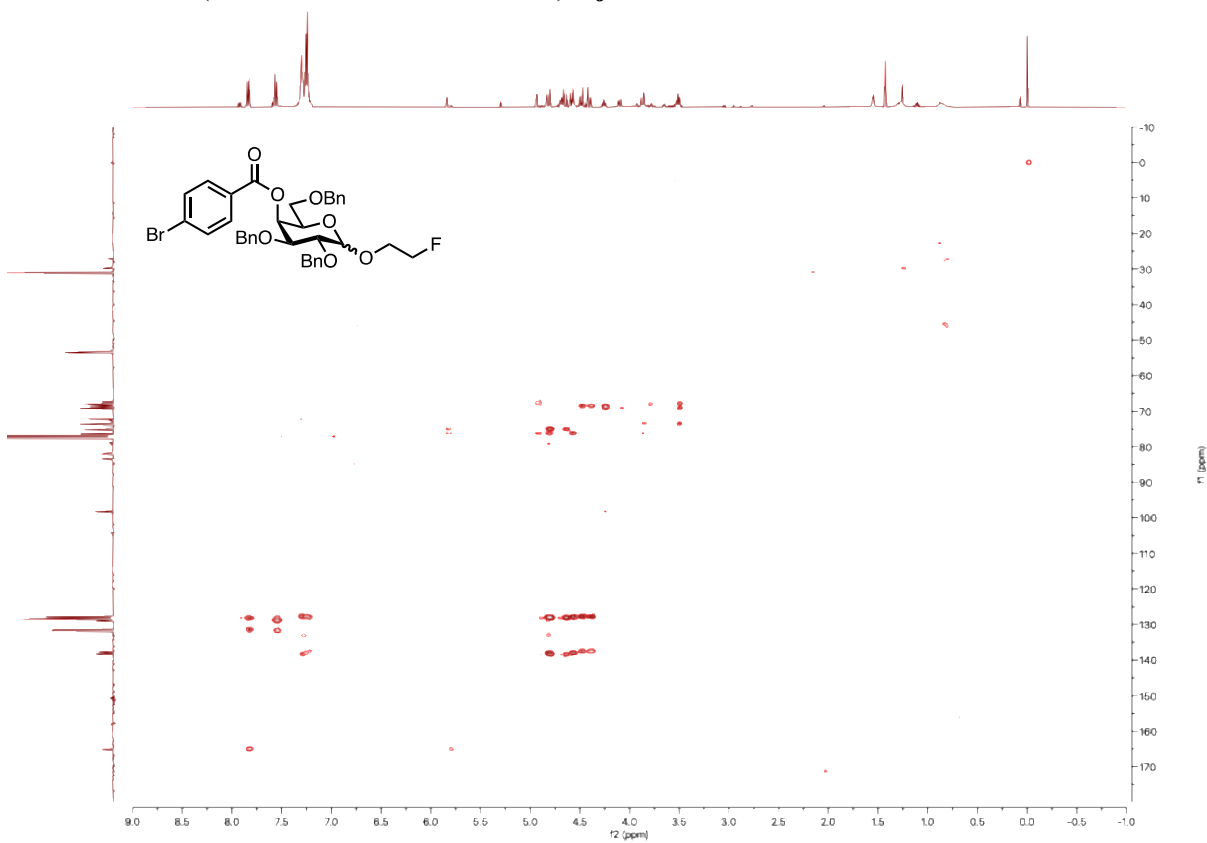
^{13}C , ^1H HSQC (400 MHz $\times$ 126 MHz, CDCl_3): **9j**



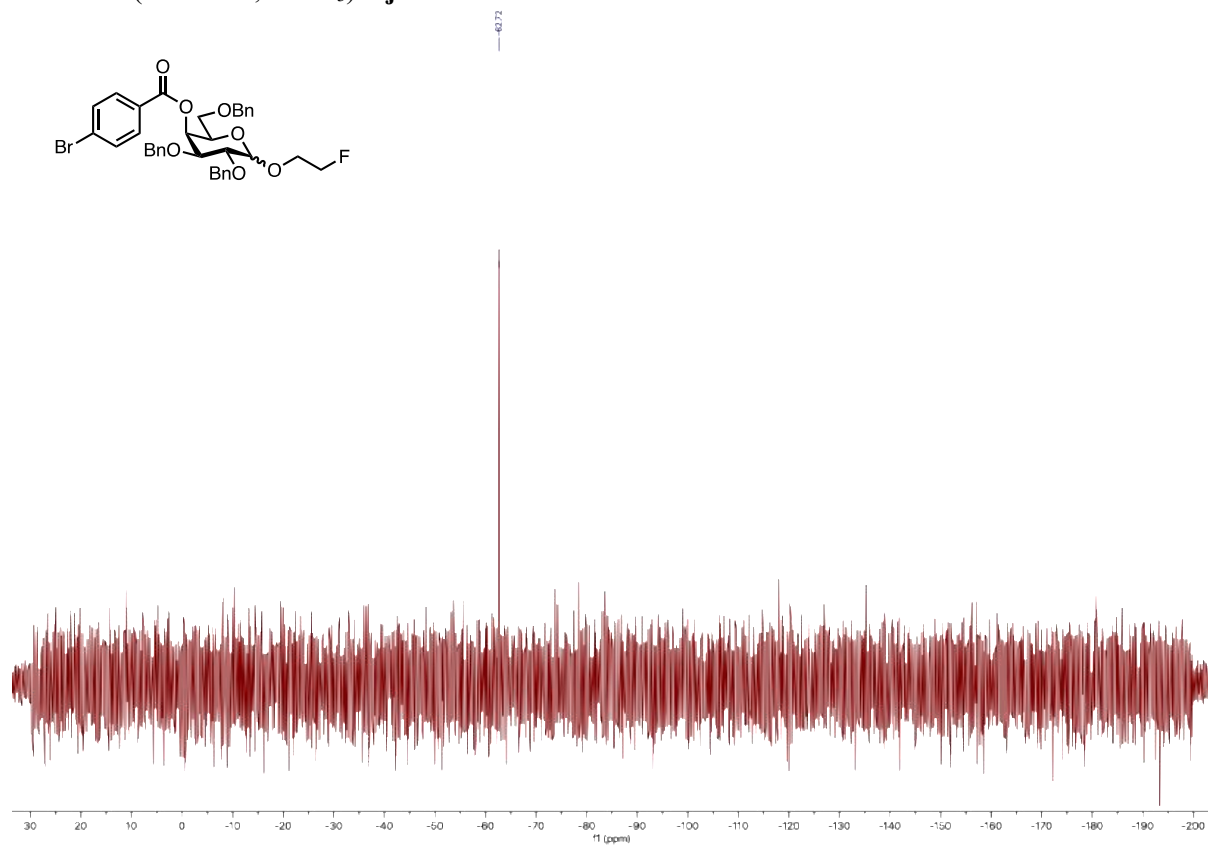
^1H , ^1H COSY (400 MHz, CDCl_3): **9j**



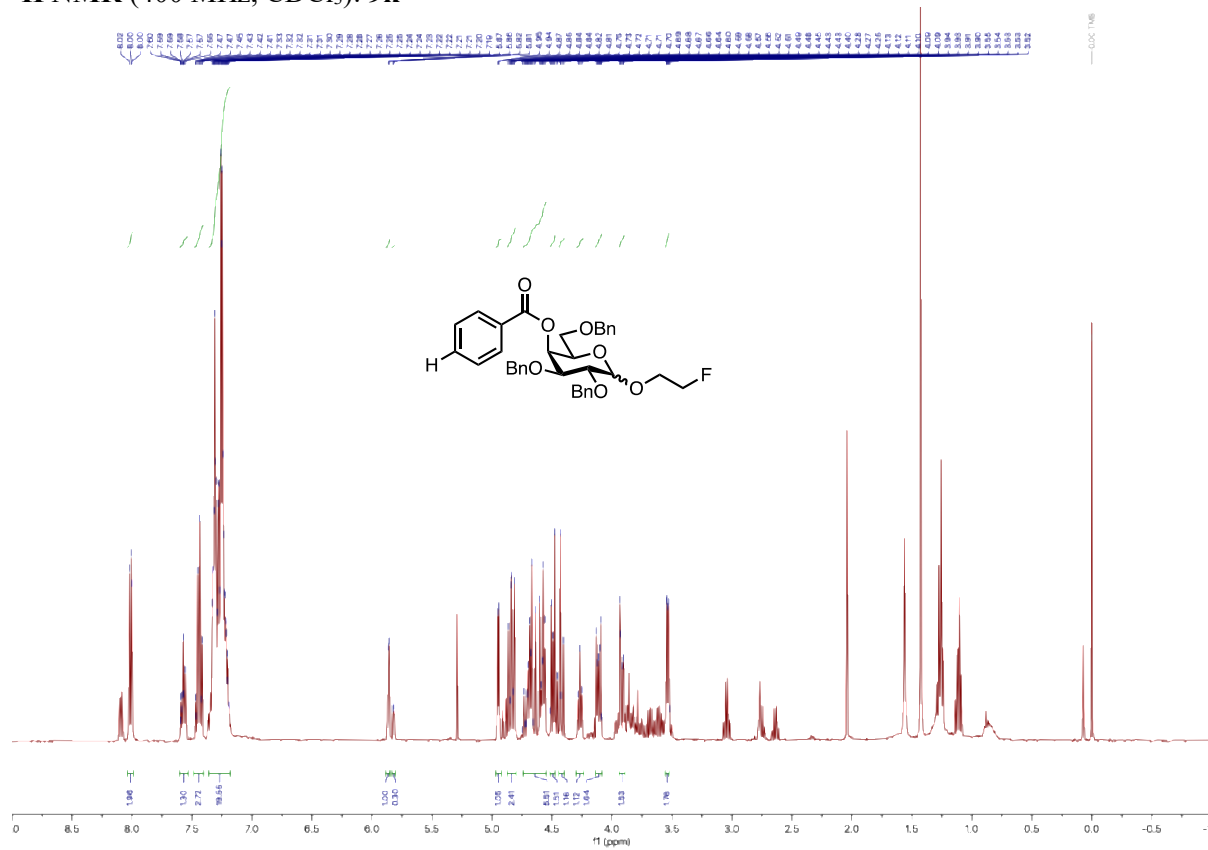
^{13}C , ^1H HMBC (400 MHz $\times$ 126 MHz, CDCl_3): **9j**



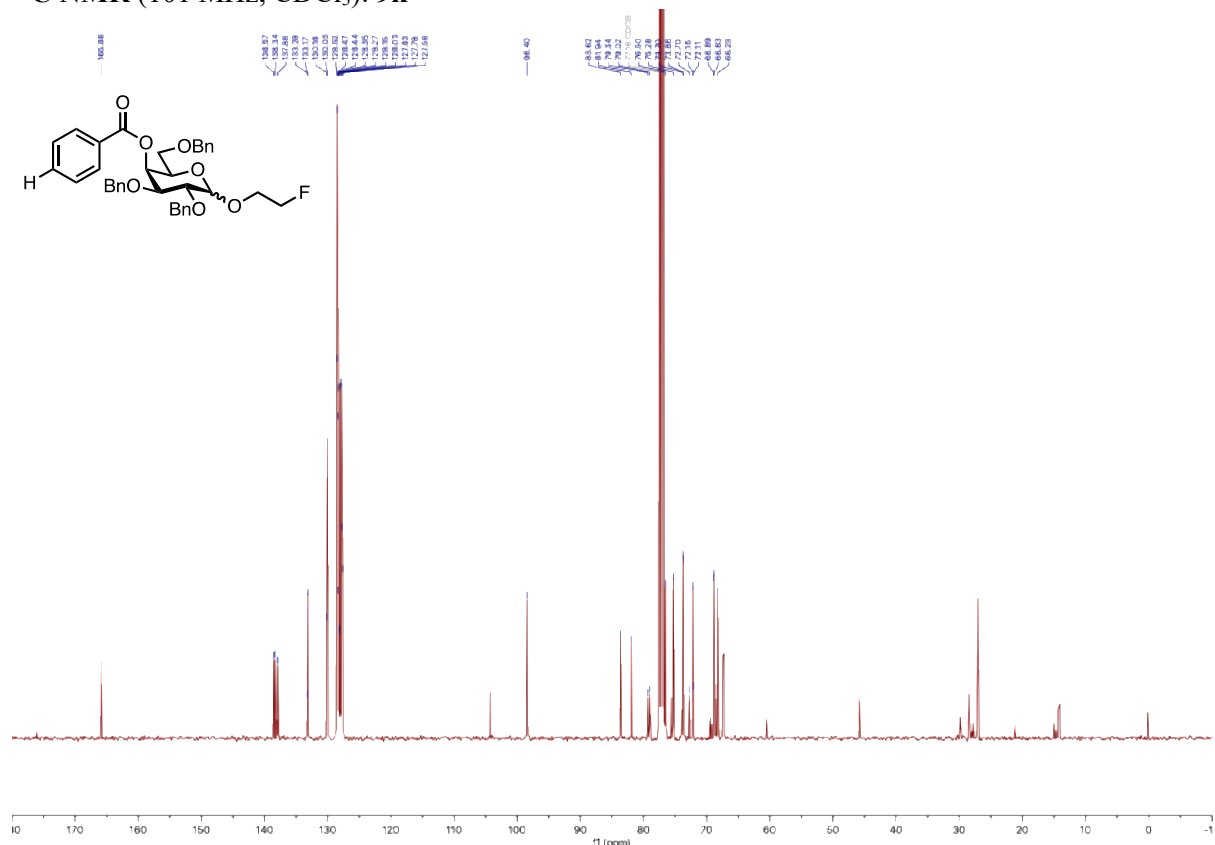
^{19}F NMR (376 MHz, CDCl_3): **9j**



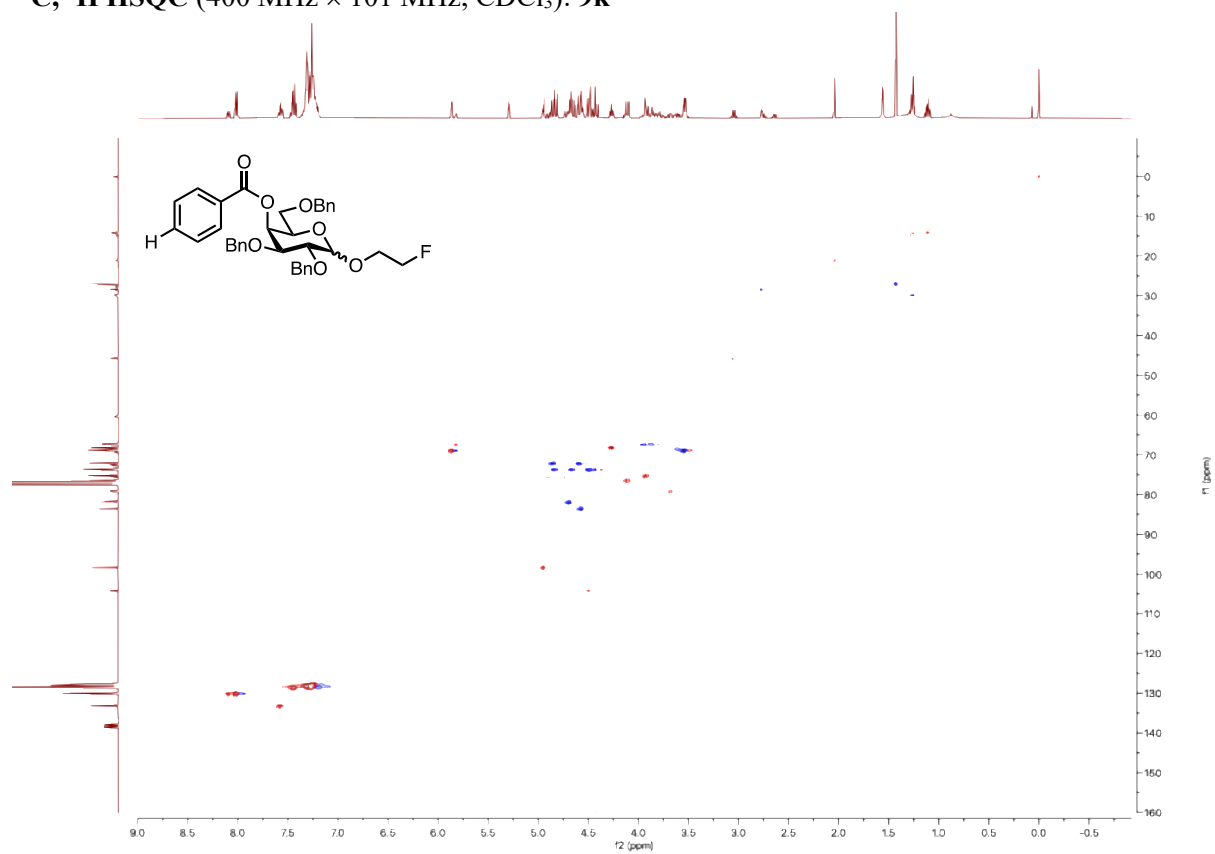
^1H NMR (400 MHz, CDCl_3): **9k**



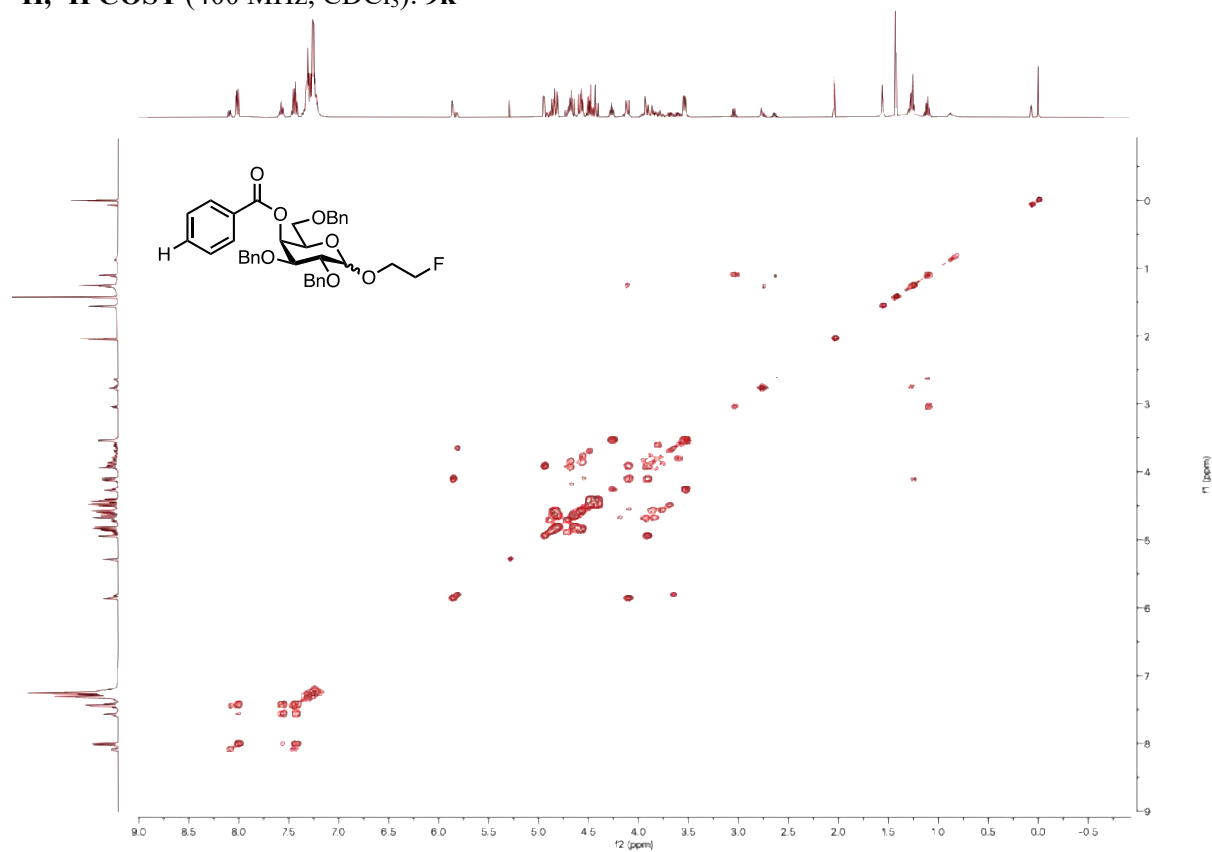
^{13}C NMR (101 MHz, CDCl_3): **9k**



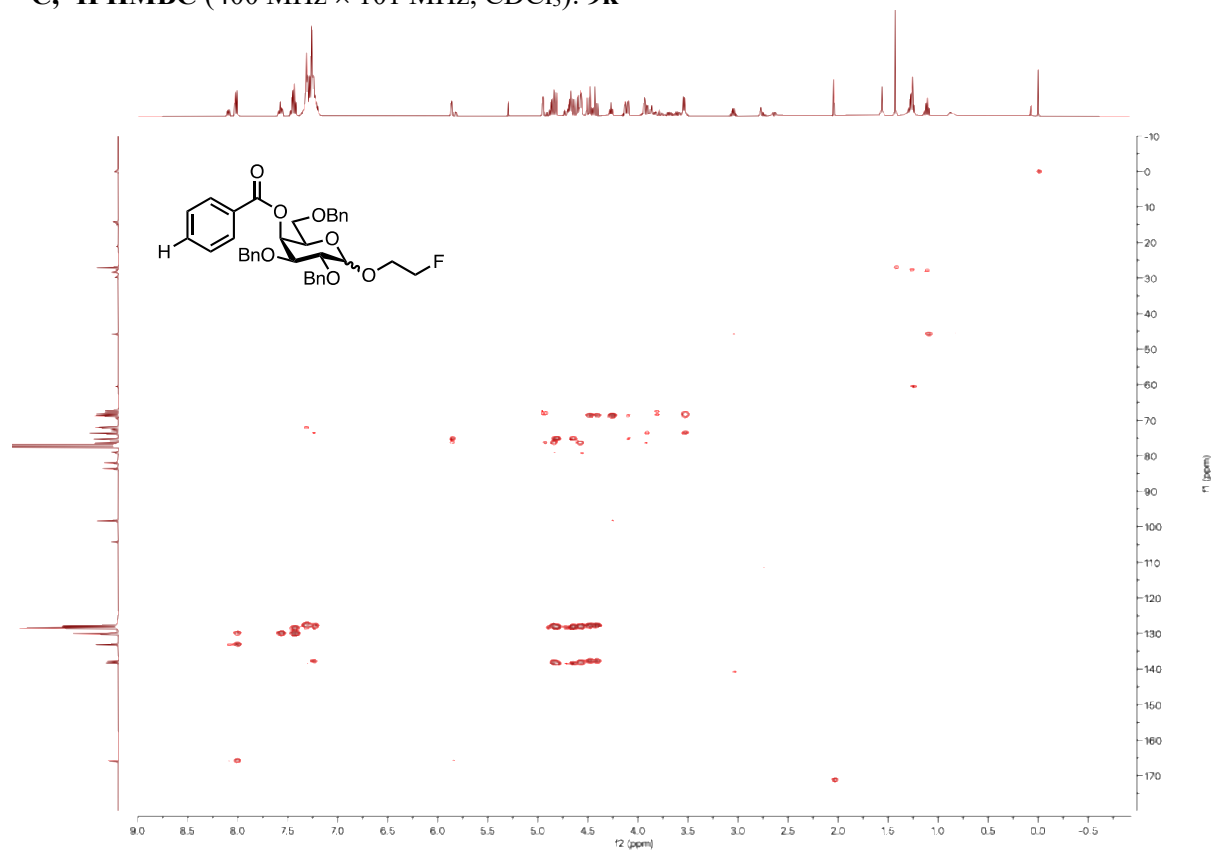
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9k**



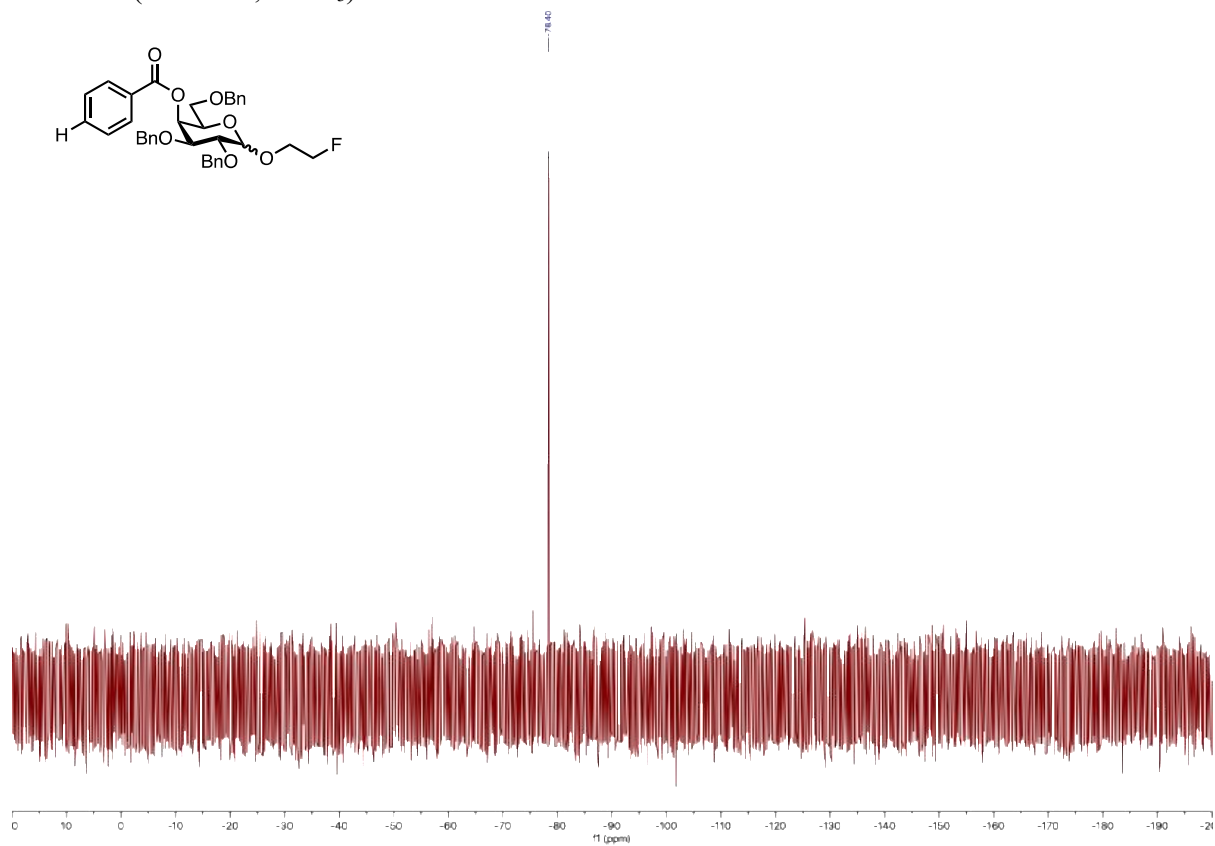
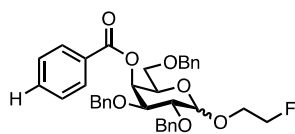
^1H , ^1H COSY (400 MHz, CDCl_3): **9k**



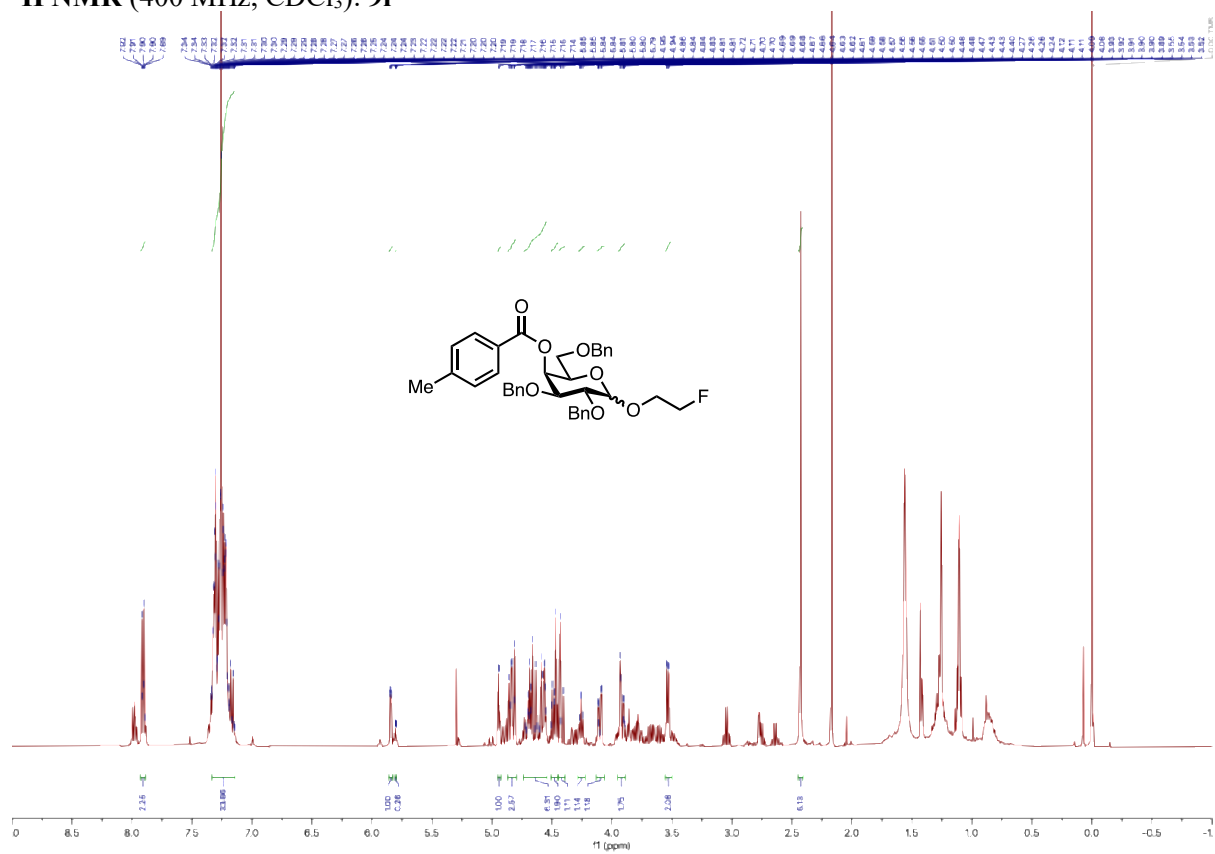
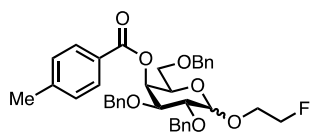
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **9k**



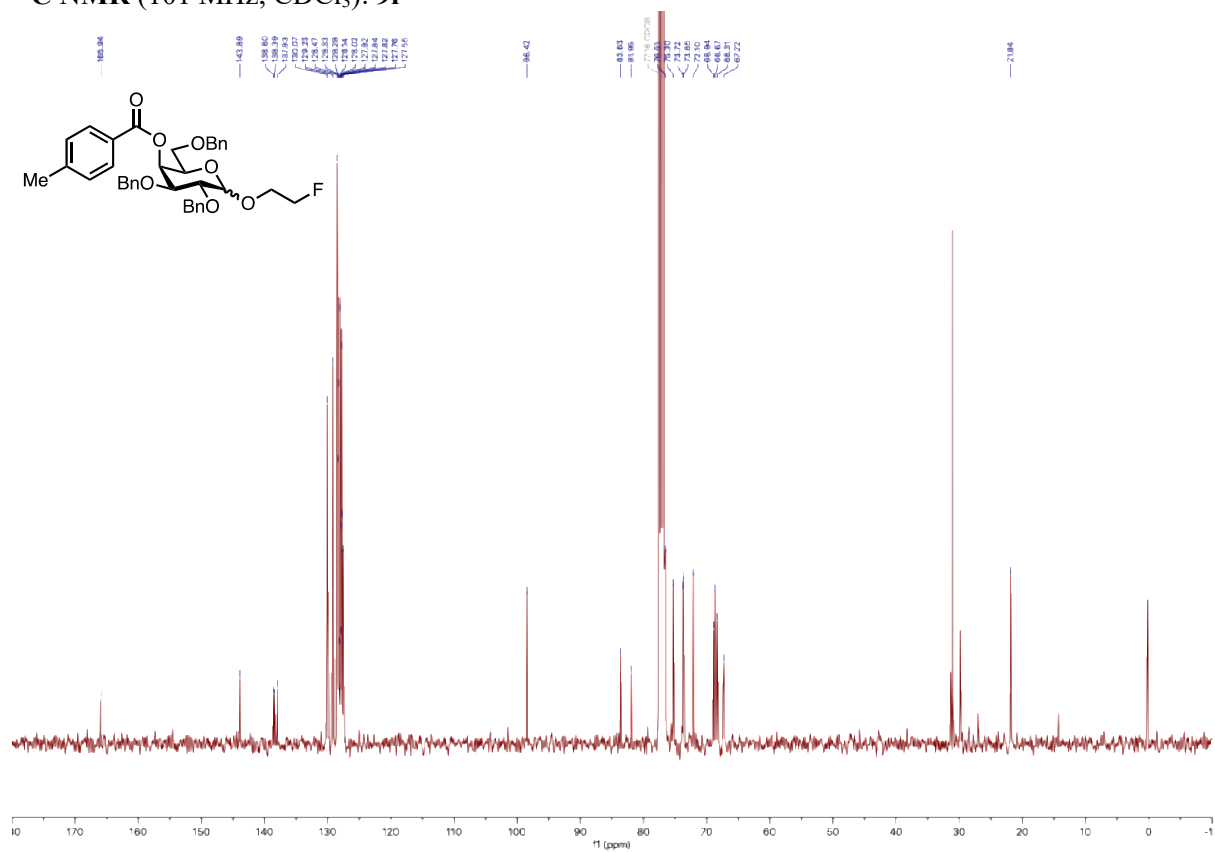
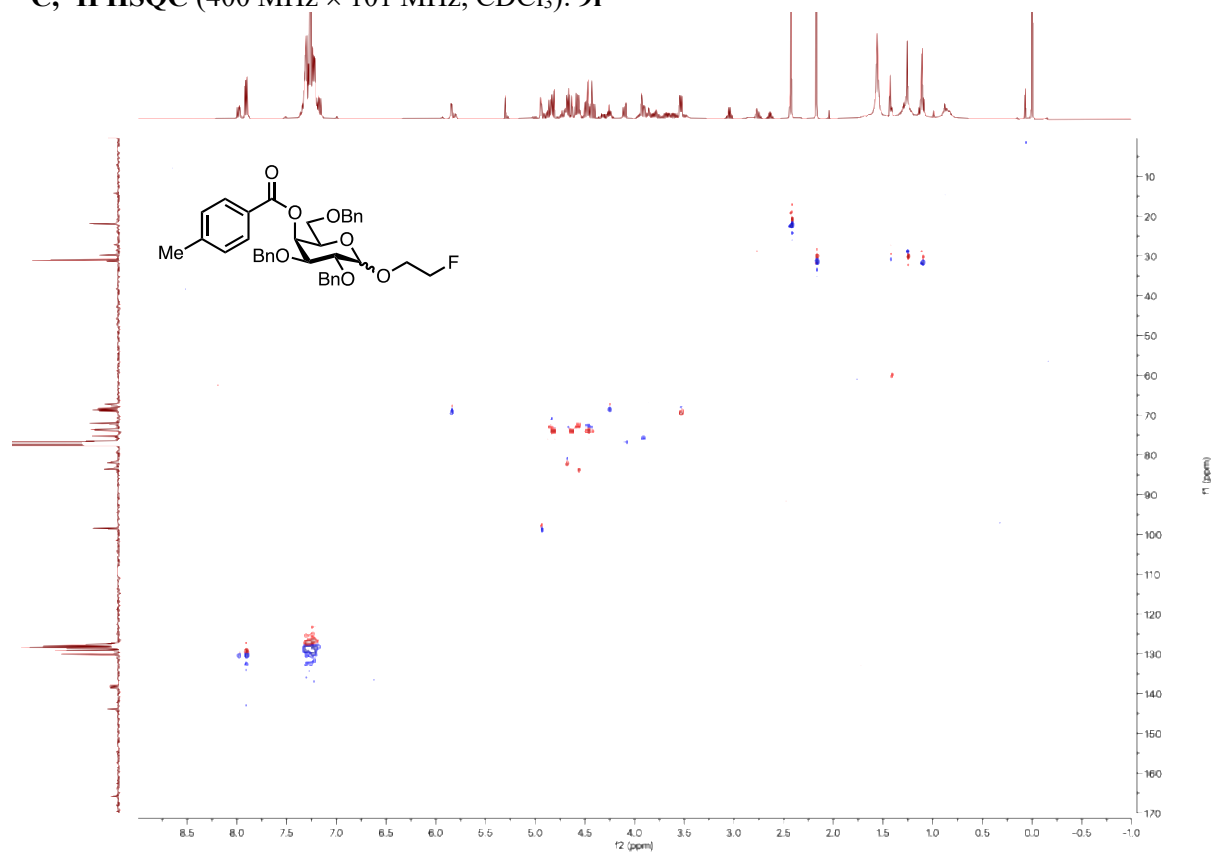
¹⁹F NMR (376 MHz, CDCl₃): **9k**



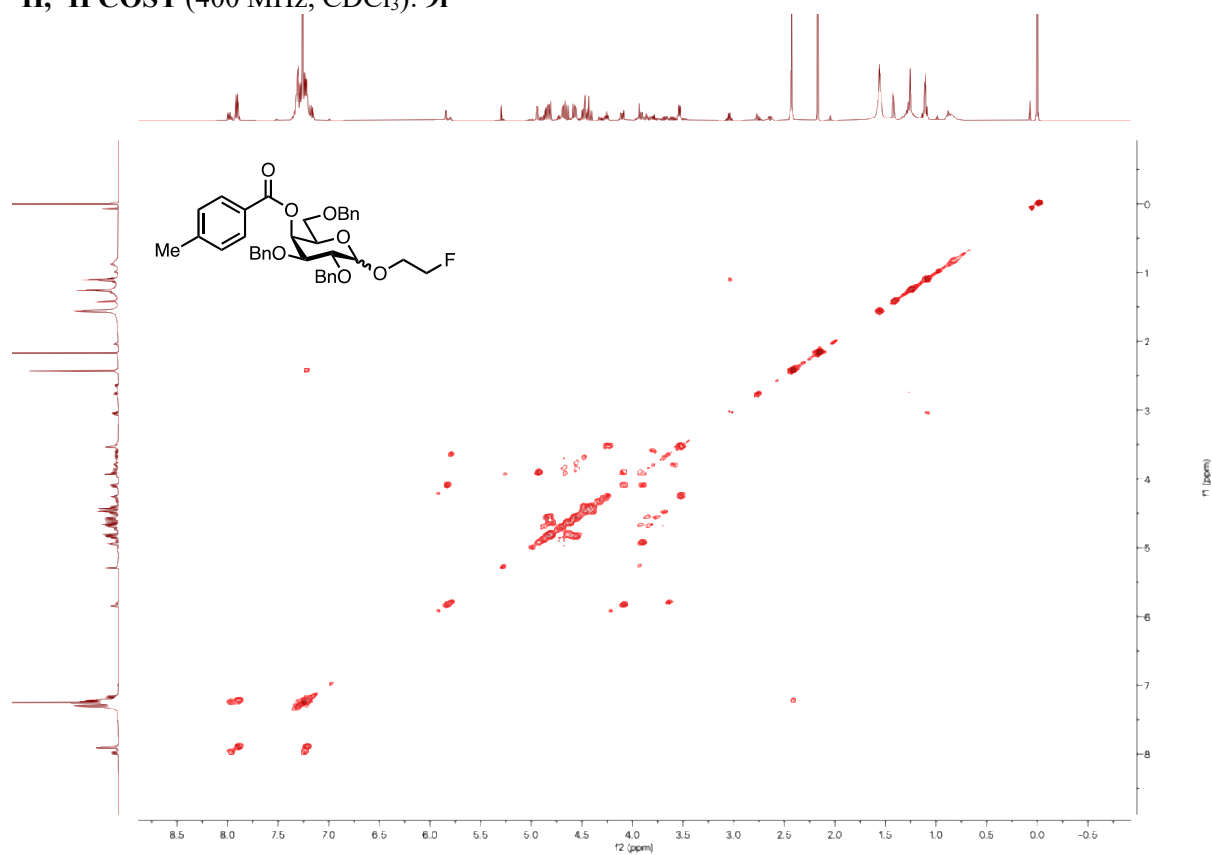
¹H NMR (400 MHz, CDCl₃): **91**



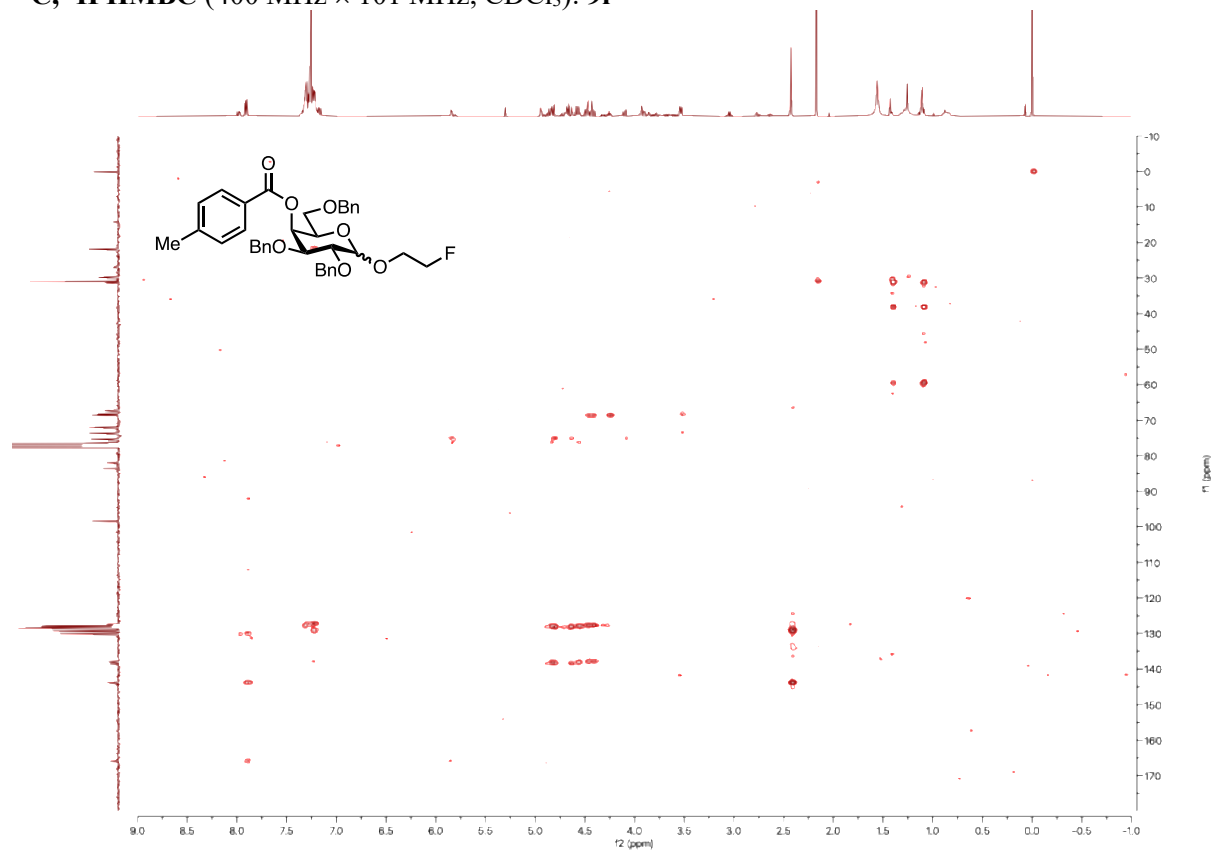
^{13}C NMR (101 MHz, CDCl_3): **9l**

 ^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **91**

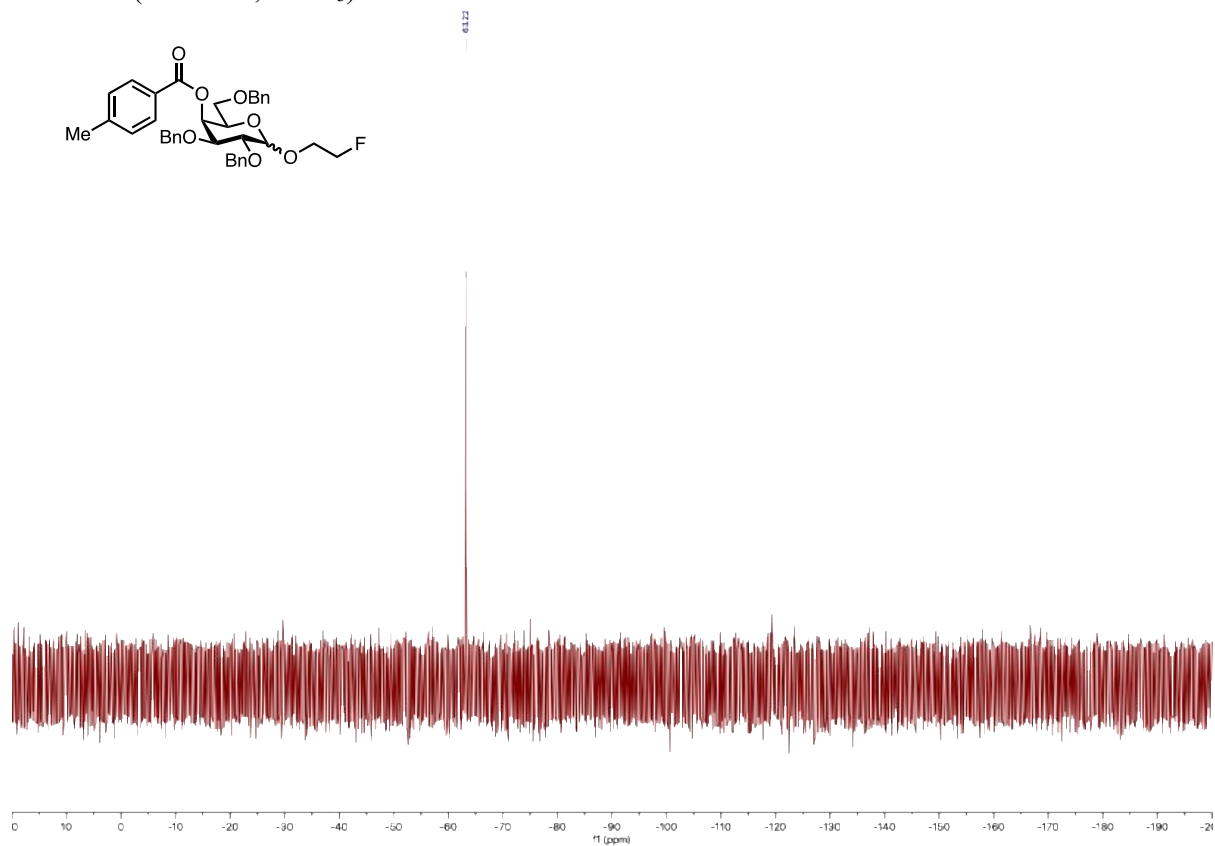
^1H , ^1H COSY (400 MHz, CDCl_3): 9I



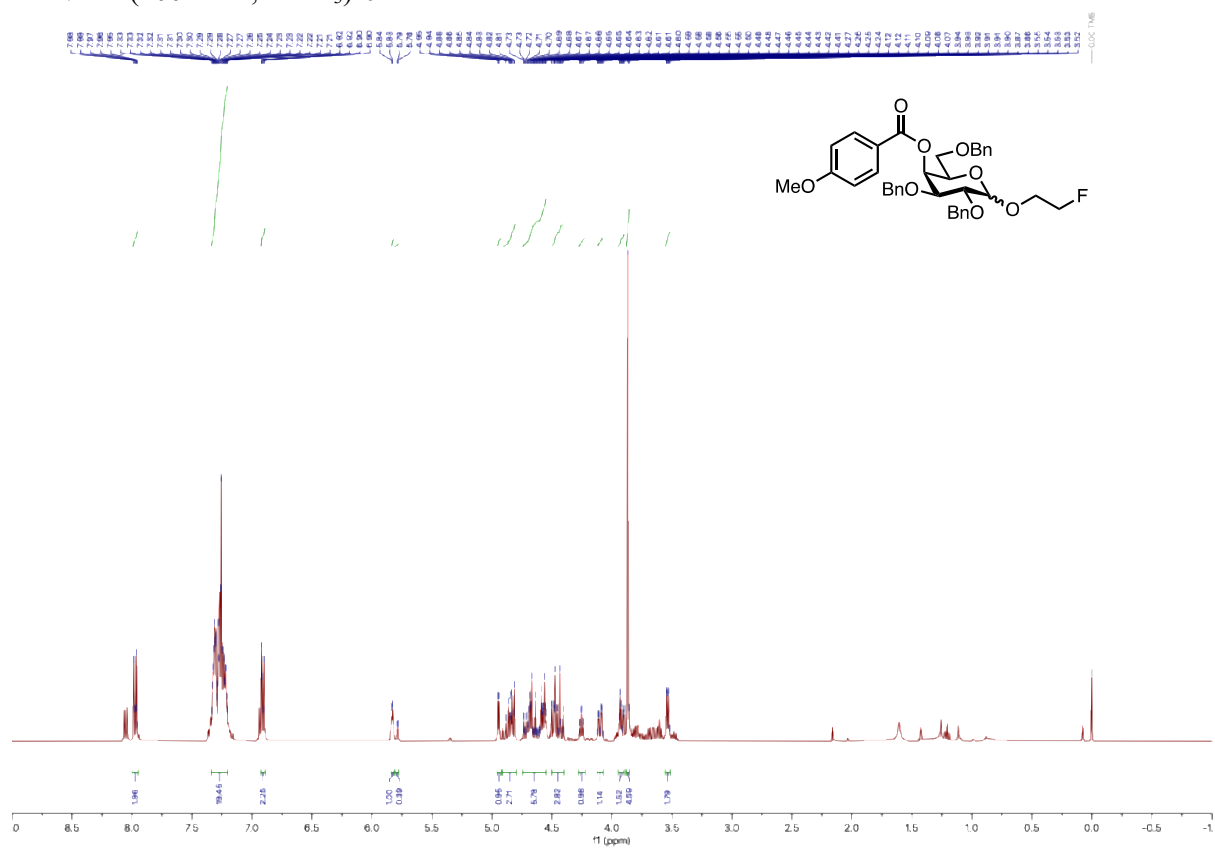
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 9I



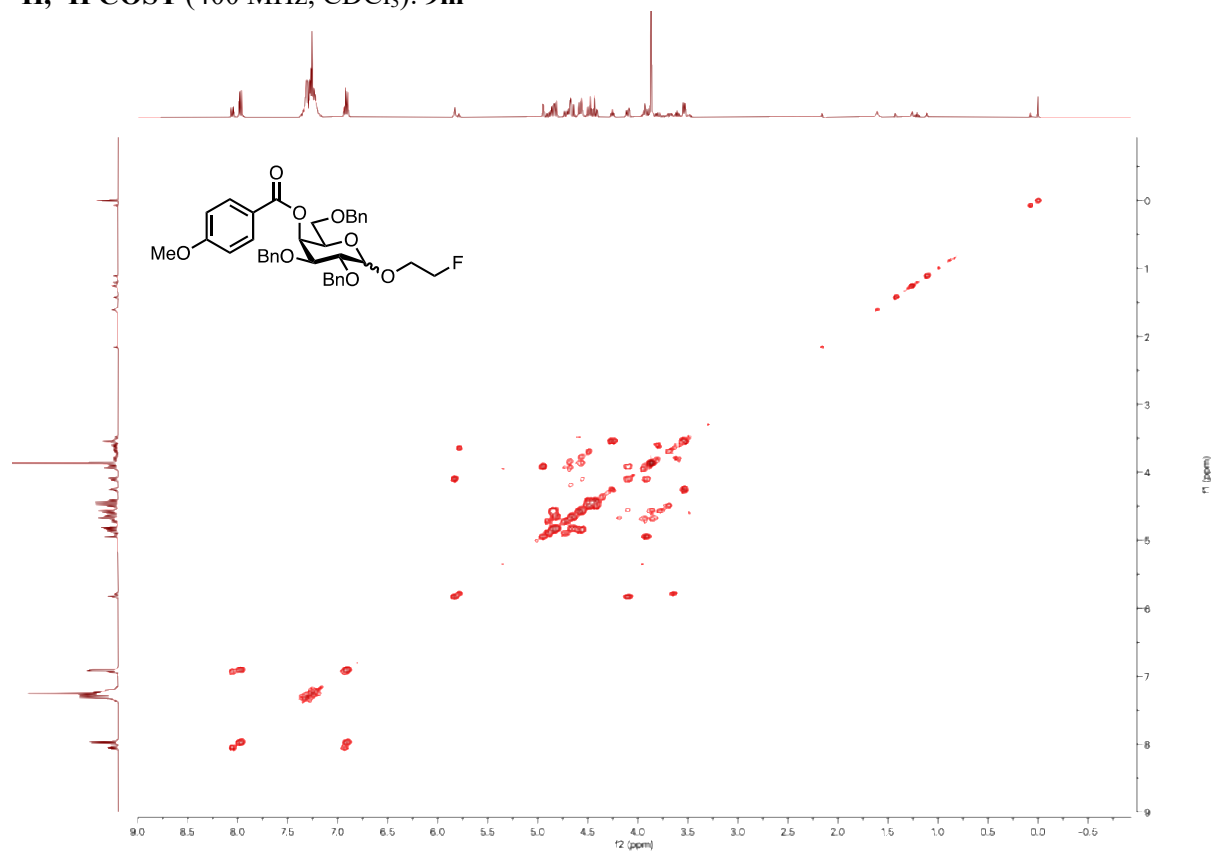
^{19}F NMR (376 MHz, CDCl_3): **9l**



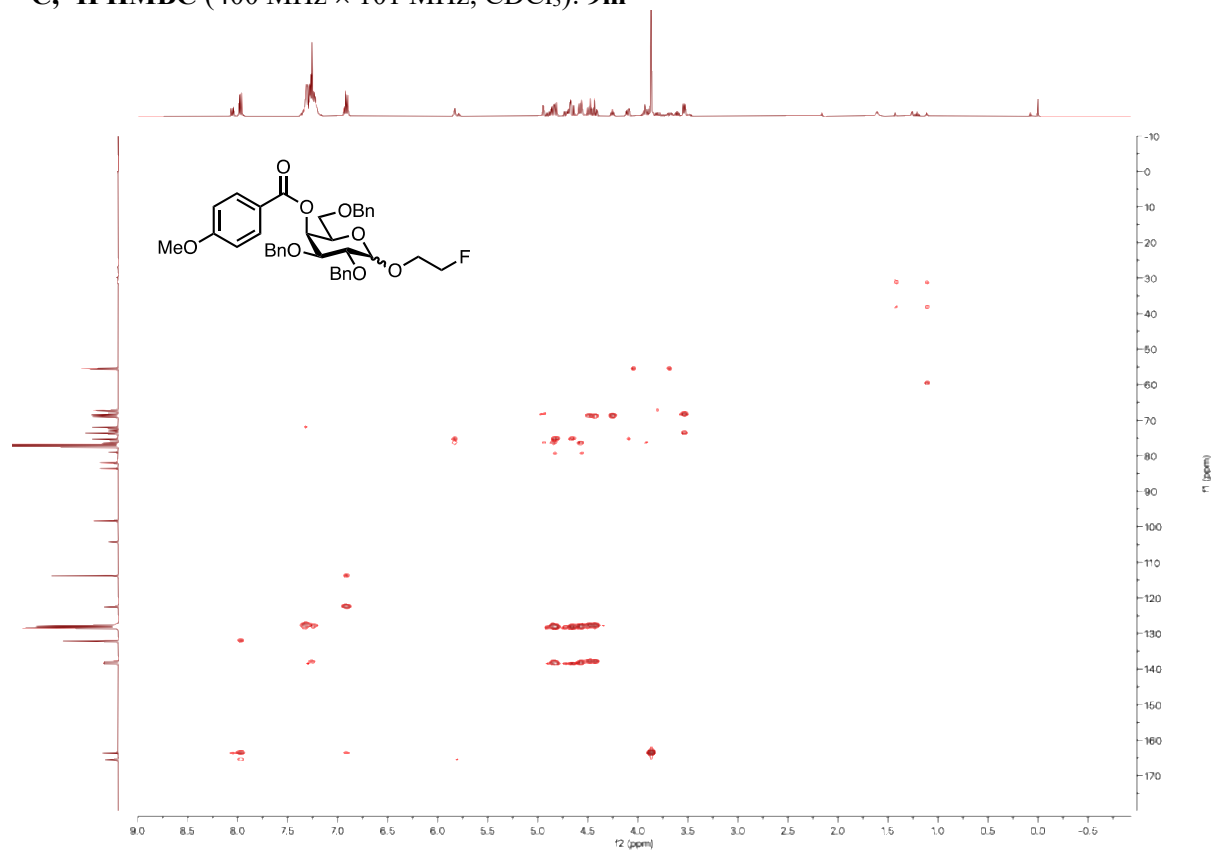
^1H NMR (400 MHz, CDCl_3): **9m**



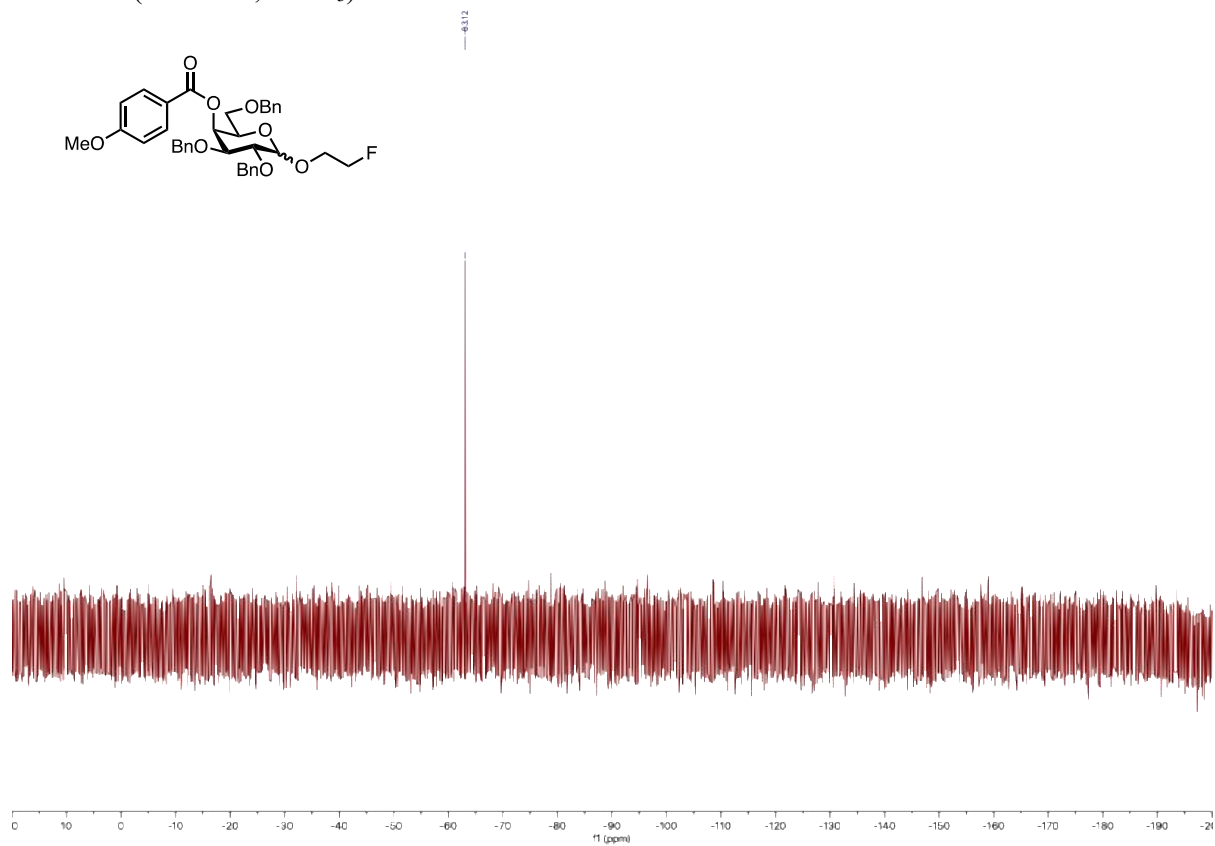
^1H , ^1H COSY (400 MHz, CDCl_3): 9m



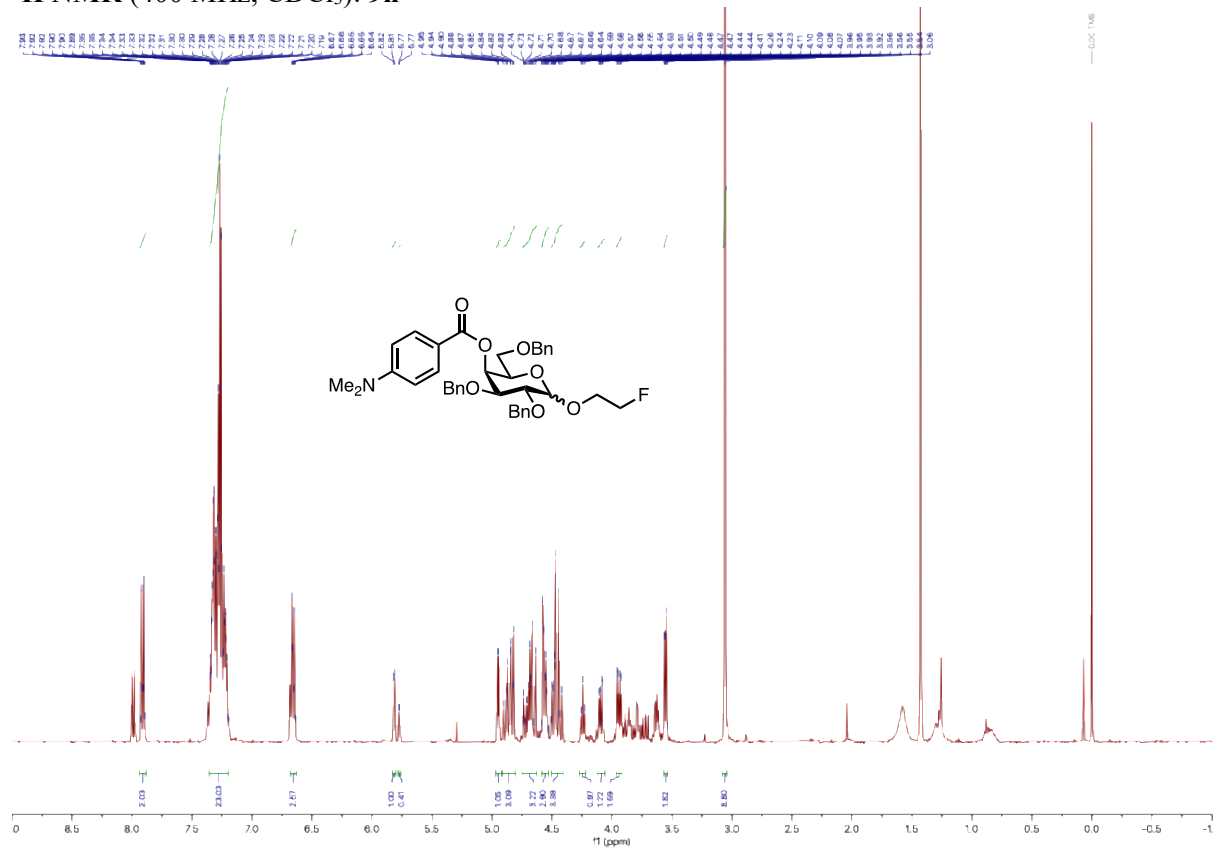
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 9m



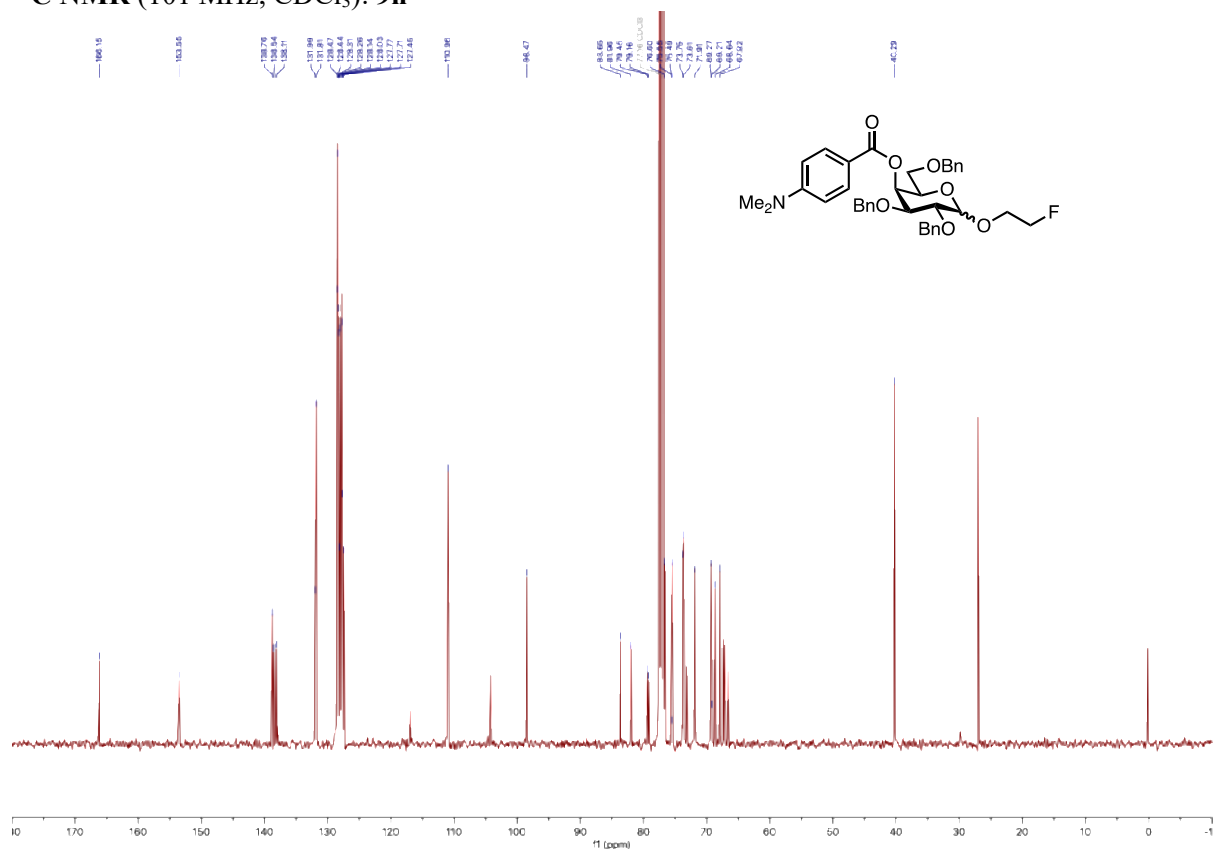
^{19}F NMR (376 MHz, CDCl_3): **9m**



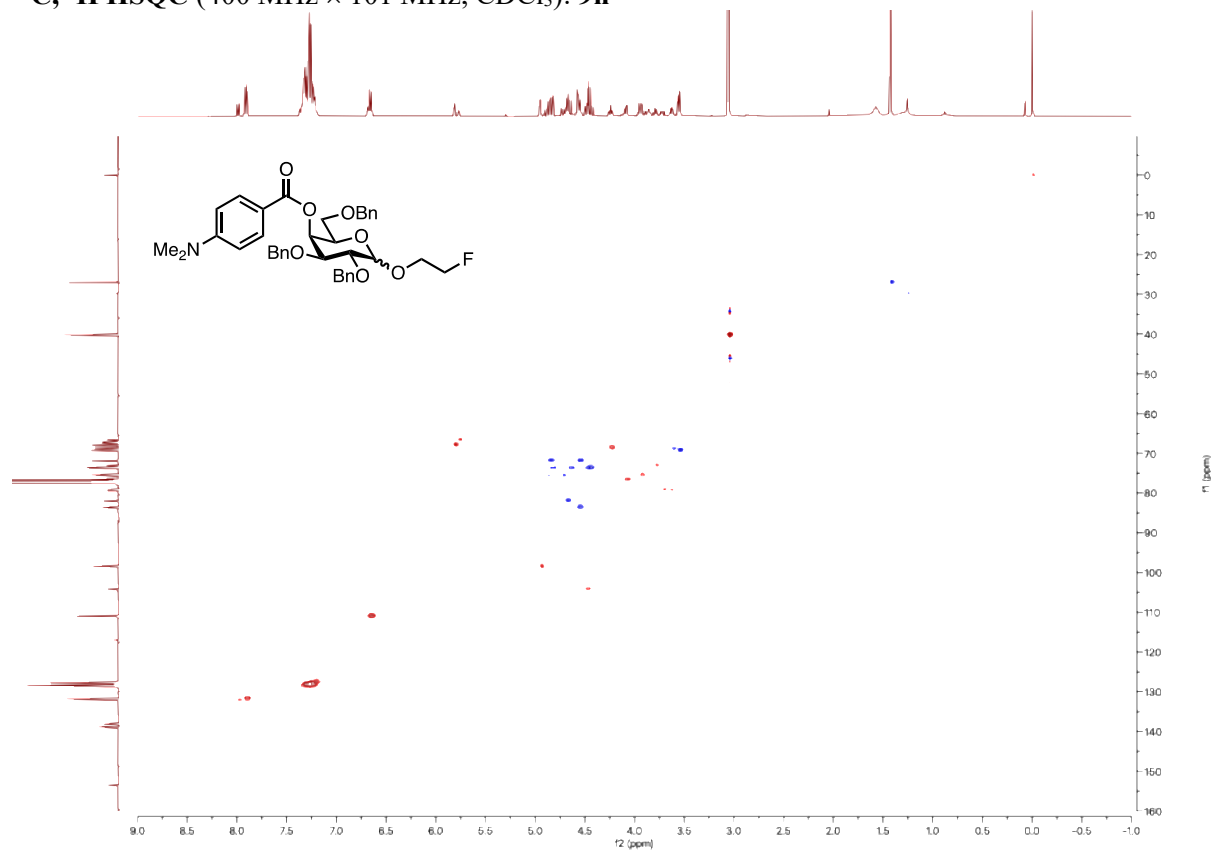
^1H NMR (400 MHz, CDCl_3): **9n**



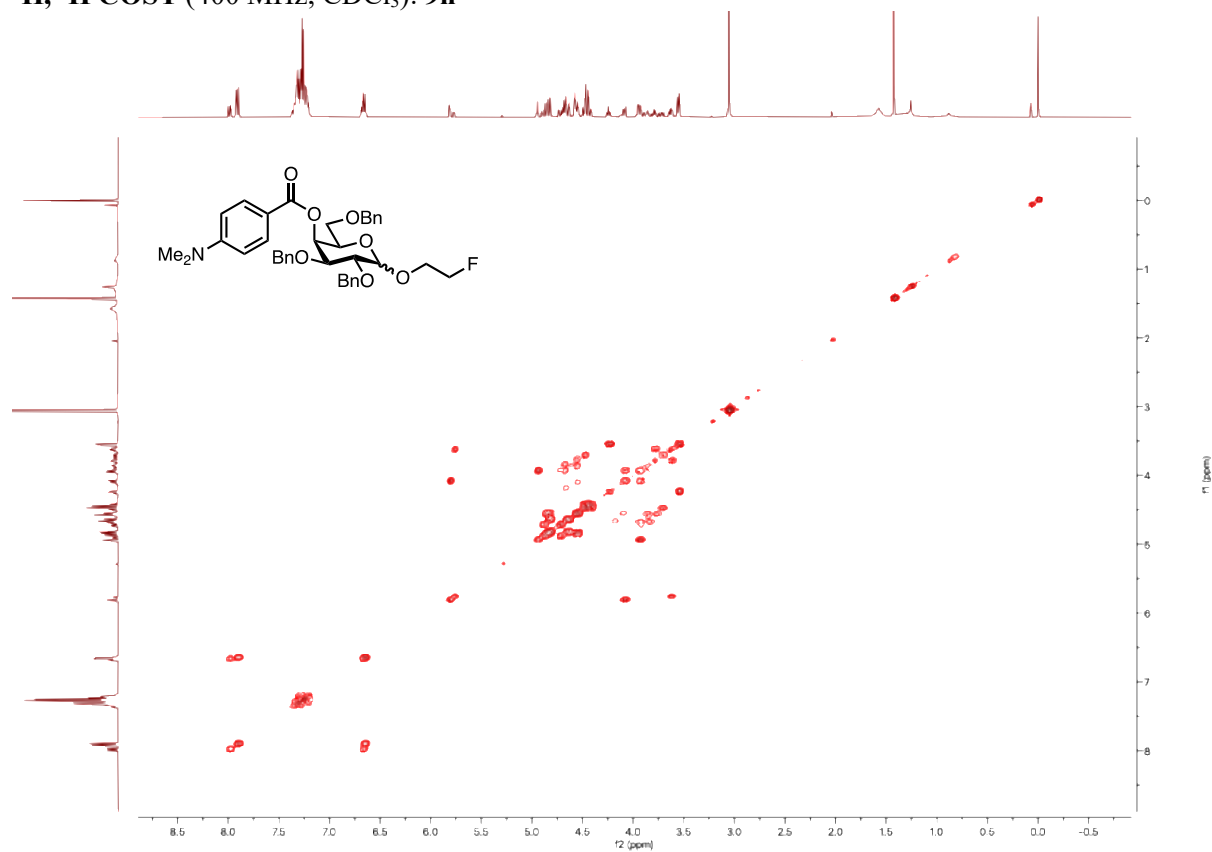
^{13}C NMR (101 MHz, CDCl_3): **9n**



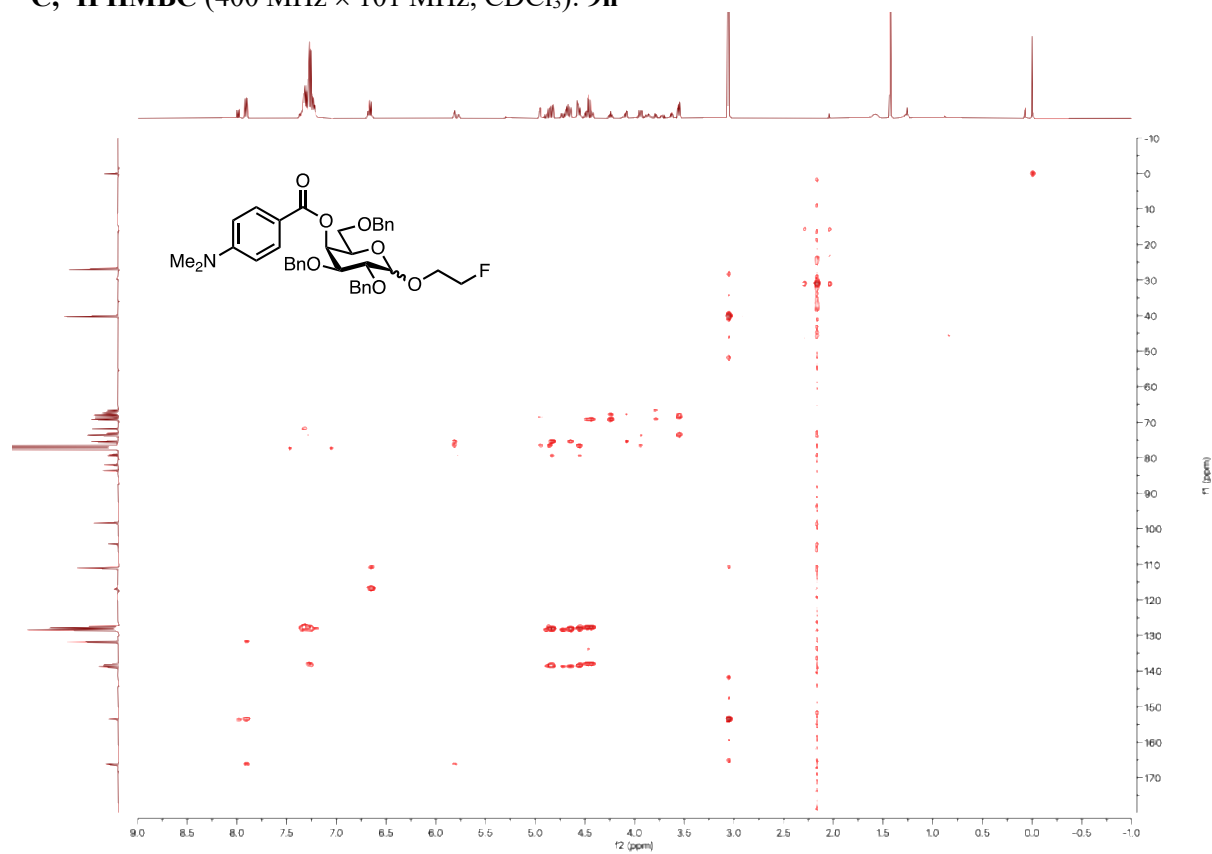
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **9n**



^1H , ^1H COSY (400 MHz, CDCl_3): 9n



^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 9n



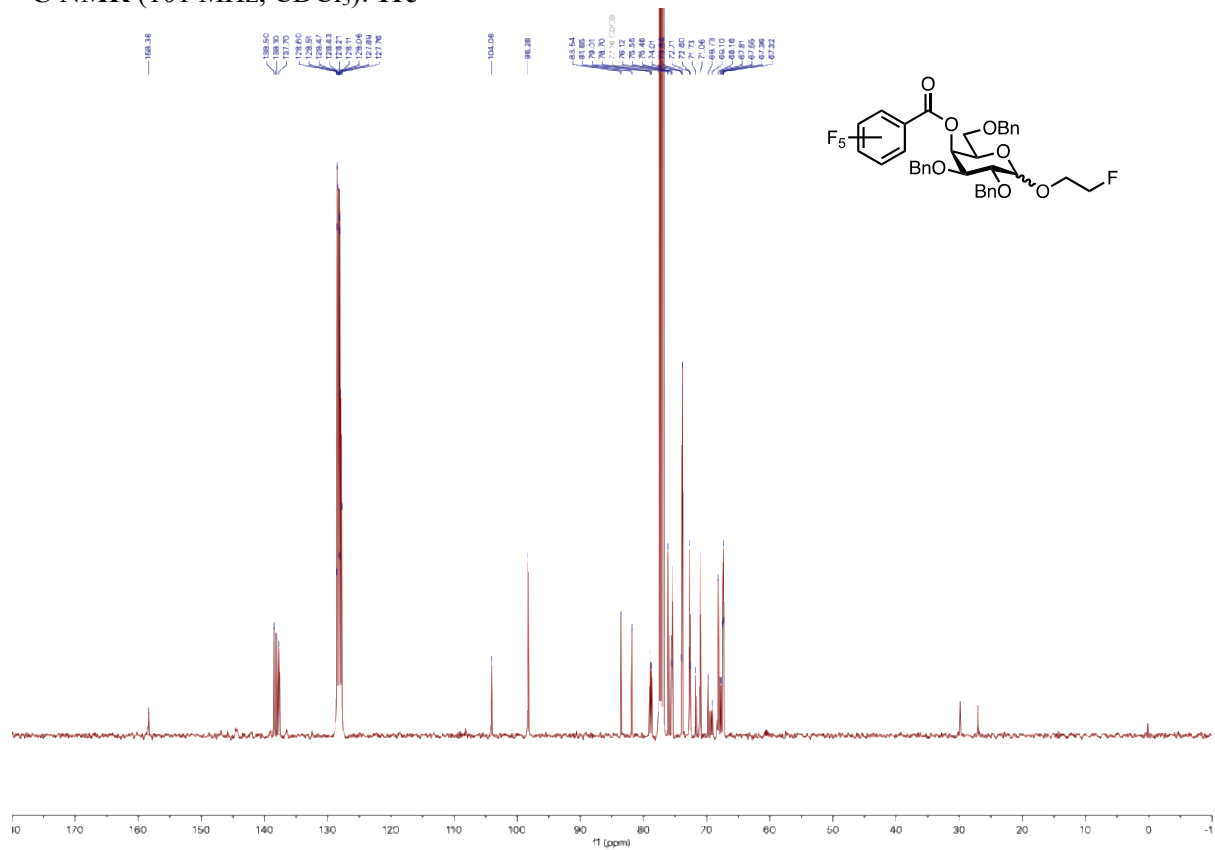
Chemical structure of the compound is shown above the spectrum. The structure is a complex molecule featuring a benzene ring substituted with a dimethylamino group (Me_2N) and a carbonyl group. The carbonyl group is part of a cyclic acetal structure, which is further substituted with a benzyl group (OBn) and a fluoromethyl group (FCH_2).

1H NMR spectrum of compound 10 in CDCl₃.

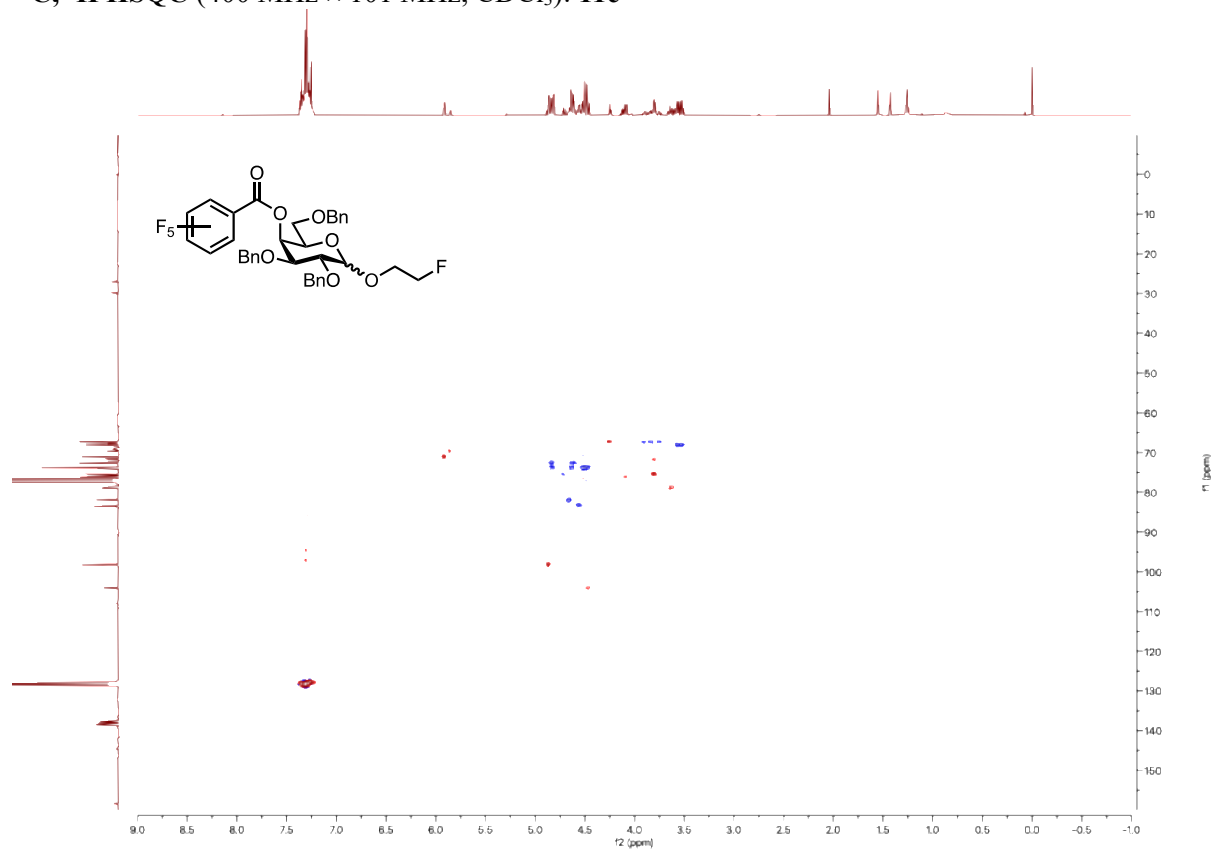
Chemical structure of compound 10:

COCC(F)O[C@H]1O[C@@H](OC(=O)c2ccccc2F)(OC(=O)c3ccccc3)[C@H](OC(=O)c4ccccc4)[C@H](OC(=O)c5ccccc5)[C@H](OC(=O)c6ccccc6)[C@H](OC(=O)c7ccccc7)[C@H](OC(=O)c8ccccc8)[C@H](OC(=O)c9ccccc9)[C@H](OC(=O)c10ccccc10)[C@H](OC(=O)c11ccccc11)[C@H](OC(=O)c12ccccc12)[C@H](OC(=O)c13ccccc13)[C@H](OC(=O)c14ccccc14)[C@H](OC(=O)c15ccccc15)[C@H](OC(=O)c16ccccc16)[C@H](OC(=O)c17ccccc17)[C@H](OC(=O)c18ccccc18)[C@H](OC(=O)c19ccccc19)[C@H](OC(=O)c20ccccc20)[C@H](OC(=O)c21ccccc21)[C@H](OC(=O)c22ccccc22)[C@H](OC(=O)c23ccccc23)[C@H](OC(=O)c24ccccc24)[C@H](OC(=O)c25ccccc25)[C@H](OC(=O)c26ccccc26)[C@H](OC(=O)c27ccccc27)[C@H](OC(=O)c28ccccc28)[C@H](OC(=O)c29ccccc29)[C@H](OC(=O)c30ccccc30)[C@H](OC(=O)c31ccccc31)[C@H](OC(=O)c32ccccc32)[C@H](OC(=O)c33ccccc33)[C@H](OC(=O)c34ccccc34)[C@H](OC(=O)c35ccccc35)[C@H](OC(=O)c36ccccc36)[C@H](OC(=O)c37ccccc37)[C@H](OC(=O)c38ccccc38)[C@H](OC(=O)c39ccccc39)[C@H](OC(=O)c40ccccc40)[C@H](OC(=O)c41ccccc41)[C@H](OC(=O)c42ccccc42)[C@H](OC(=O)c43ccccc43)[C@H](OC(=O)c44ccccc44)[C@H](OC(=O)c45ccccc45)[C@H](OC(=O)c46ccccc46)[C@H](OC(=O)c47ccccc47)[C@H](OC(=O)c48ccccc48)[C@H](OC(=O)c49ccccc49)[C@H](OC(=O)c50ccccc50)[C@H](OC(=O)c51ccccc51)[C@H](OC(=O)c52ccccc52)[C@H](OC(=O)c53ccccc53)[C@H](OC(=O)c54ccccc54)[C@H](OC(=O)c55ccccc55)[C@H](OC(=O)c56ccccc56)[C@H](OC(=O)c57ccccc57)[C@H](OC(=O)c58ccccc58)[C@H](OC(=O)c59ccccc59)[C@H](OC(=O)c60ccccc60)[C@H](OC(=O)c61ccccc61)[C@H](OC(=O)c62ccccc62)[C@H](OC(=O)c63ccccc63)[C@H](OC(=O)c64ccccc64)[C@H](OC(=O)c65ccccc65)[C@H](OC(=O)c66ccccc66)[C@H](OC(=O)c67ccccc67)[C@H](OC(=O)c68ccccc68)[C@H](OC(=O)c69ccccc69)[C@H](OC(=O)c70ccccc70)[C@H](OC(=O)c71ccccc71)[C@H](OC(=O)c72ccccc72)[C@H](OC(=O)c73ccccc73)[C@H](OC(=O)c74ccccc74)[C@H](OC(=O)c75ccccc75)[C@H](OC(=O)c76ccccc76)[C@H](OC(=O)c77ccccc77)[C@H](OC(=O)c78ccccc78)[C@H](OC(=O)c79ccccc79)[C@H](OC(=O)c80ccccc80)[C@H](OC(=O)c81ccccc81)[C@H](OC(=O)c82ccccc82)[C@H](OC(=O)c83ccccc83)[C@H](OC(=O)c84ccccc84)[C@H](OC(=O)c85ccccc85)[C@H](OC(=O)c86ccccc86)[C@H](OC(=O)c87ccccc87)[C@H](OC(=O)c88ccccc88)[C@H](OC(=O)c89ccccc89)[C@H](OC(=O)c90ccccc90)[C@H](OC(=O)c91ccccc91)[C@H](OC(=O)c92ccccc92)[C@H](OC(=O)c93ccccc93)[C@H](OC(=O)c94ccccc94)[C@H](OC(=O)c95ccccc95)[C@H](OC(=O)c96ccccc96)[C@H](OC(=O)c97ccccc97)[C@H](OC(=O)c98ccccc98)[C@H](OC(=O)c99ccccc99)[C@H](OC(=O)c100ccccc100)[C@H](OC(=O)c101ccccc101)[C@H](OC(=O)c102ccccc102)[C@H](OC(=O)c103ccccc103)[C@H](OC(=O)c104ccccc104)[C@H](OC(=O)c105ccccc105)[C@H](OC(=O)c106ccccc106)[C@H](OC(=O)c107ccccc107)[C@H](OC(=O)c108ccccc108)[C@H](OC(=O)c109ccccc109)[C@H](OC(=O)c110ccccc110)[C@H](OC(=O)c111ccccc111)[C@H](OC(=O)c112ccccc112)[C@H](OC(=O)c113ccccc113)[C@H](OC(=O)c114ccccc114)[C@H](OC(=O)c115ccccc115)[C@H](OC(=O)c116ccccc116)[C@H](OC(=O)c117ccccc117)[C@H](OC(=O)c118ccccc118)[C@H](OC(=O)c119ccccc119)[C@H](OC(=O)c120ccccc120)[C@H](OC(=O)c121ccccc121)[C@H](OC(=O)c122ccccc122)[C@H](OC(=O)c123ccccc123)[C@H](OC(=O)c124ccccc124)[C@H](OC(=O)c125ccccc125)[C@H](OC(=O)c126ccccc126)[C@H](OC(=O)c127ccccc127)[C@H](OC(=O)c128ccccc128)[C@H](OC(=O)c129ccccc129)[C@H](OC(=O)c130ccccc130)[C@H](OC(=O)c131ccccc131)[C@H](OC(=O)c132ccccc132)[C@H](OC(=O)c133ccccc133)[C@H](OC(=O)c134ccccc134)[C@H](OC(=O)c135ccccc135)[C@H](OC(=O)c136ccccc136)[C@H](OC(=O)c137ccccc137)[C@H](OC(=O)c138ccccc138)[C@H](OC(=O)c139ccccc139)[C@H](OC(=O)c140ccccc140)[C@H](OC(=O)c141ccccc141)[C@H](OC(=O)c142ccccc142)[C@H](OC(=O)c143ccccc143)[C@H](OC(=O)c144ccccc144)[C@H](OC(=O)c145ccccc145)[C@H](OC(=O)c146ccccc146)[C@H](OC(=O)c147ccccc147)[C@H](OC(=O)c148ccccc148)[C@H](OC(=O)c149ccccc149)[C@H](OC(=O)c150ccccc150)[C@H](OC(=O)c151ccccc151)[C@H](OC(=O)c152ccccc152)[C@H](OC(=O)c153ccccc153)[C@H](OC(=O)c154ccccc154)[C@H](OC(=O)c155ccccc155)[C@H](OC(=O)c156ccccc156)[C@H](OC(=O)c157ccccc157)[C@H](OC(=O)c158ccccc158)[C@H](OC(=O)c159ccccc159)[C@H](OC(=O)c160ccccc160)[C@H](OC(=O)c161ccccc161)[C@H](OC(=O)c162ccccc162)[C@H](OC(=O)c163ccccc163)[C@H](OC(=O)c164ccccc164)[C@H](OC(=O)c165ccccc165)[C@H](OC(=O)c166ccccc166)[C@H](OC(=O)c167ccccc167)[C@H](OC(=O)c168ccccc168)[C@H](OC(=O)c169ccccc169)[C@H](OC(=O)c170ccccc170)[C@H](OC(=O)c171ccccc171)[C@H](OC(=O)c172ccccc172)[C@H](OC(=O)c173ccccc173)[C@H](OC(=O)c174ccccc174)[C@H](OC(=O)c175ccccc175)[C@H](OC(=O)c176ccccc176)[C@H](OC(=O)c177ccccc177)[C@H](OC(=O)c178ccccc178)[C@H](OC(=O)c179ccccc179)[C@H](OC(=O)c180ccccc180)[C@H](OC(=O)c181ccccc181)[C@H](OC(=O)c182ccccc182)[C@H](OC(=O)c183ccccc183)[C@H](OC(=O)c184ccccc184)[C@H](OC(=O)c185ccccc185)[C@H](OC(=O)c186ccccc186)[C@H](OC(=O)c187ccccc187)[C@H](OC(=O)c188ccccc188)[C@H](OC(=O)c189ccccc189)[C@H](OC(=O)c190ccccc190)[C@H](OC(=O)c191ccccc191)[C@H](OC(=O)c192ccccc192)[C@H](OC(=O)c193ccccc193)[C@H](OC(=O)c194ccccc194)[C@H](OC(=O)c195ccccc195)[C@H](OC(=O)c196ccccc196)[C@H](OC(=O)c197ccccc197)[C@H](OC(=O)c198ccccc198)[C@H](OC(=O)c199ccccc199)[C@H](OC(=O)c200ccccc200)[C@H](OC(=O)c201ccccc201)[C@H](OC(=O)c202ccccc202)[C@H](OC(=O)c203ccccc203)[C@H](OC(=O)c204ccccc204)[C@H](OC(=O)c205ccccc205)[C@H](OC(=O)c206ccccc206)[C@H](OC(=O)c207ccccc207)[C@H](OC(=O)c208ccccc208)[C@H](OC(=O)c209ccccc209)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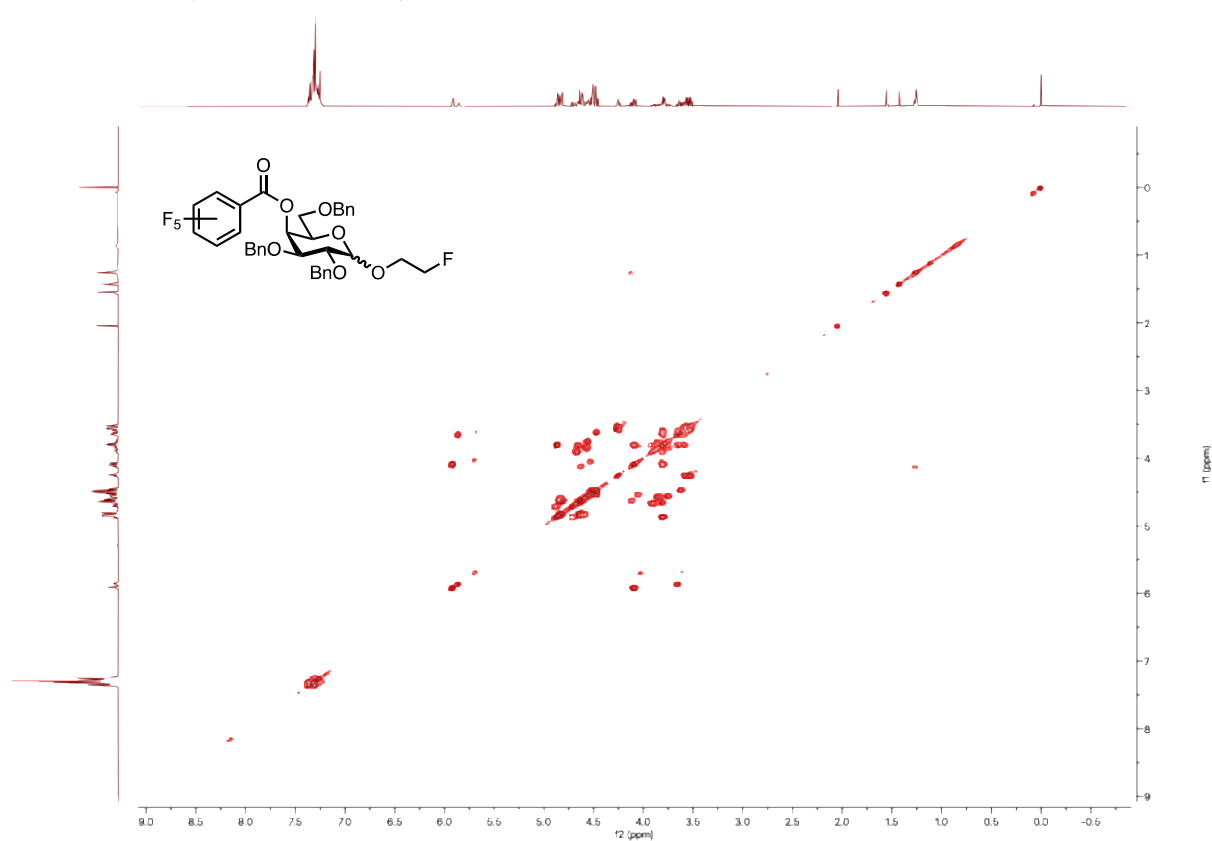
^{13}C NMR (101 MHz, CDCl_3): **11c**



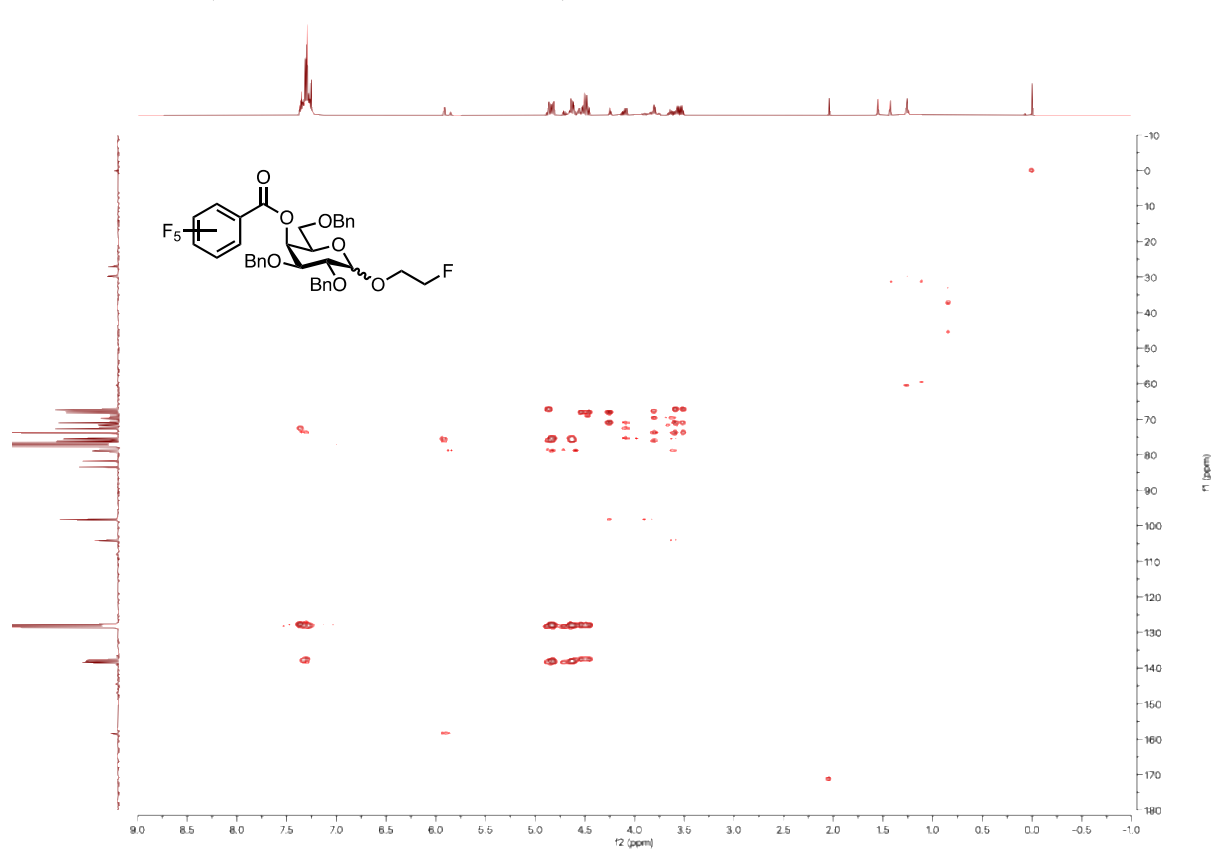
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **11c**



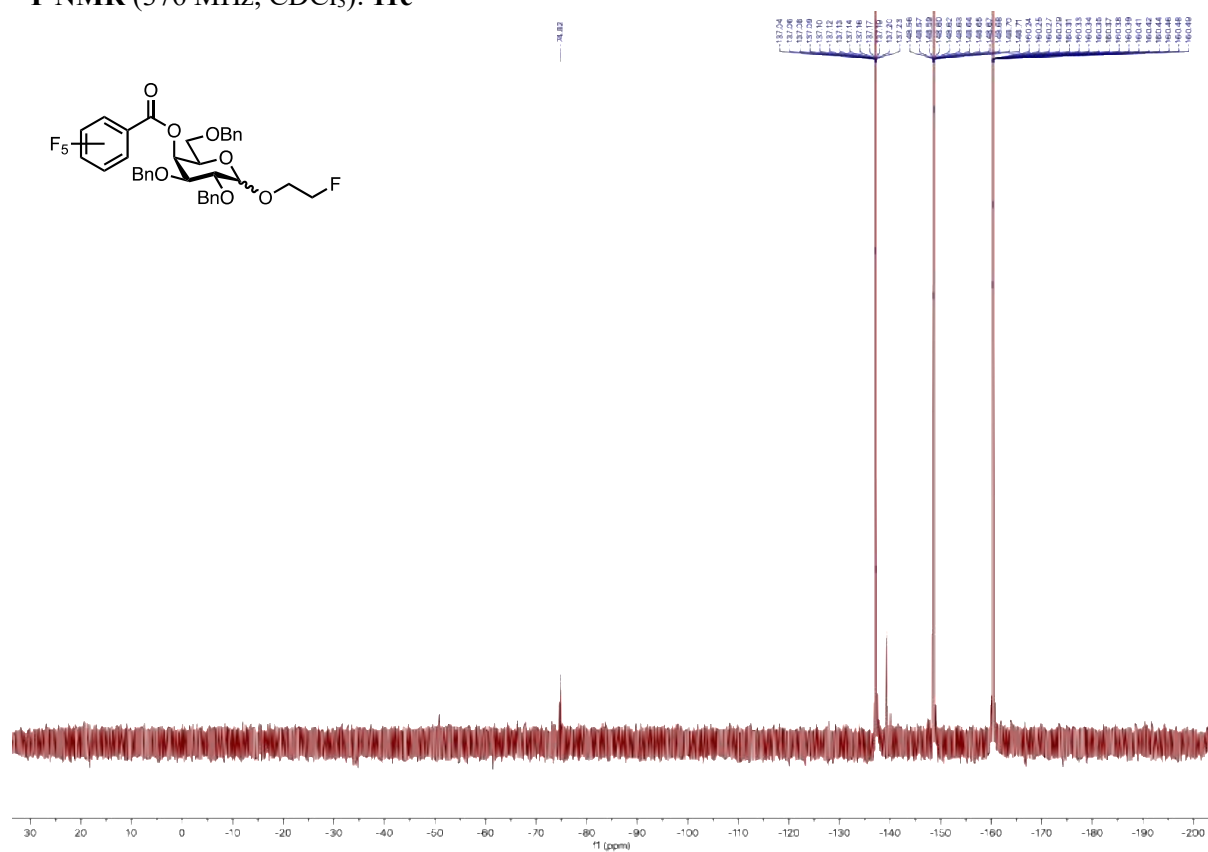
^1H , ^1H COSY (400 MHz, CDCl_3): **11c**



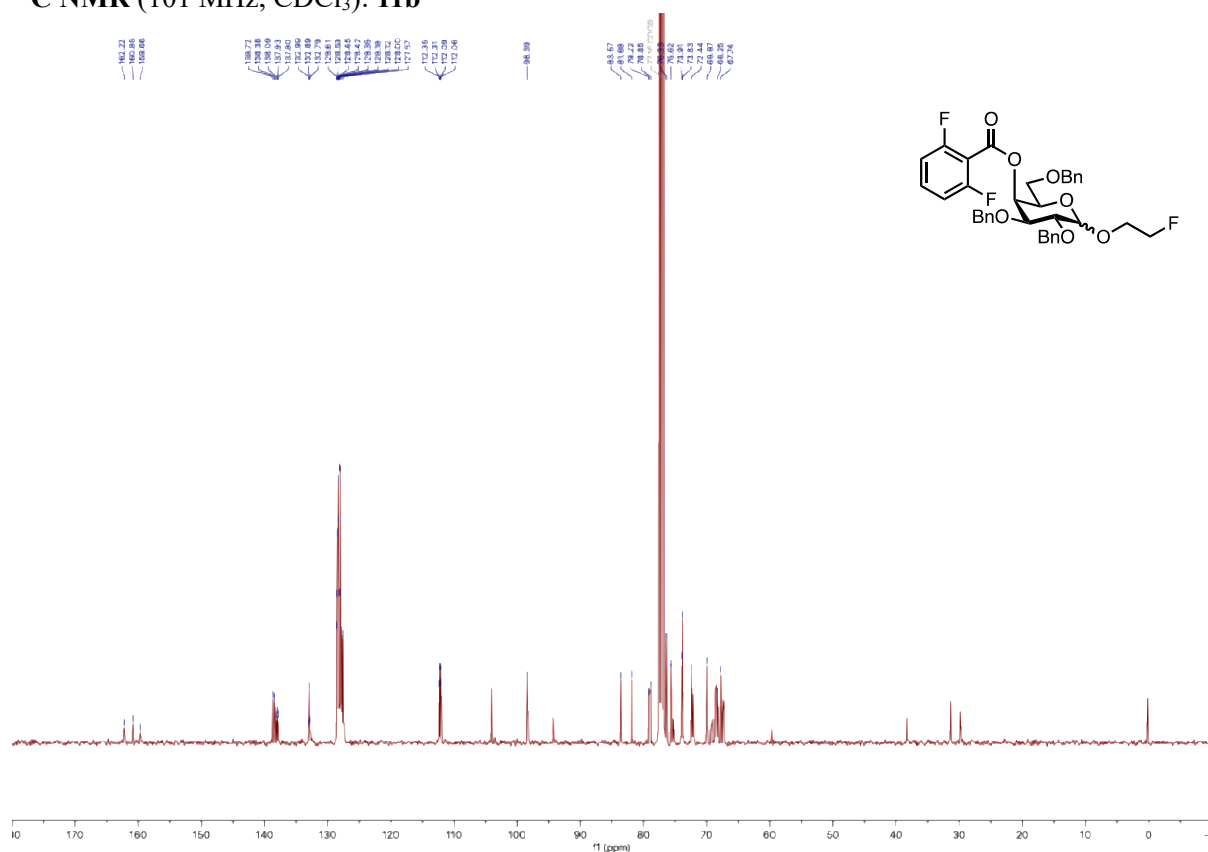
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **11c**



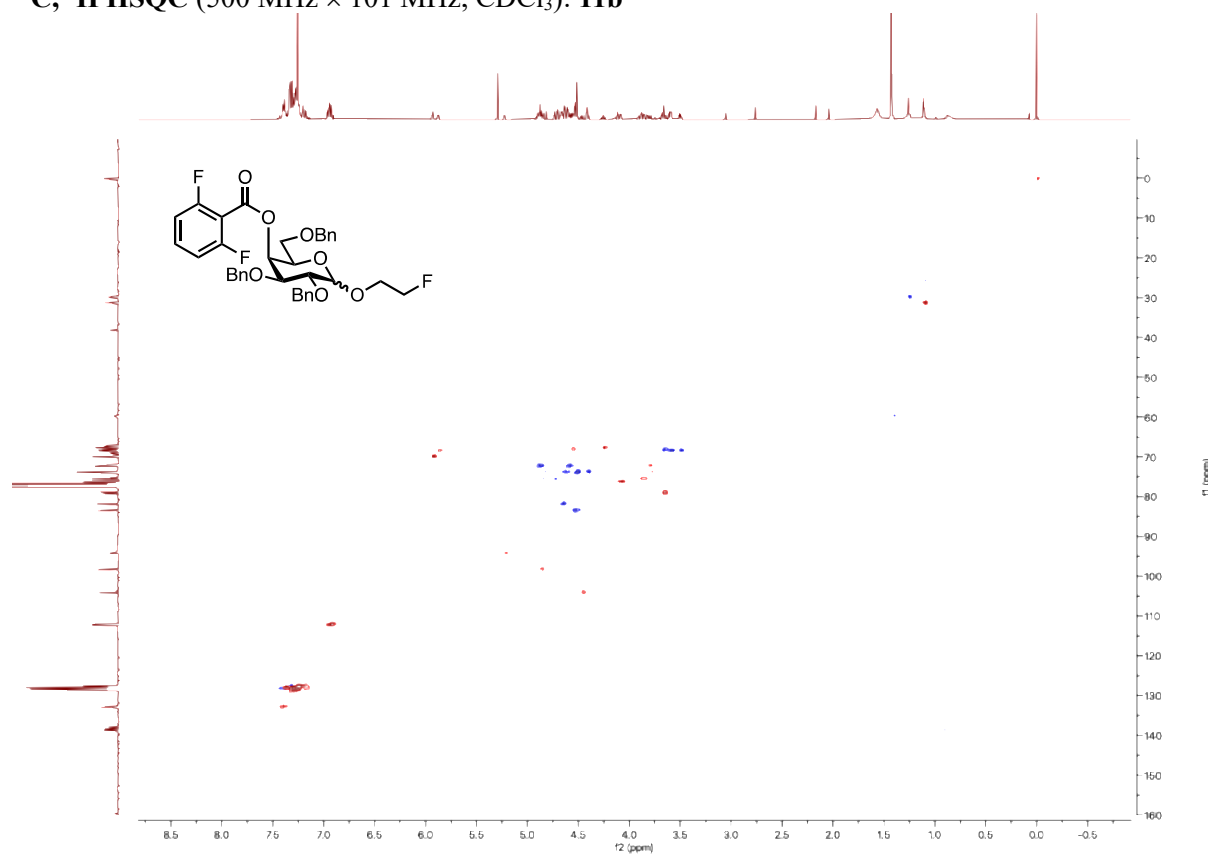
^{19}F NMR (376 MHz, CDCl_3): 11c



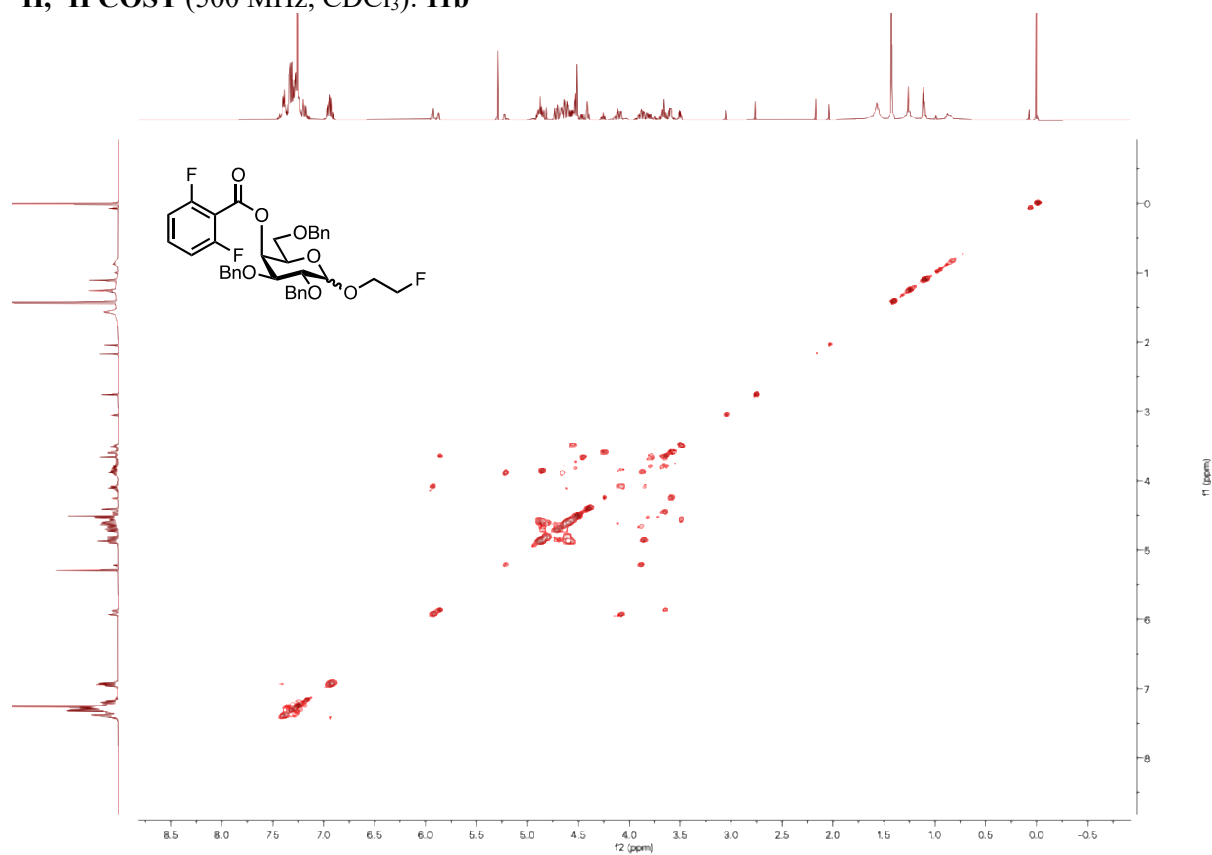
^{13}C NMR (101 MHz, CDCl_3): 11b



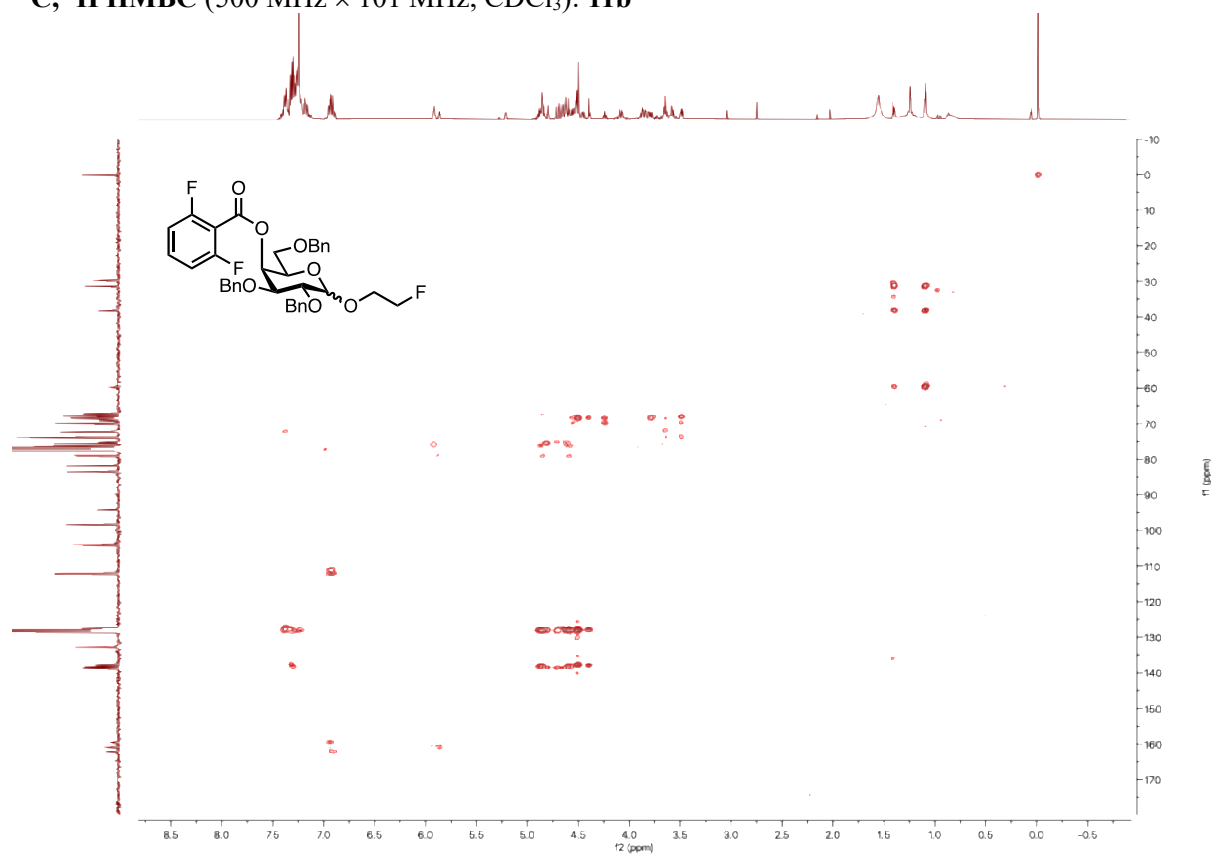
^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): 11b



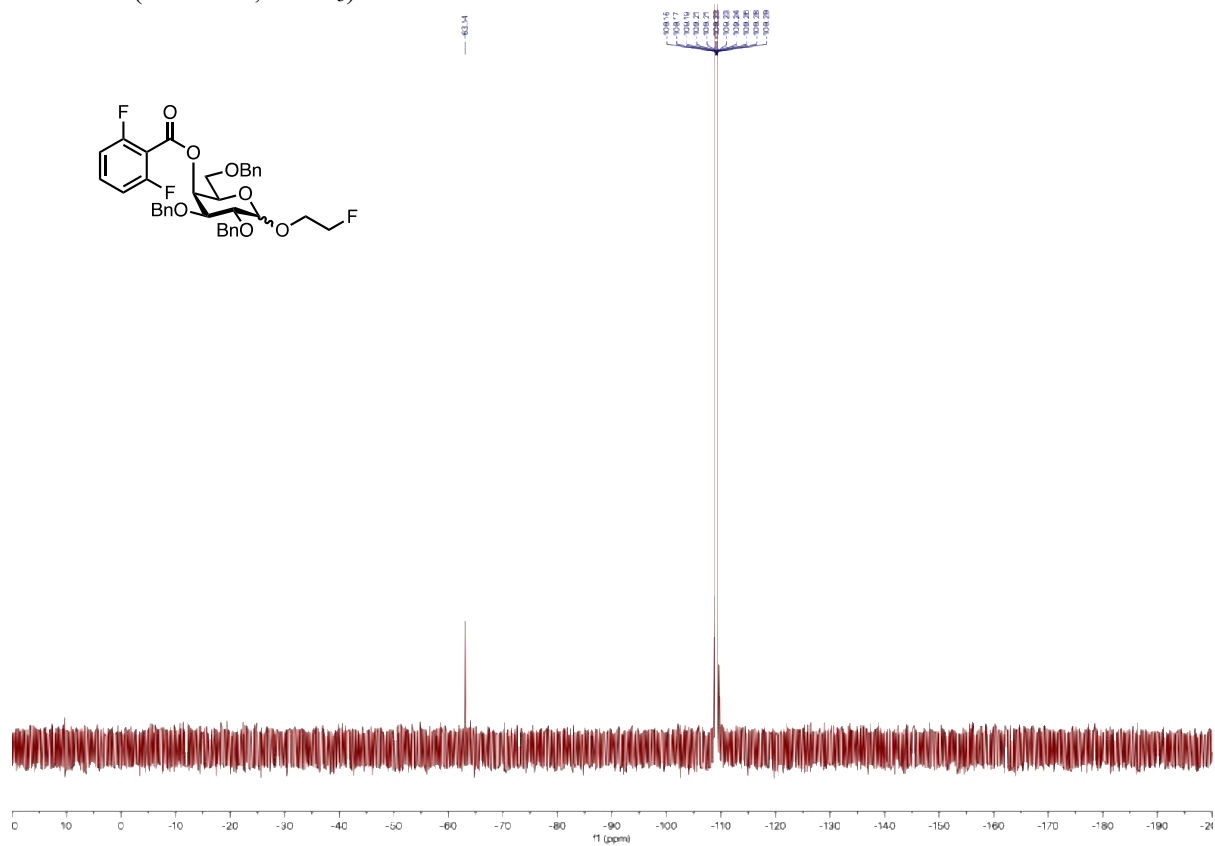
^1H , ^1H COSY (500 MHz, CDCl_3): 11b



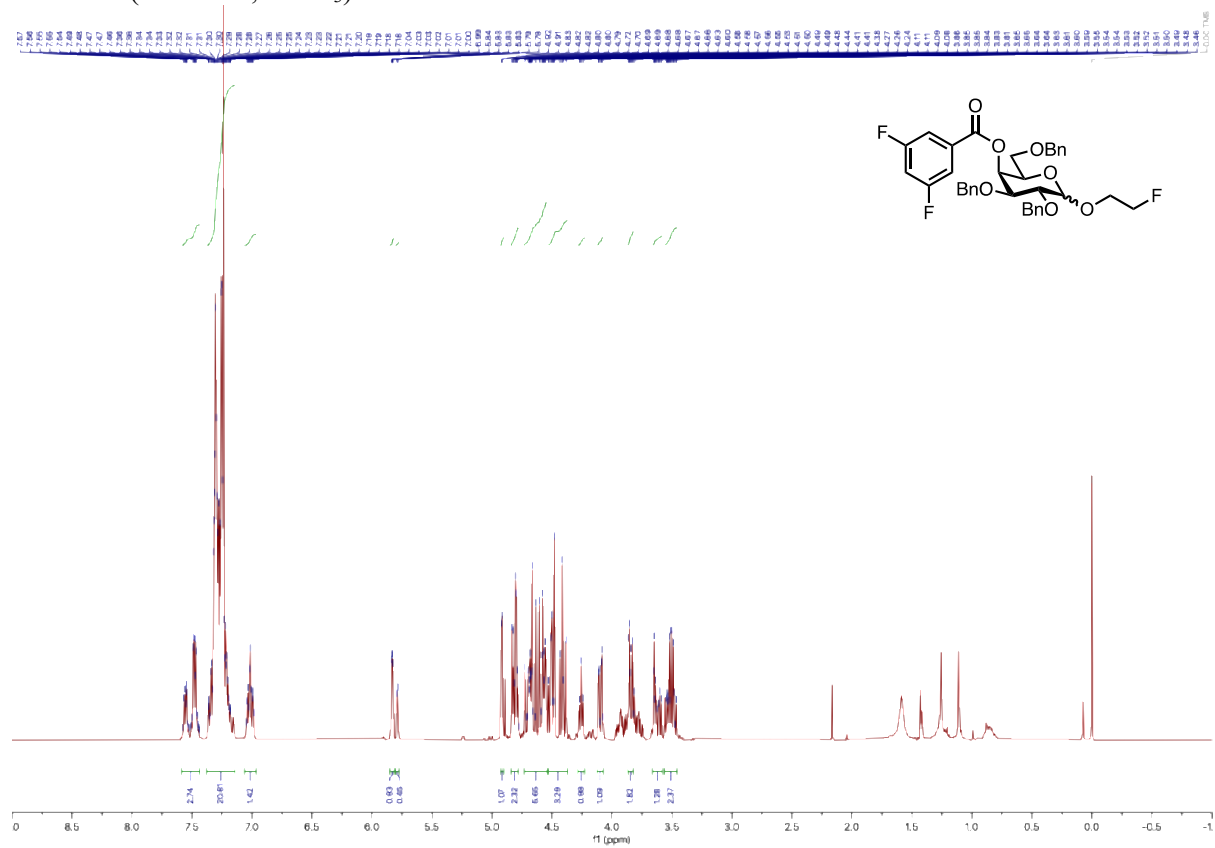
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): 11b



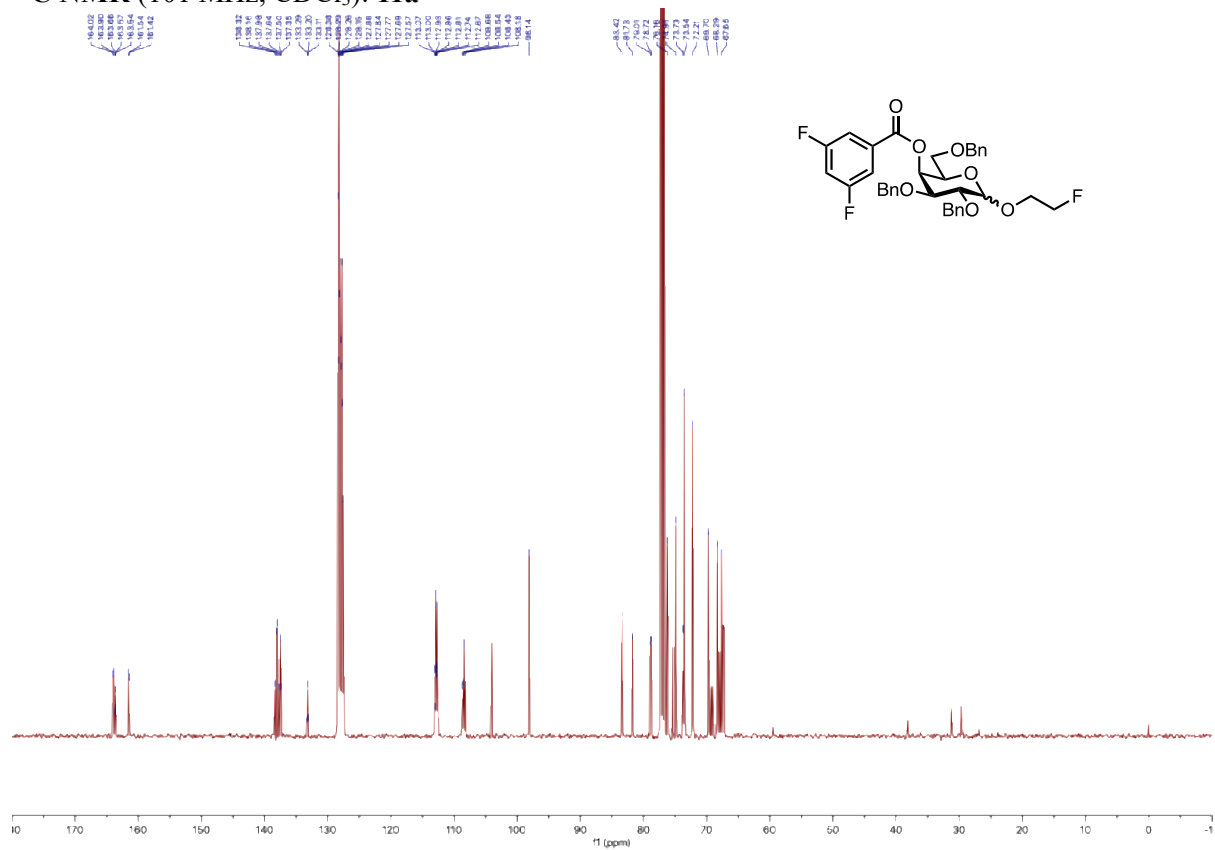
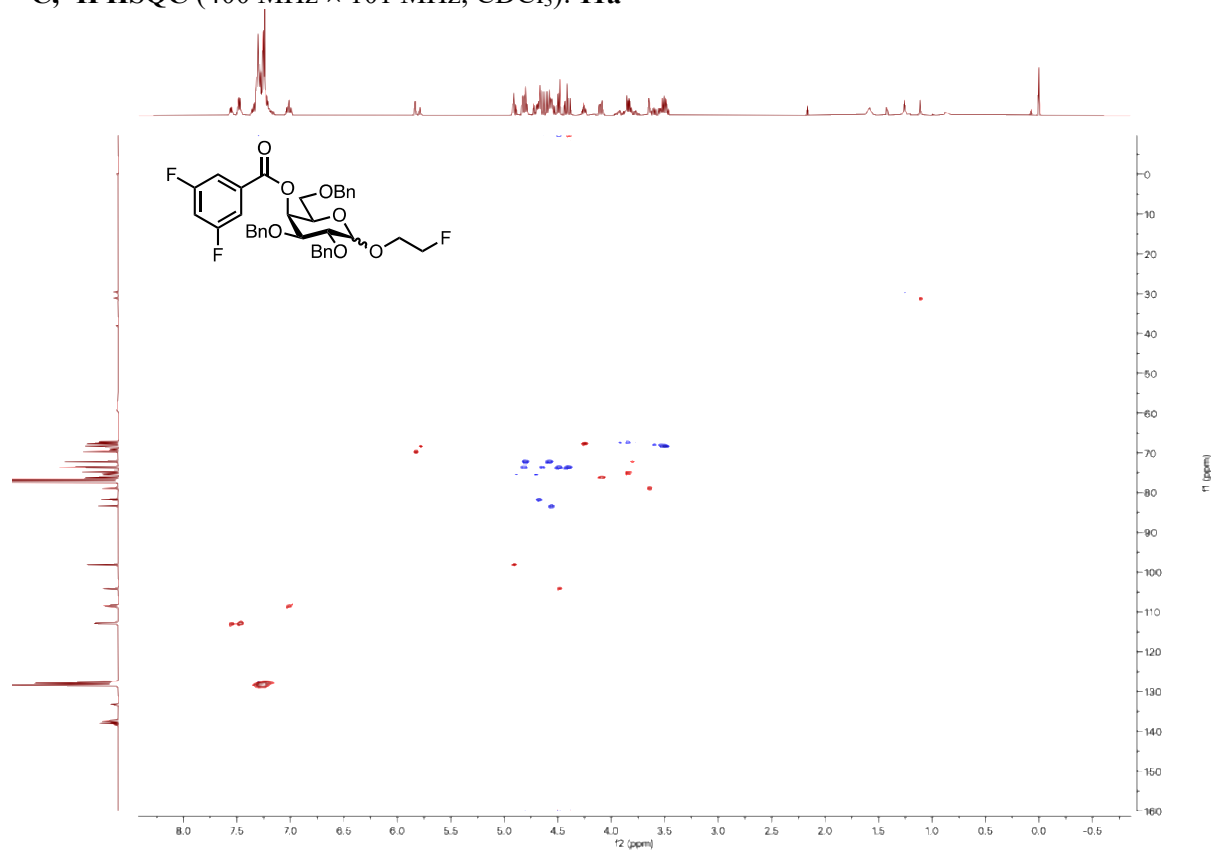
^{19}F NMR (376 MHz, CDCl_3): 11b



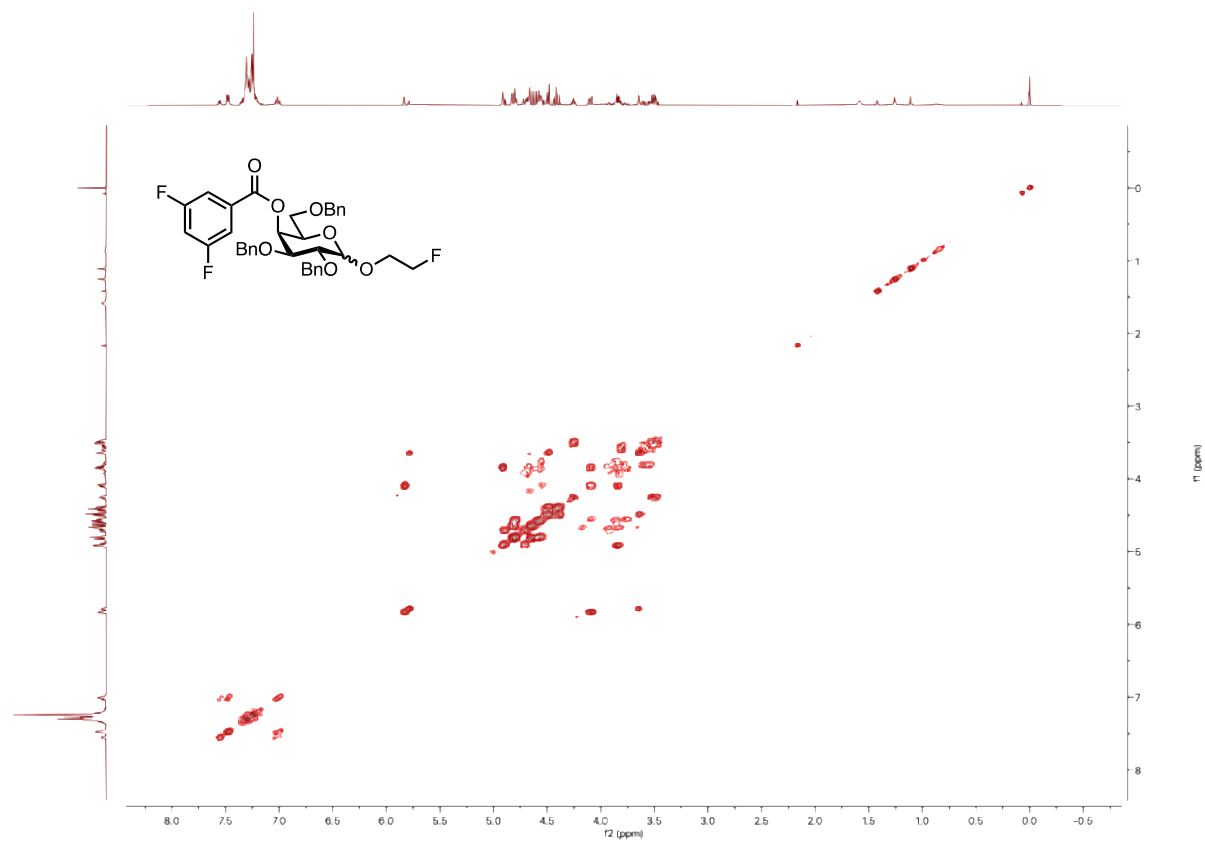
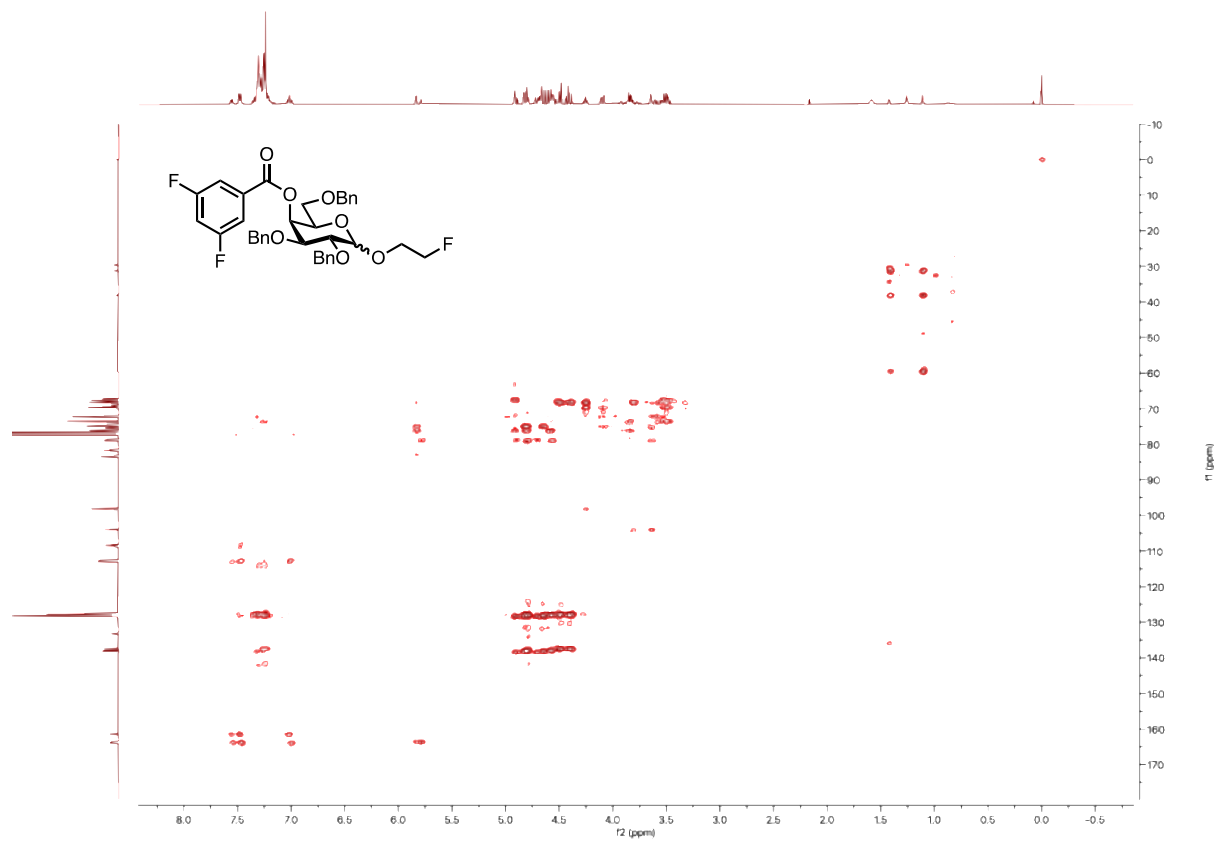
^1H NMR (400 MHz, CDCl_3): 11a



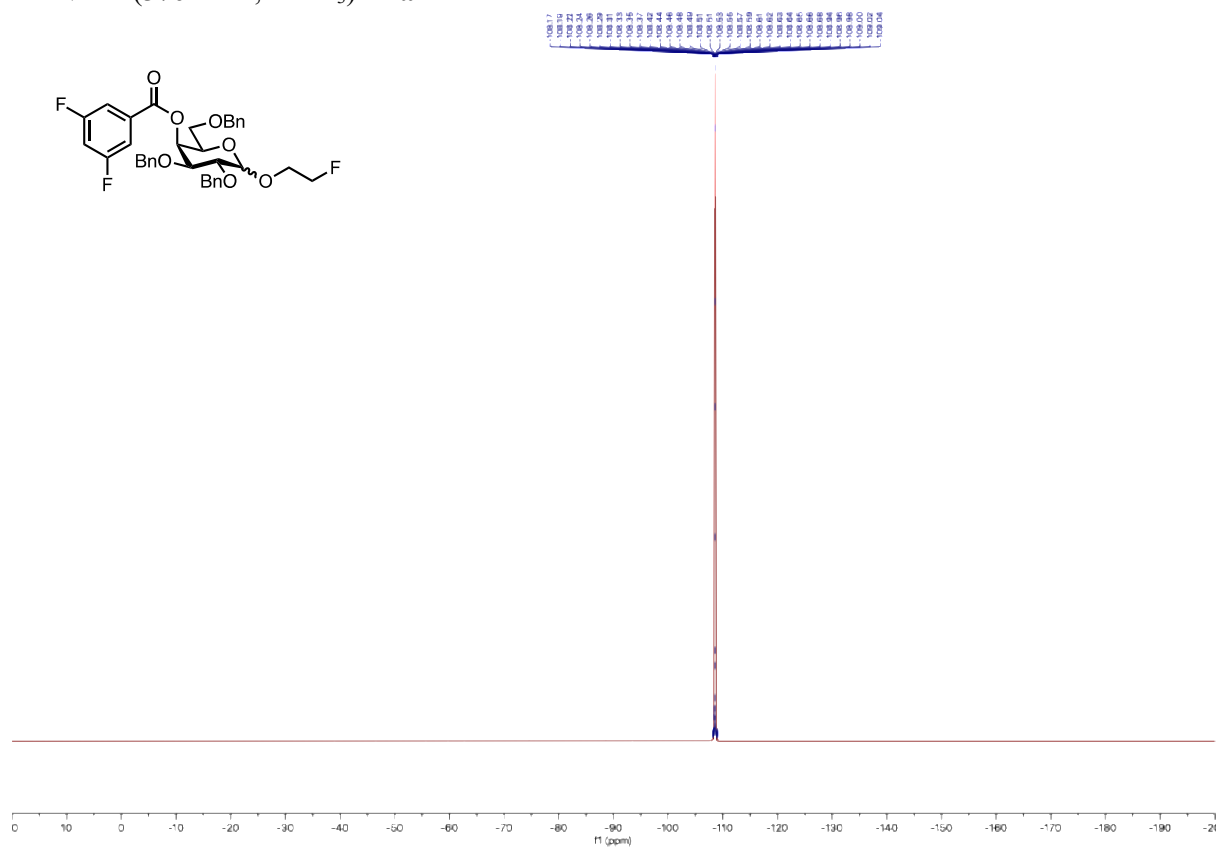
¹³C NMR (101 MHz, CDCl₃): **11a**

 ^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **11a**

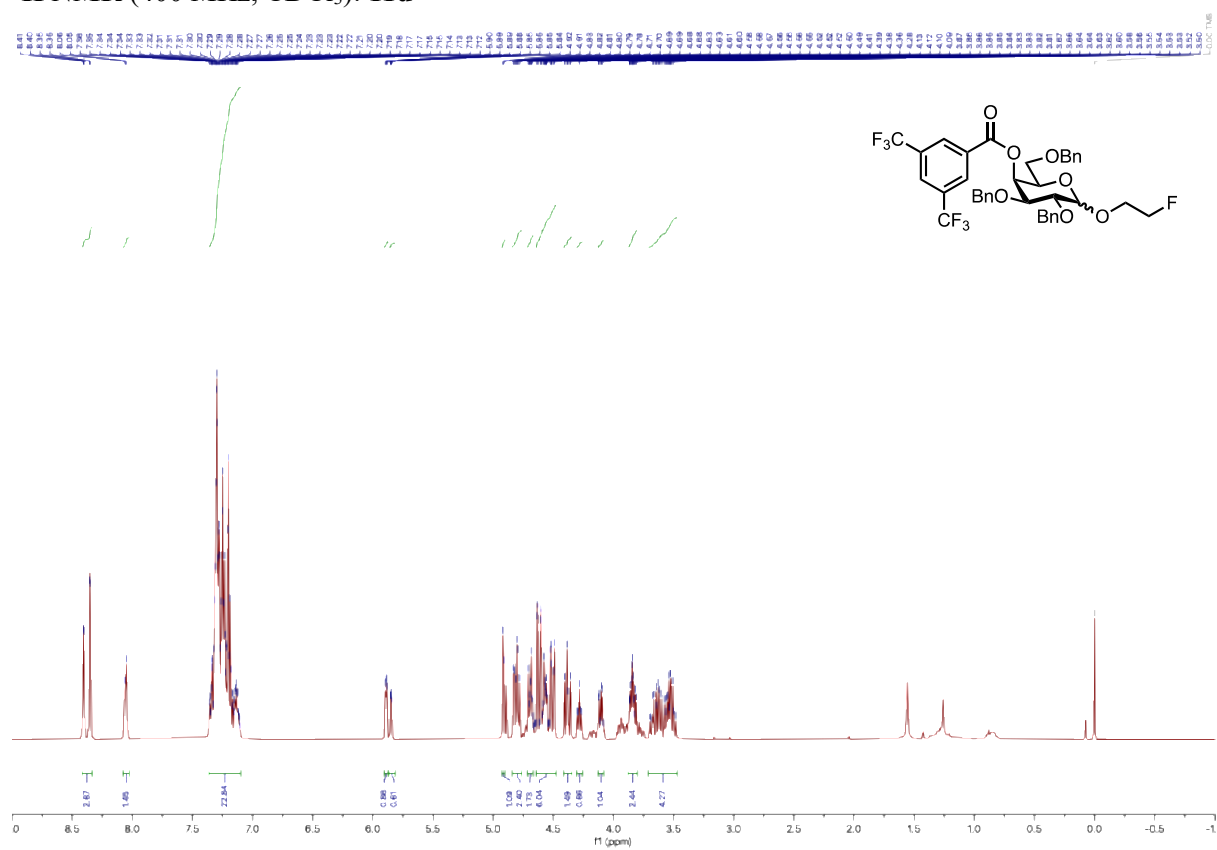
¹H, ¹H COSY (400 MHz, CDCl₃): 11a

 $^{13}\text{C}, ^1\text{H}$ HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **11a**

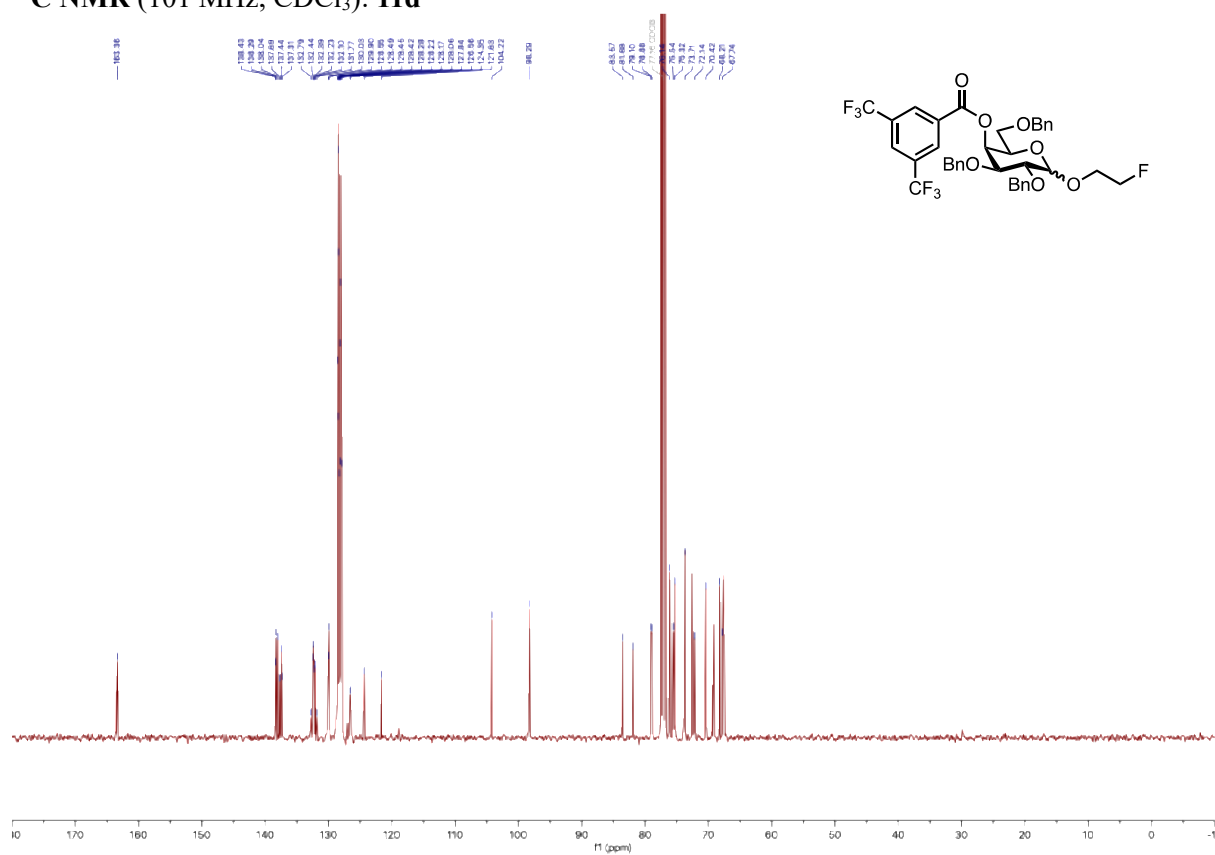
^{19}F NMR (376 MHz, CDCl_3): 11a



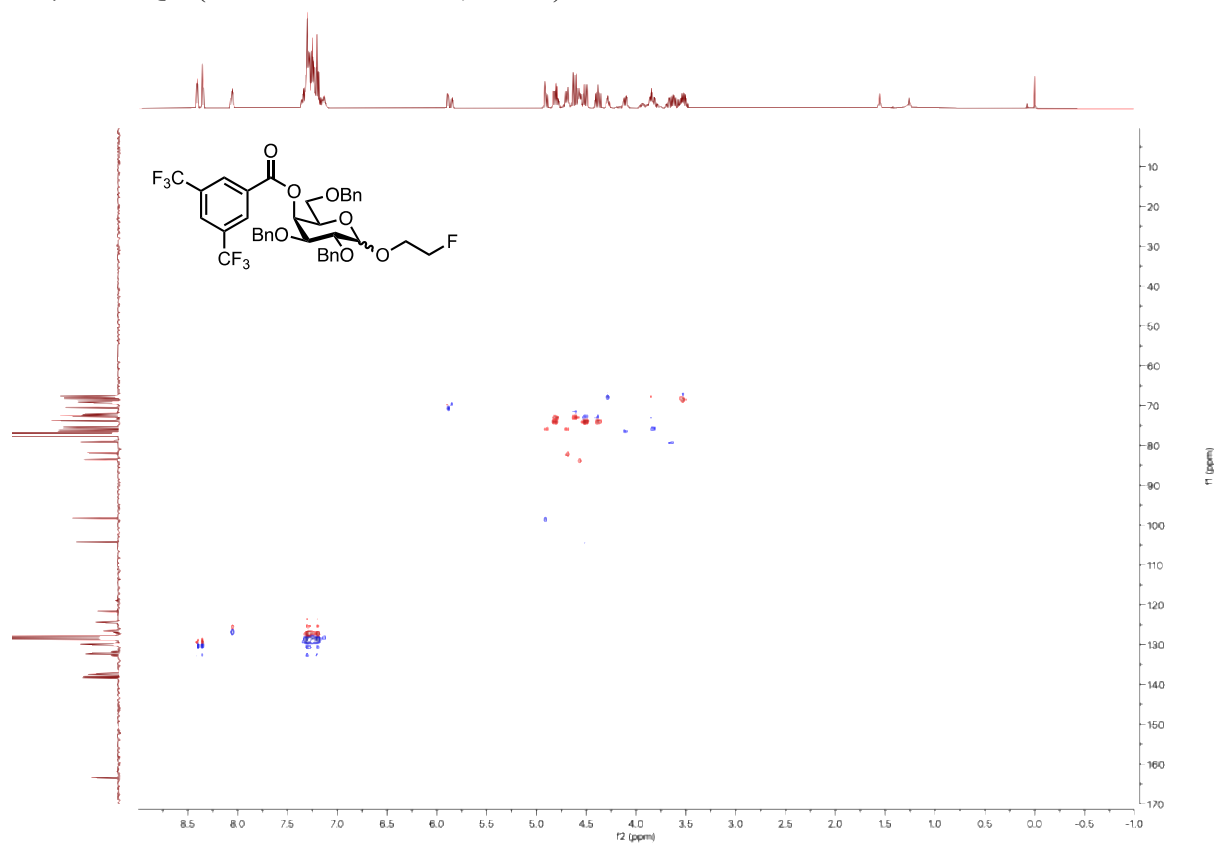
^1H NMR (400 MHz, CDCl_3): 11d



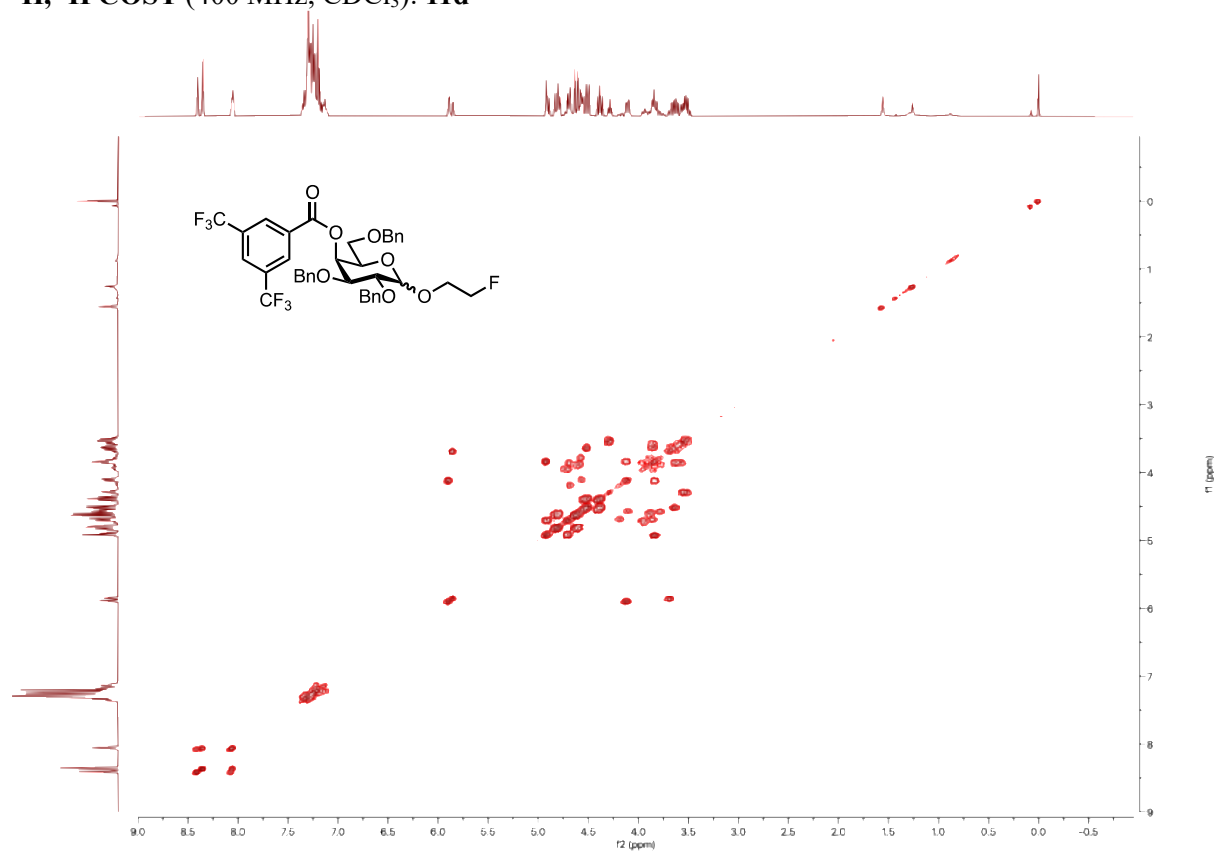
^{13}C NMR (101 MHz, CDCl_3): 11d



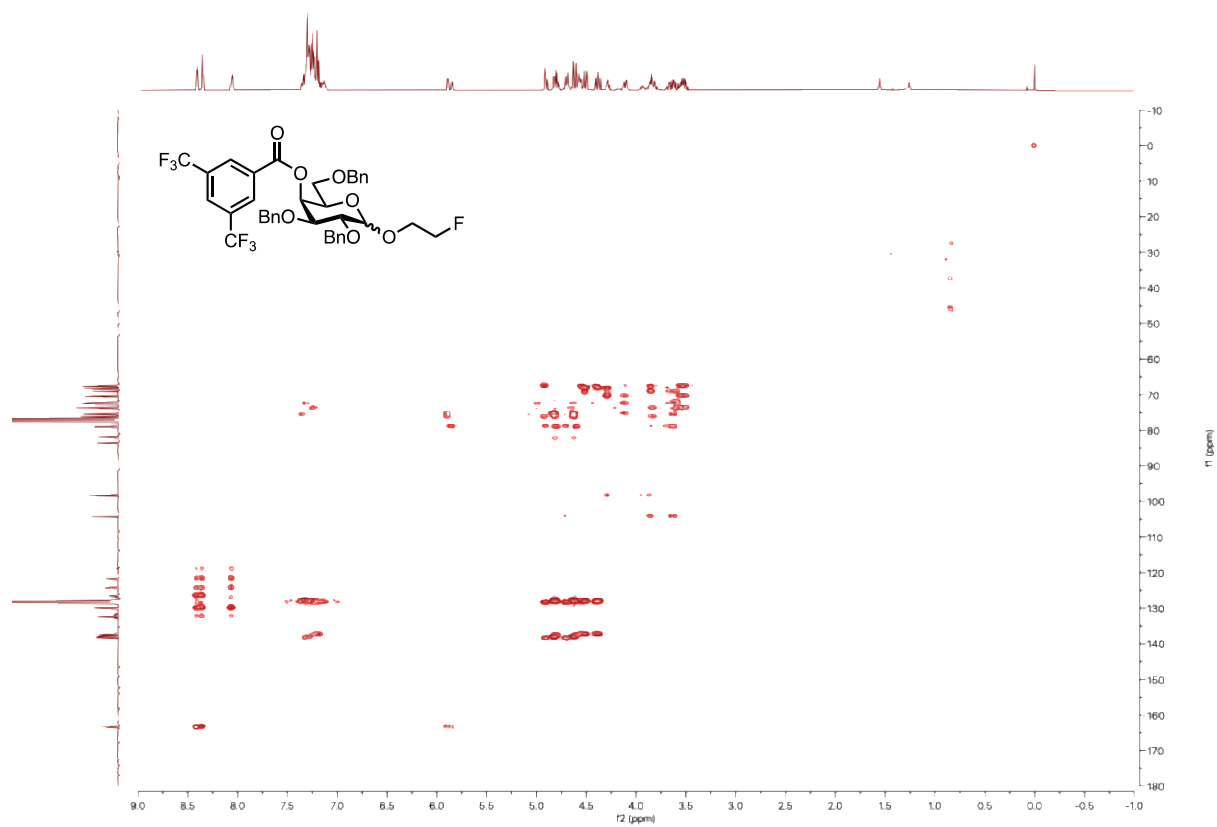
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): 11d



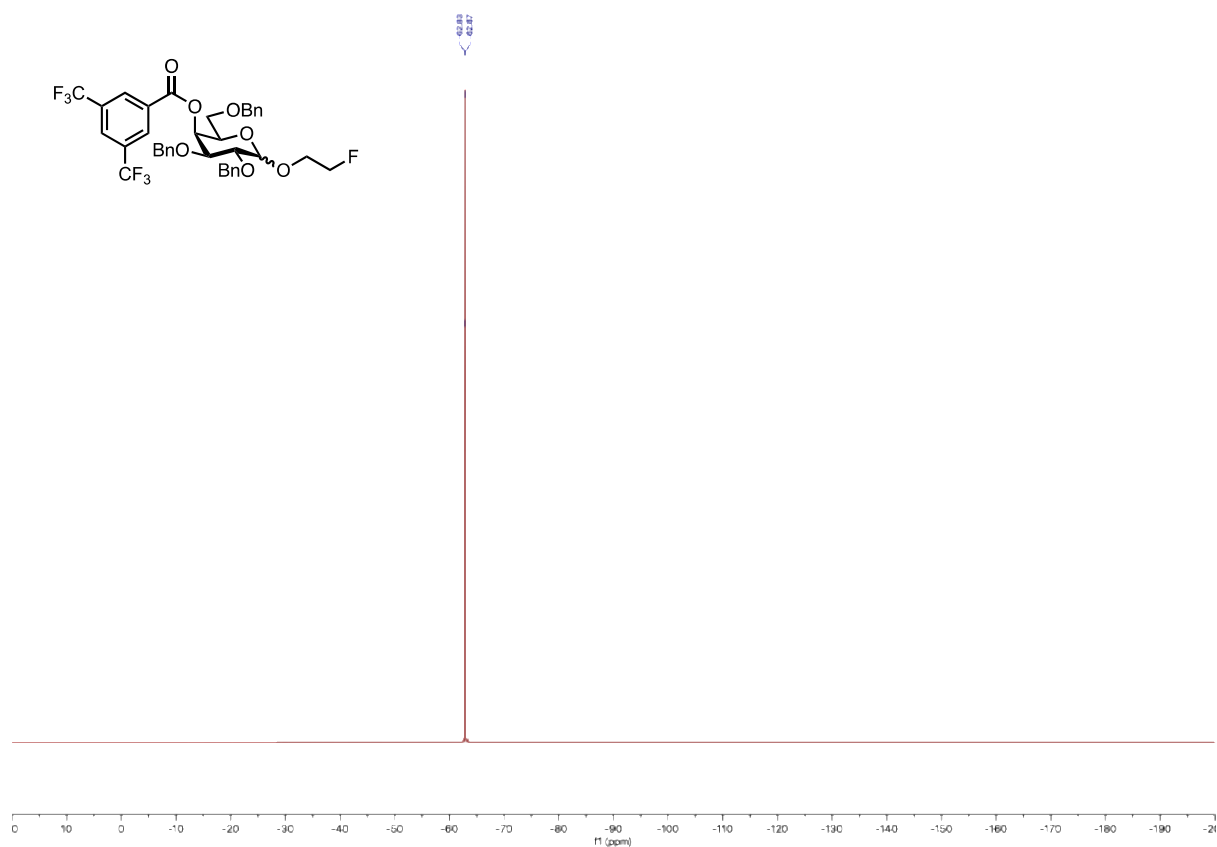
^1H , ^1H COSY (400 MHz, CDCl_3): 11d



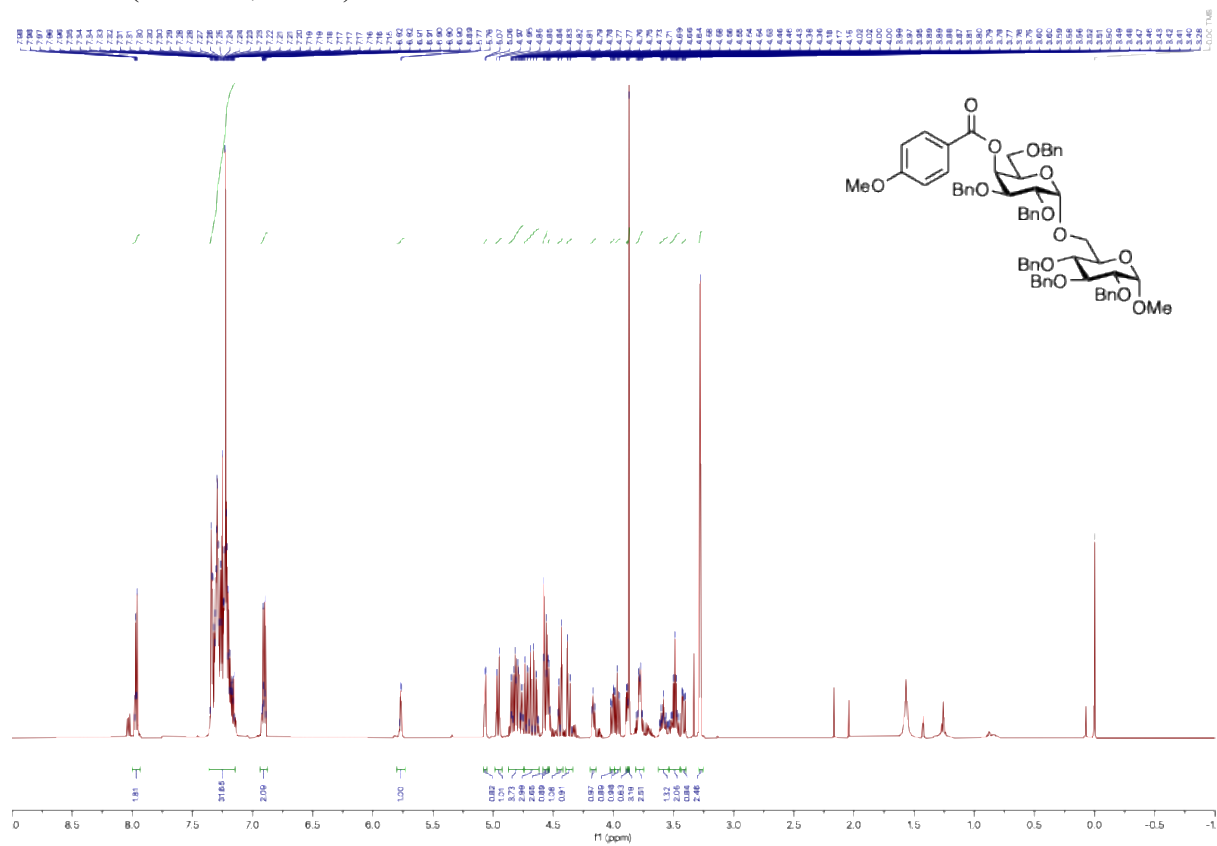
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 11d



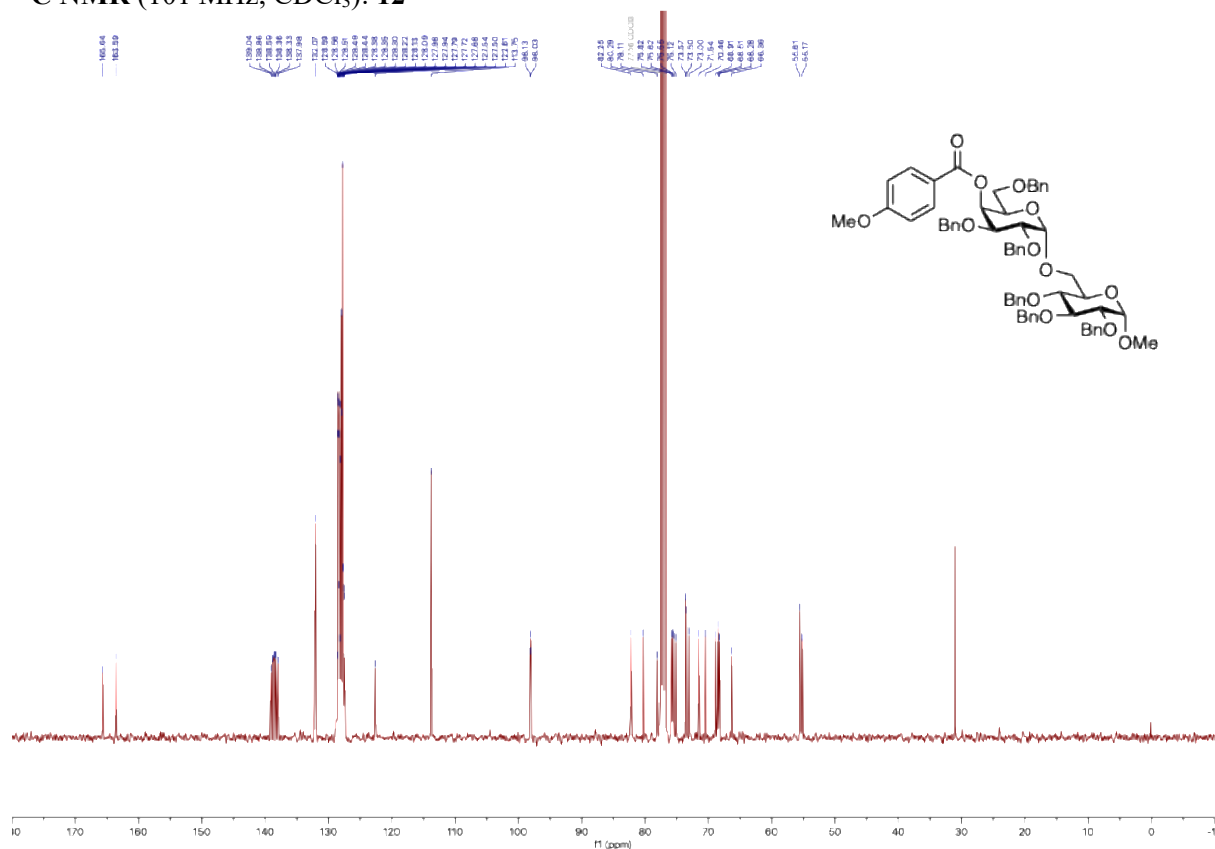
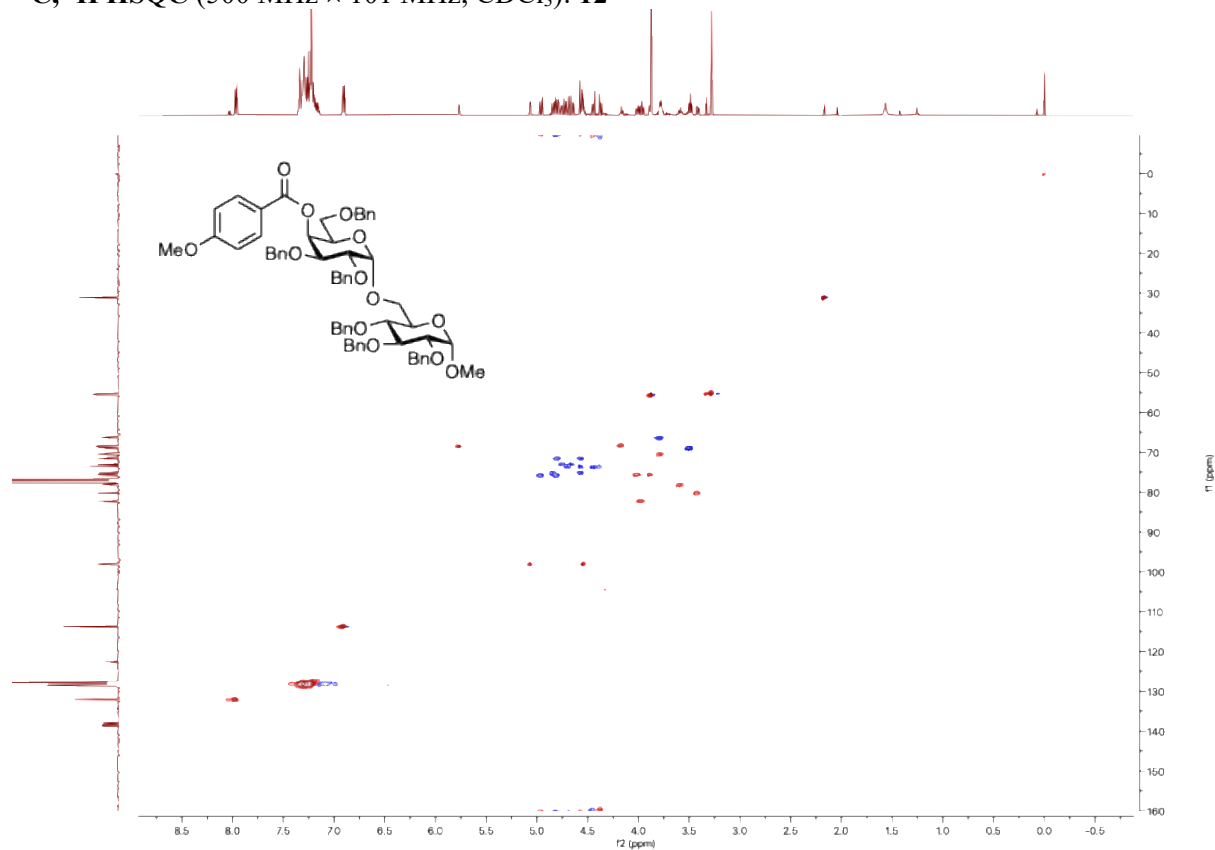
^{19}F NMR (376 MHz, CDCl_3): 11d



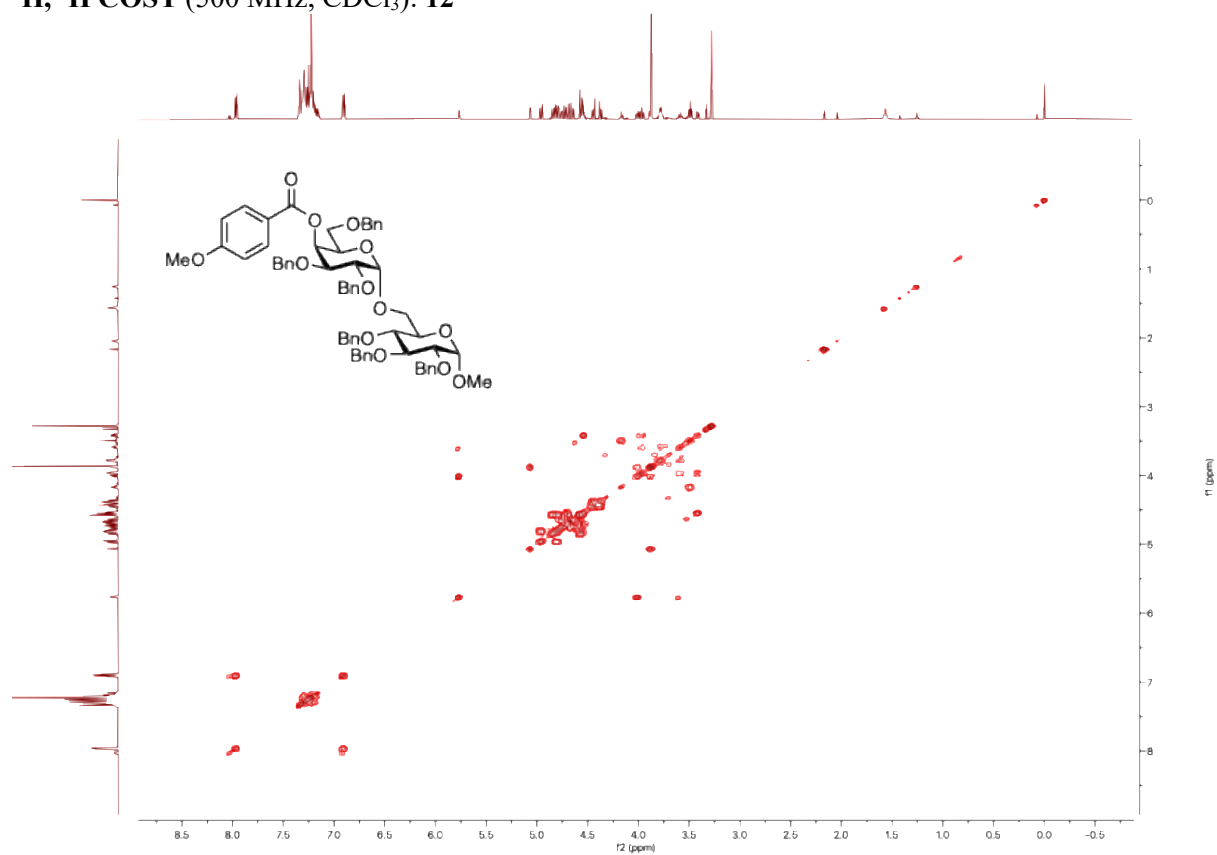
^1H NMR (500 MHz, CDCl_3): 12



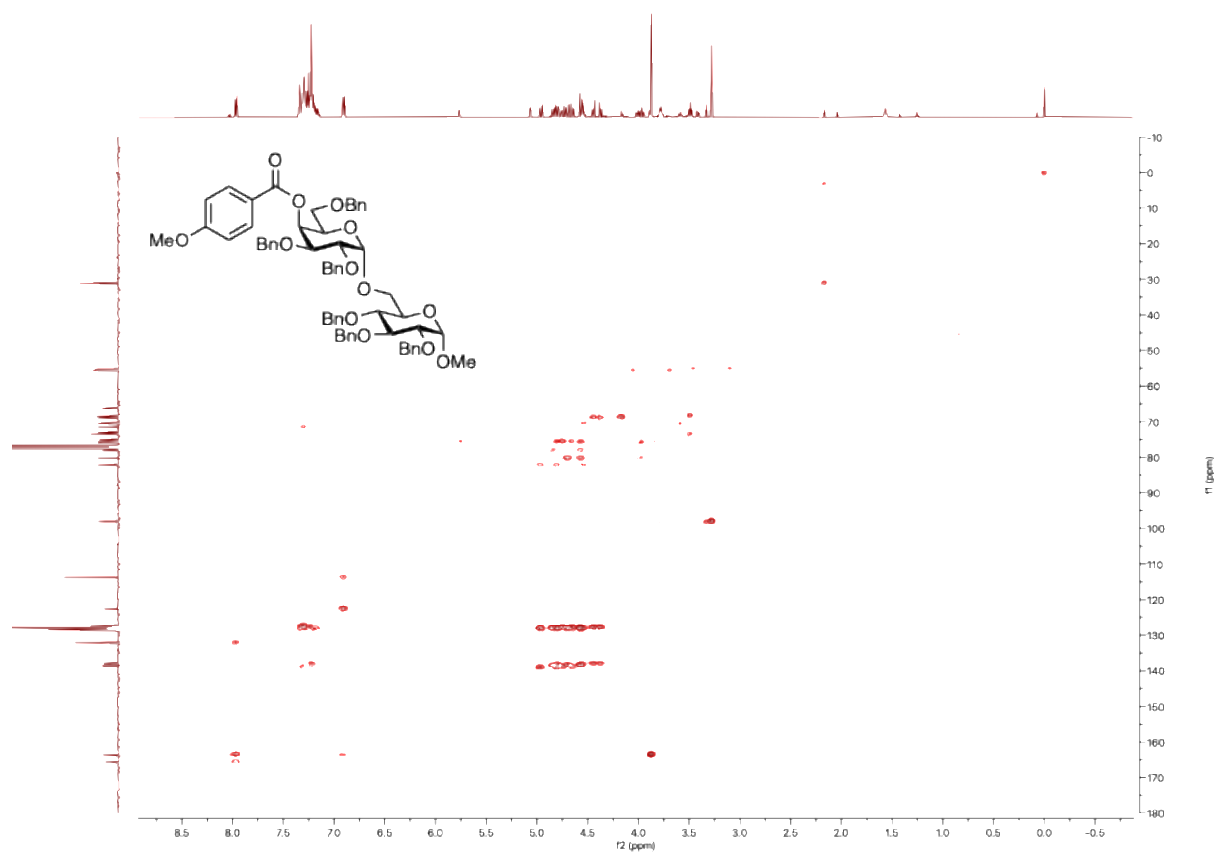
¹³C NMR (101 MHz, CDCl₃): **12**

 ^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **12**

^1H , ^1H COSY (500 MHz, CDCl_3): 12



^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): 12



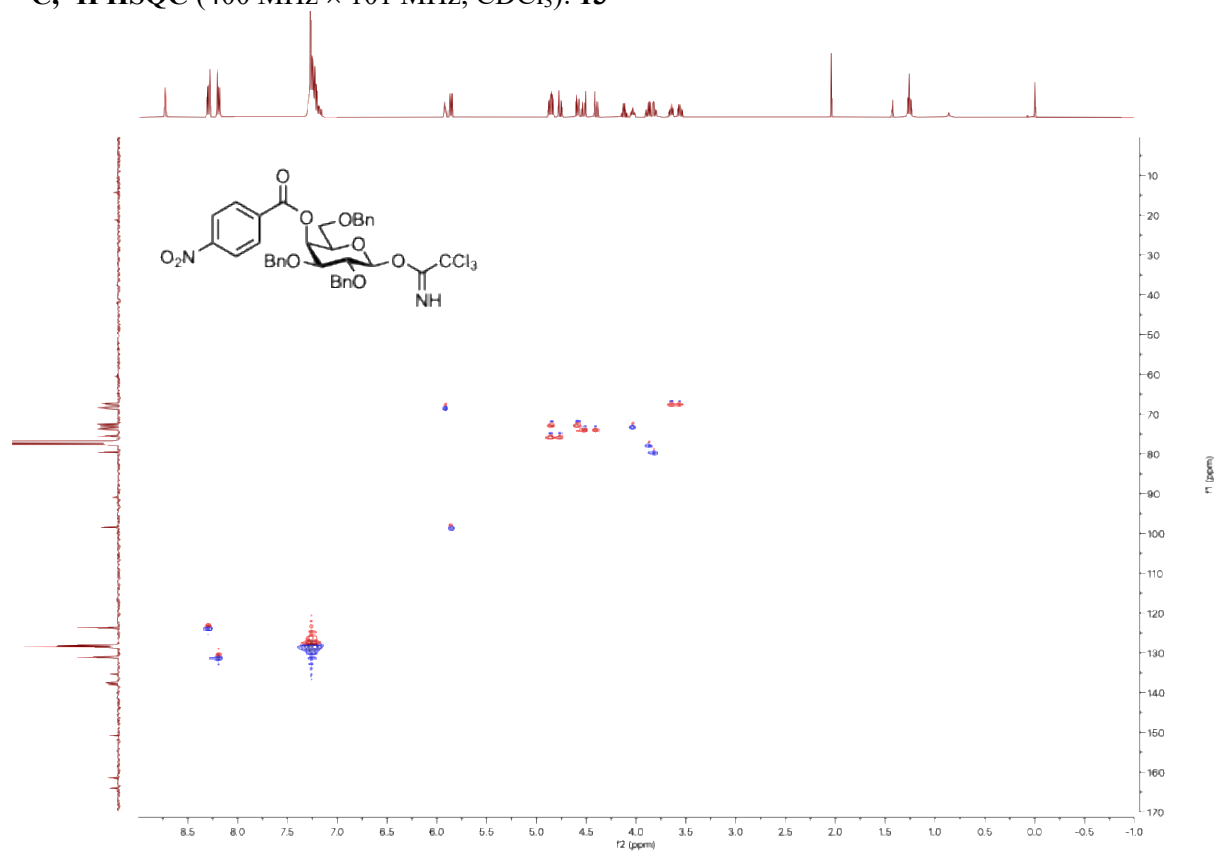
Chemical structure of compound 10: CC1(C)NC(=O)O[C@H]2[C@@H](OC(=O)c3ccc([N+](=O)[O-])cc3)[C@H](OCc4ccccc4)[C@@H](OCc5ccccc5)[C@H](O)[C@H]2O

¹H NMR spectrum (CDCl₃) of compound 10. The spectrum shows peaks from 0 to 8.5 ppm. Aromatic protons are at 7.2-7.5 ppm (m, 4H). Aromatic protons of the p-nitrophenyl group are at 8.1-8.3 ppm (m, 4H). Sugar protons are between 3.5-5.5 ppm. The CDCl₃ solvent triplet is at 7.26 ppm. The TMS reference peak is at 0 ppm. Integration values are shown below the peaks.

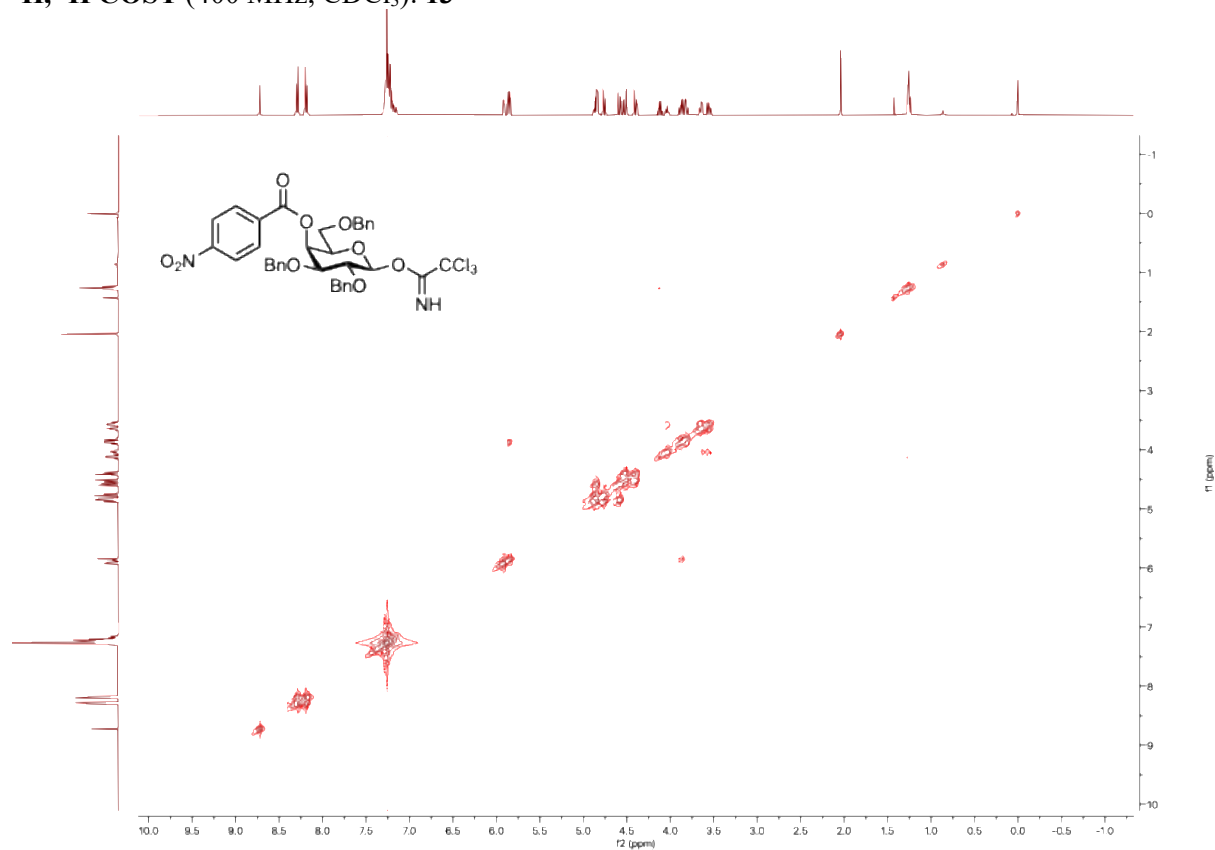
Chemical structure of the compound is shown above the spectrum. The spectrum displays peaks corresponding to the chemical structure, with the following chemical shifts (ppm) labeled on the left:

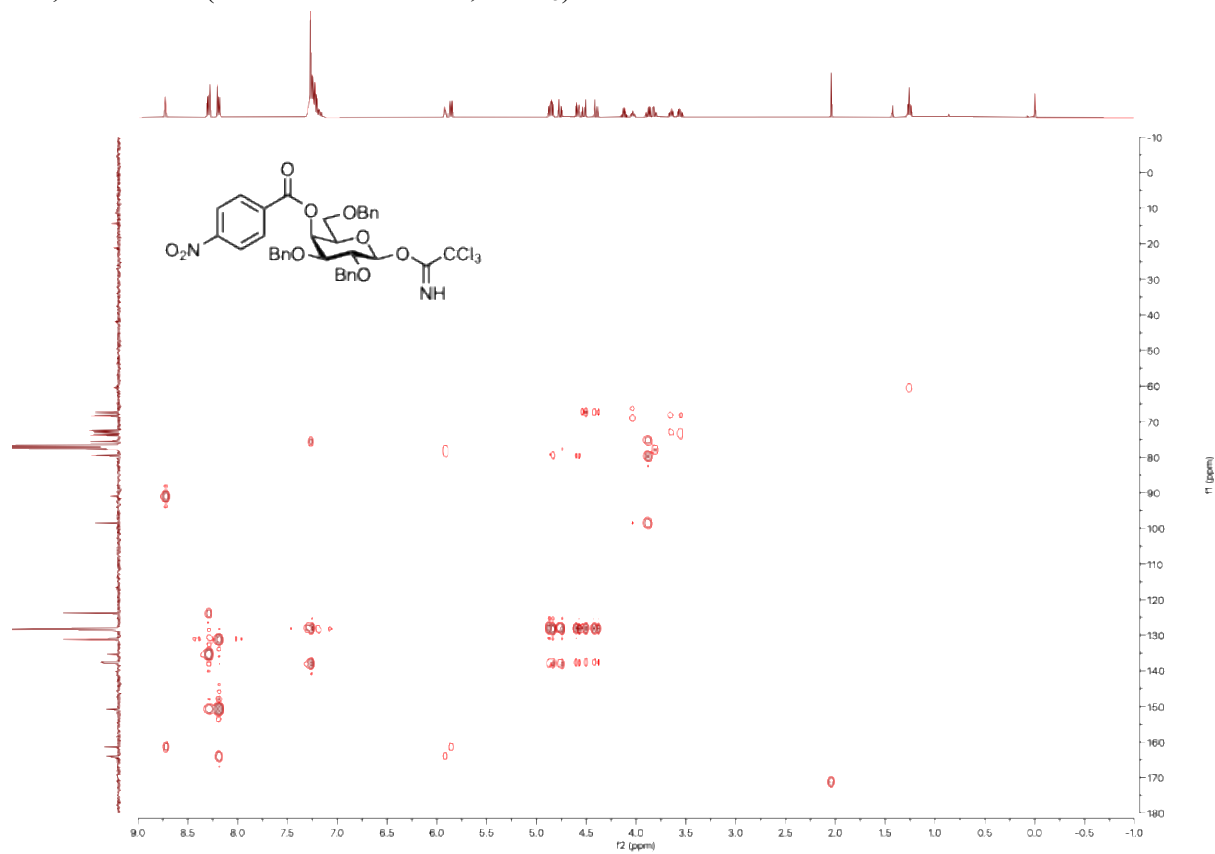
186.04, 181.42, 150.79, 138.02, 137.96, 137.86, 137.80, 137.74, 137.68, 137.62, 137.56, 137.50, 137.44, 137.38, 137.32, 137.26, 137.20, 137.14, 137.08, 137.02, 136.96, 136.90, 136.84, 136.78, 136.72, 136.66, 136.60, 136.54, 136.48, 136.42, 136.36, 136.30, 136.24, 136.18, 136.12, 136.06, 136.00, 135.94, 135.88, 135.82, 135.76, 135.70, 135.64, 135.58, 135.52, 135.46, 135.40, 135.34, 135.28, 135.22, 135.16, 135.10, 135.04, 134.98, 134.92, 134.86, 134.80, 134.74, 134.68, 134.62, 134.56, 134.50, 134.44, 134.38, 134.32, 134.26, 134.20, 134.14, 134.08, 134.02, 133.96, 133.90, 133.84, 133.78, 133.72, 133.66, 133.60, 133.54, 133.48, 133.42, 133.36, 133.30, 133.24, 133.18, 133.12, 133.06, 133.00, 132.94, 132.88, 132.82, 132.76, 132.70, 132.64, 132.58, 132.52, 132.46, 132.40, 132.34, 132.28, 132.22, 132.16, 132.10, 132.04, 131.98, 131.92, 131.86, 131.80, 131.74, 131.68, 131.62, 131.56, 131.50, 131.44, 131.38, 131.32, 131.26, 131.20, 131.14, 131.08, 131.02, 130.96, 130.90, 130.84, 130.78, 130.72, 130.66, 130.60, 130.54, 130.48, 130.42, 130.36, 130.30, 130.24, 130.18, 130.12, 130.06, 130.00, 129.94, 129.88, 129.82, 129.76, 129.70, 129.64, 129.58, 129.52, 129.46, 129.40, 129.34, 129.28, 129.22, 129.16, 129.10, 129.04, 128.98, 128.92, 128.86, 128.80, 128.74, 128.68, 128.62, 128.56, 128.50, 128.44, 128.38, 128.32, 128.26, 128.20, 128.14, 128.08, 128.02, 127.96, 127.90, 127.84, 127.78, 127.72, 127.66, 127.60, 127.54, 127.48, 127.42, 127.36, 127.30, 127.24, 127.18, 127.12, 127.06, 127.00, 126.94, 126.88, 126.82, 126.76, 126.70, 126.64, 126.58, 126.52, 126.46, 126.40, 126.34, 126.28, 126.22, 126.16, 126.10, 126.04, 125.98, 125.92, 125.86, 125.80, 125.74, 125.68, 125.62, 125.56, 125.50, 125.44, 125.38, 125.32, 125.26, 125.20, 125.14, 125.08, 125.02, 124.96, 124.90, 124.84, 124.78, 124.72, 124.66, 124.60, 124.54, 124.48, 124.42, 124.36, 124.30, 124.24, 124.18, 124.12, 124.06, 124.00, 123.94, 123.88, 123.82, 123.76, 123.70, 123.64, 123.58, 123.52, 123.46, 123.40, 123.34, 123.28, 123.22, 123.16, 123.10, 123.04, 122.98, 122.92, 122.86, 122.80, 122.74, 122.68, 122.62, 122.56, 122.50, 122.44, 122.38, 122.32, 122.26, 122.20, 122.14, 122.08, 122.02, 121.96, 121.90, 121.84, 121.78, 121.72, 121.66, 121.60, 121.54, 121.48, 121.42, 121.36, 121.30, 121.24, 121.18, 121.12, 121.06, 121.00, 120.94, 120.88, 120.82, 120.76, 120.70, 120.64, 120.58, 120.52, 120.46, 120.40, 120.34, 120.28, 120.22, 120.16, 120.10, 120.04, 119.98, 119.92, 119.86, 119.80, 119.74, 119.68, 119.62, 119.56, 119.50, 119.44, 119.38, 119.32, 119.26, 119.20, 119.14, 119.08, 119.02, 118.96, 118.90, 118.84, 118.78, 118.72, 118.66, 118.60, 118.54, 118.48, 118.42, 118.36, 118.30, 118.24, 118.18, 118.12, 118.06, 118.00, 117.94, 117.88, 117.82, 117.76, 117.70, 117.64, 117.58, 117.52, 117.46, 117.40, 117.34, 117.28, 117.22, 117.16, 117.10, 117.04, 116.98, 116.92, 116.86, 116.80, 116.74, 116.68, 116.62, 116.56, 116.50, 116.44, 116.38, 116.32, 116.26, 116.20, 116.14, 116.08, 116.02, 115.96, 115.90, 115.84, 115.78, 115.72, 115.66, 115.60, 115.54, 115.48, 115.42, 115.36, 115.30, 115.24, 115.18, 115.12, 115.06, 115.00, 114.94, 114.88, 114.82, 114.76, 114.70, 114.64, 114.58, 114.52, 114.46, 114.40, 114.34, 114.28, 114.22, 114.16, 114.10, 114.04, 113.98, 113.92, 113.86, 113.80, 113.74, 113.68, 113.62, 113.56, 113.50, 113.44, 113.38, 113.32, 113.26, 113.20, 113.14, 113.08, 113.02, 112.96, 112.90, 112.84, 112.78, 112.72, 112.66, 112.60, 112.54, 112.48, 112.42, 112.36, 112.30, 112.24, 112.18, 112.12, 112.06, 112.00, 111.94, 111.88, 111.82, 111.76, 111.70, 111.64, 111.58, 111.52, 111.46, 111.40, 111.34, 111.28, 111.22, 111.16, 111.10, 111.04, 110.98, 110.92, 110.86, 110.80, 110.74, 110.68, 110.62, 110.56, 110.50, 110.44, 110.38, 110.32, 110.26, 110.20, 110.14, 110.08, 110.02, 109.96, 109.90, 109.84, 109.78, 109.72, 109.66, 109.60, 109.54, 109.48, 109.42, 109.36, 109.30, 109.24, 109.18, 109.12, 109.06, 109.00, 108.94, 108.88, 108.82, 108.76, 108.70, 108.64, 108.58, 108.52, 108.46, 108.40, 108.34, 108.28, 108.22, 108.16, 108.10, 108.04, 107.98, 107.92, 107.86, 107.80

^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **13**

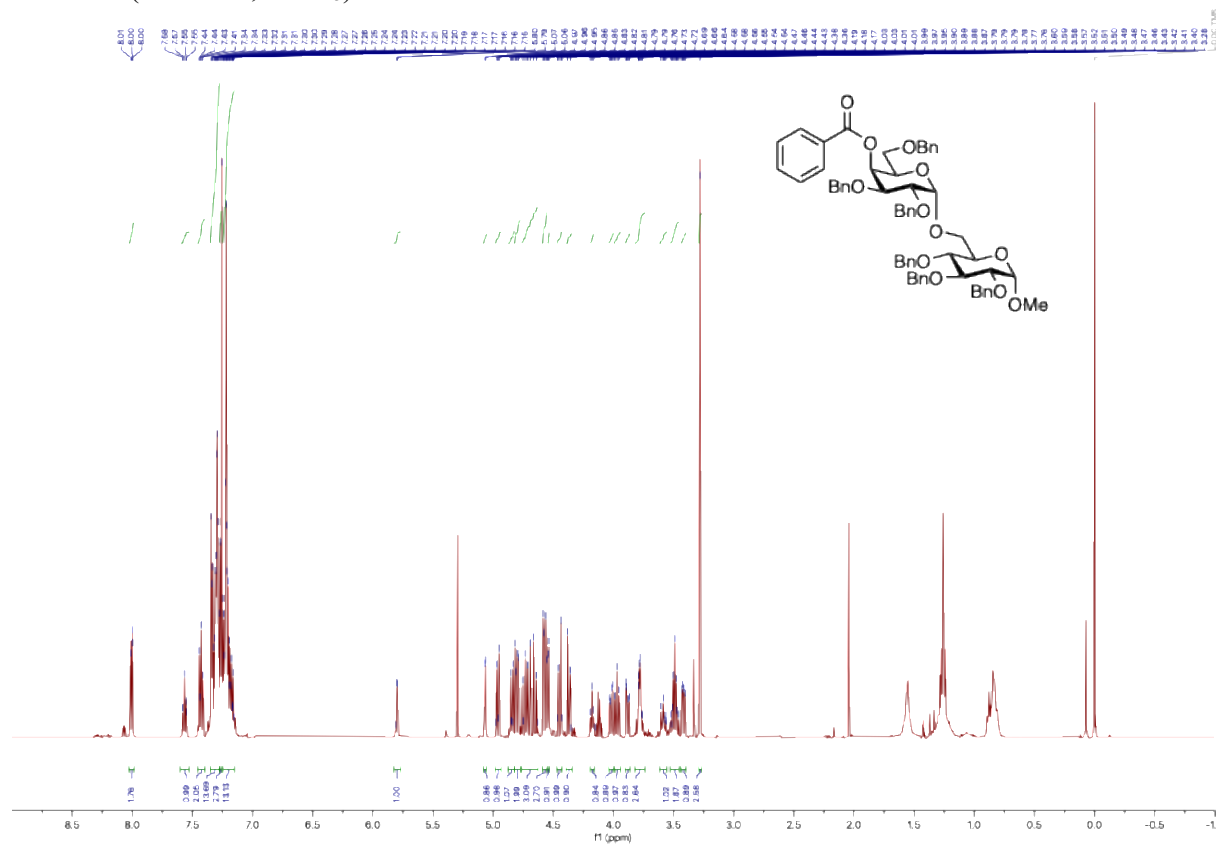


^1H , ^1H COSY (400 MHz, CDCl_3): **13**

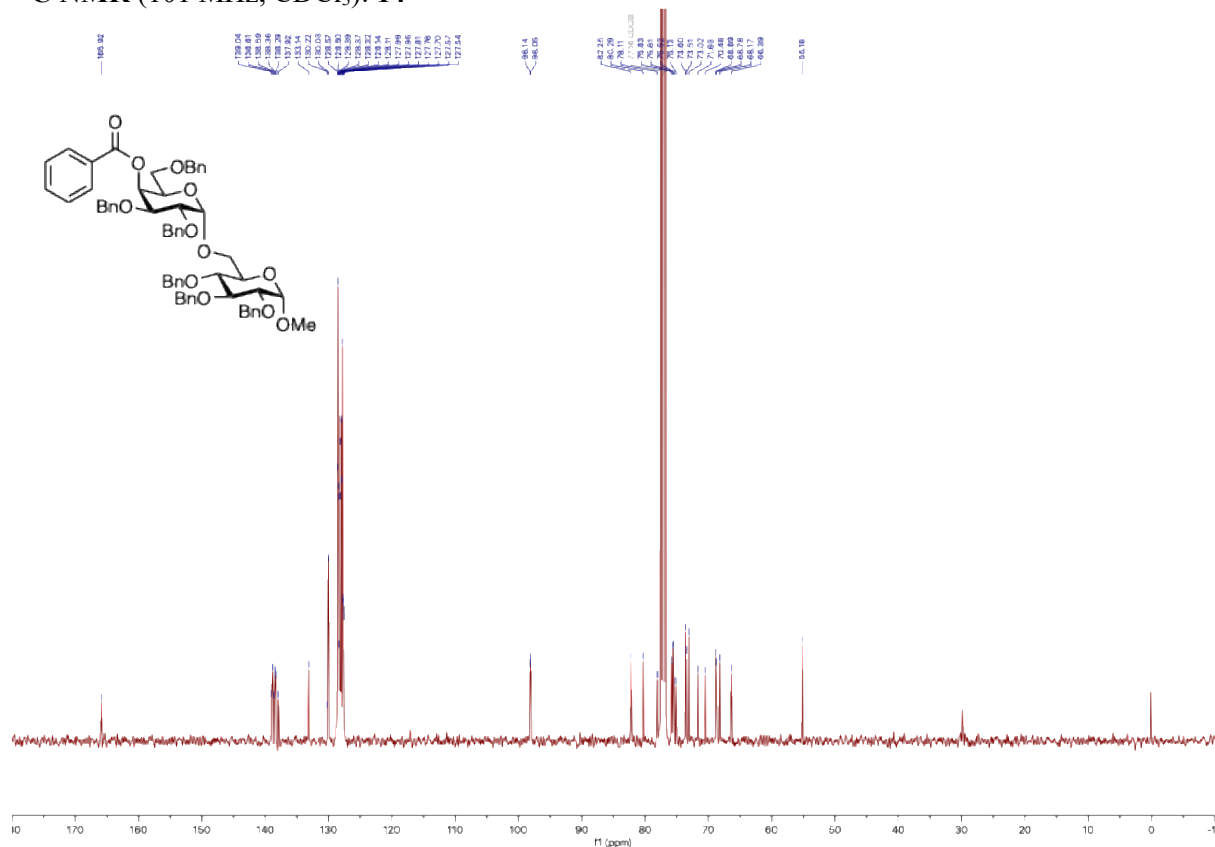


^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **13**

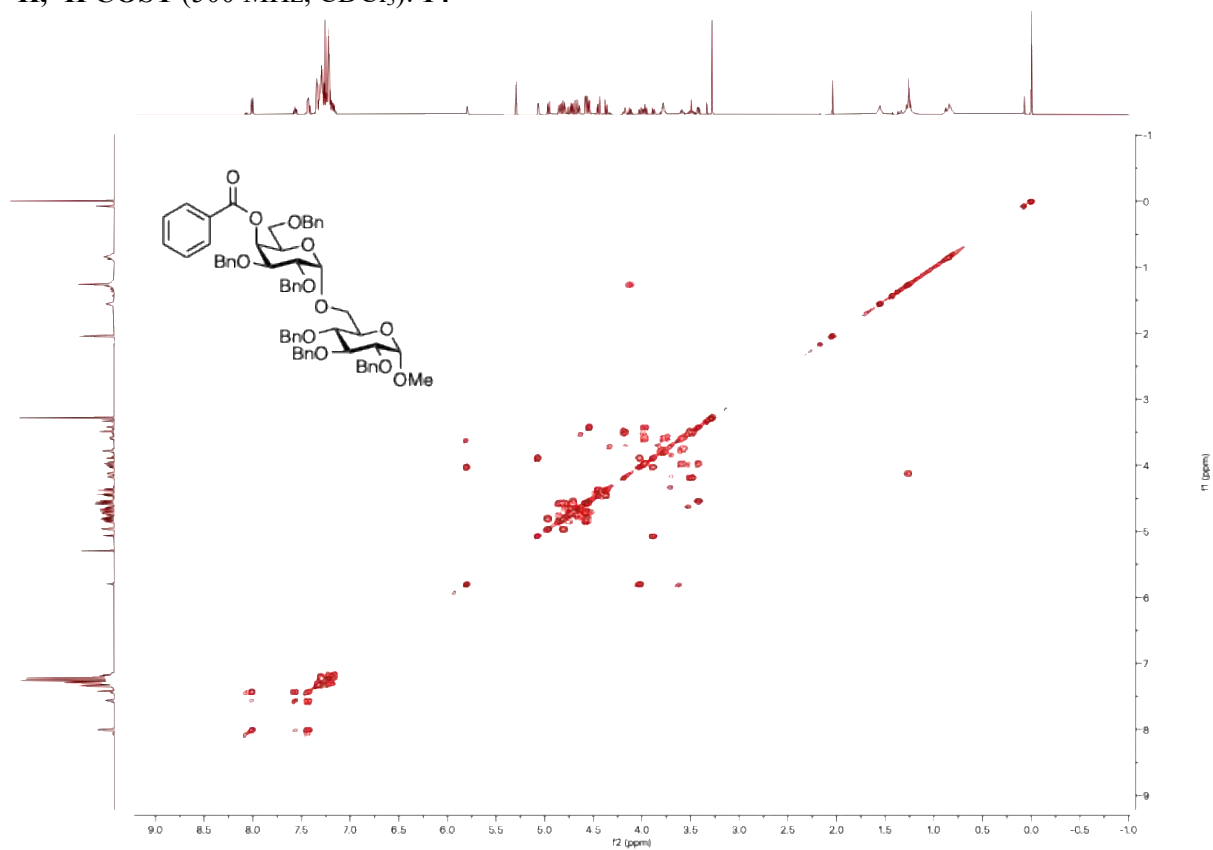
¹H NMR (500 MHz, CDCl₃): **14**



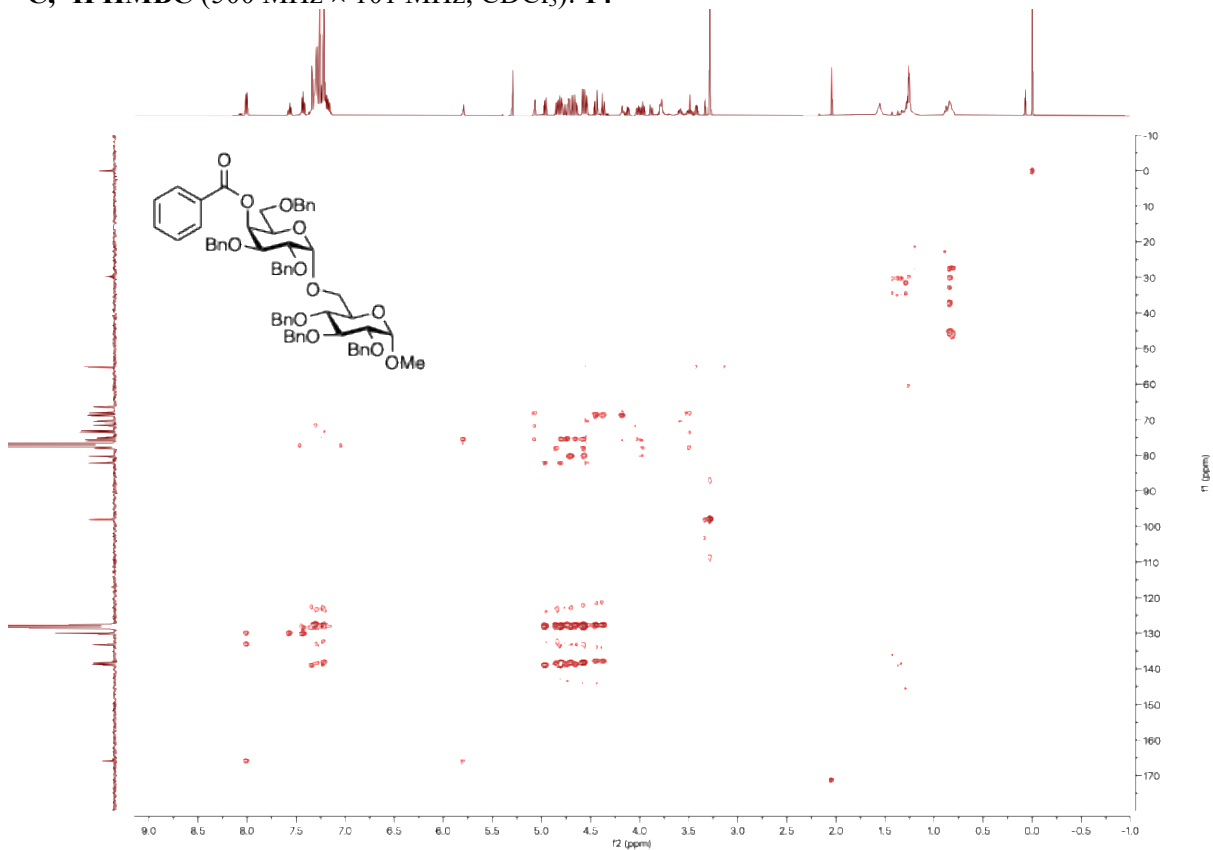
^{13}C NMR (101 MHz, CDCl_3): 14



^1H , ^1H COSY (500 MHz, CDCl_3): 14



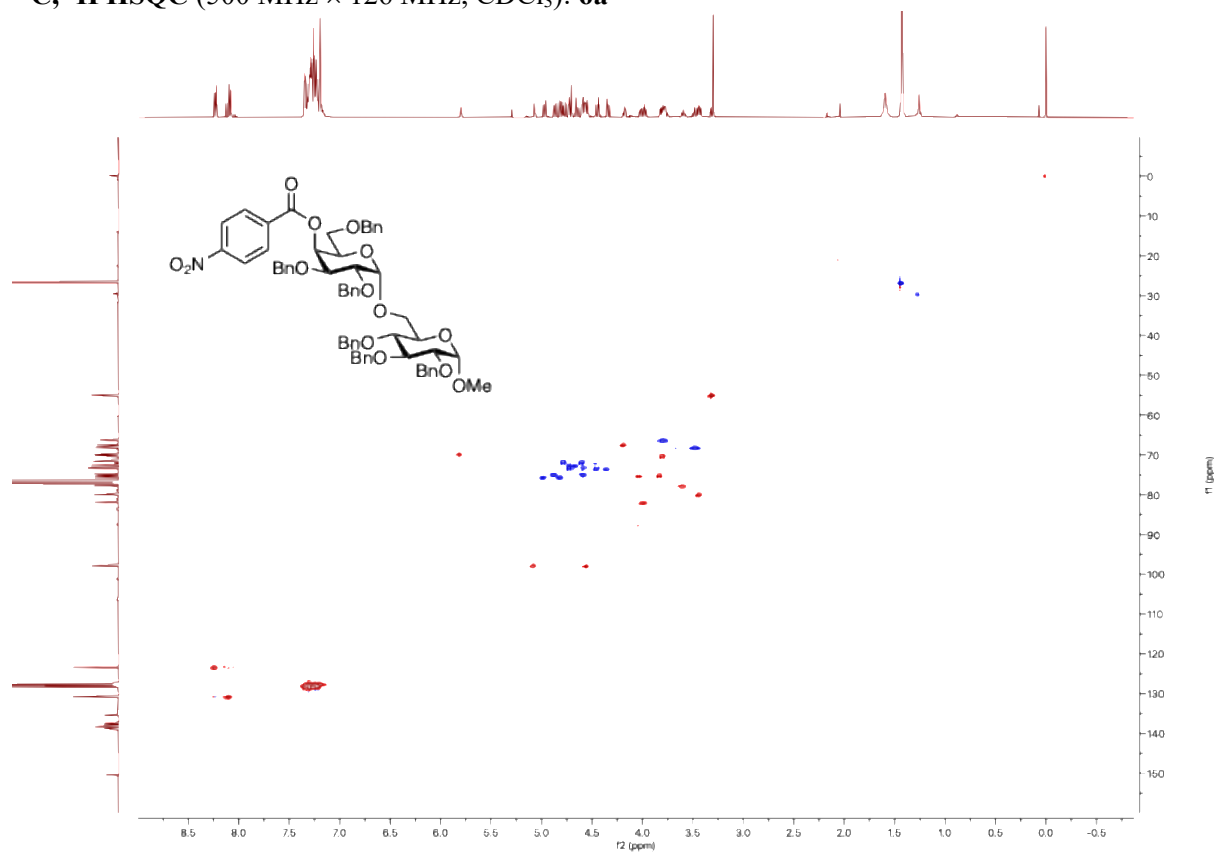
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): 14



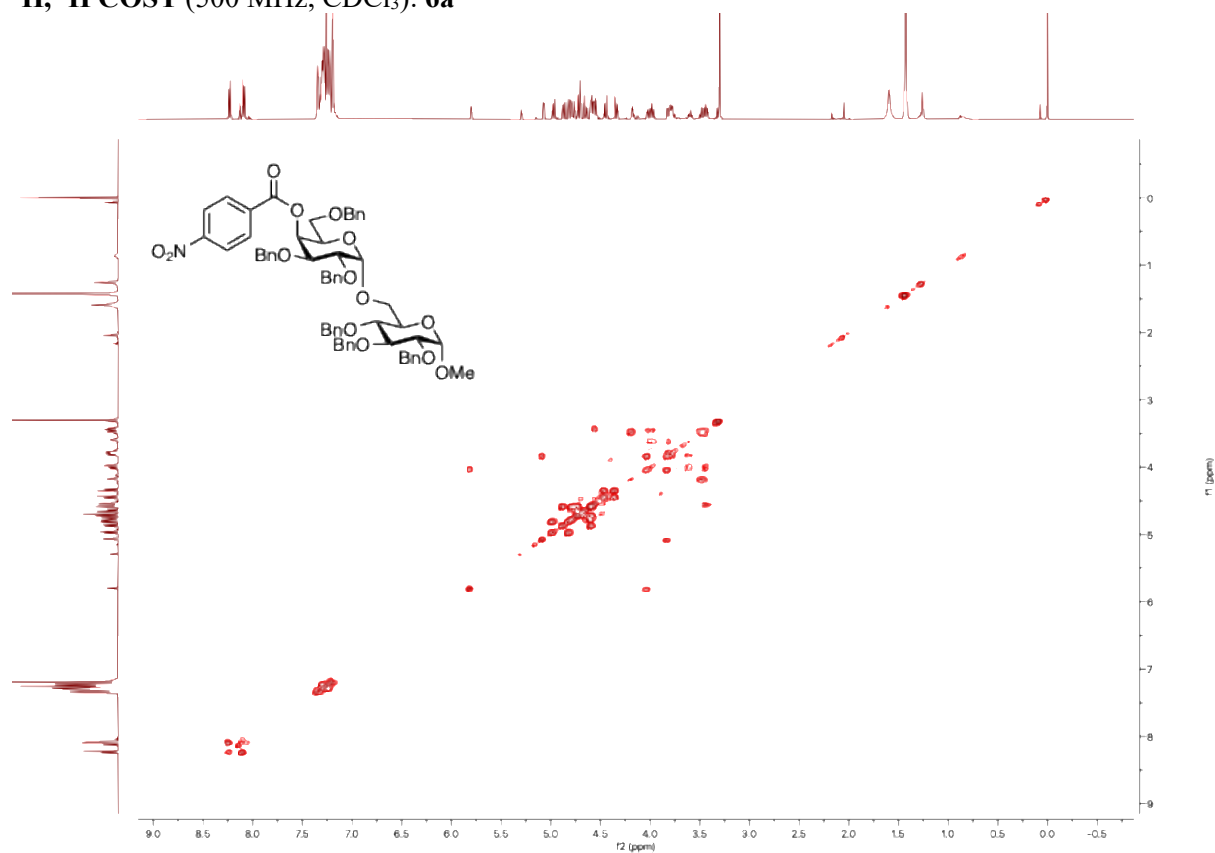
¹H NMR spectrum of compound 10 in CDCl₃. The spectrum shows peaks from 0 to 8 ppm. Aromatic signals are between 7.0-8.5 ppm, sugar protons between 3.5-5.5 ppm, and aliphatic protons between 0.0-2.0 ppm. Integration values are shown below the baseline.

[illegible]

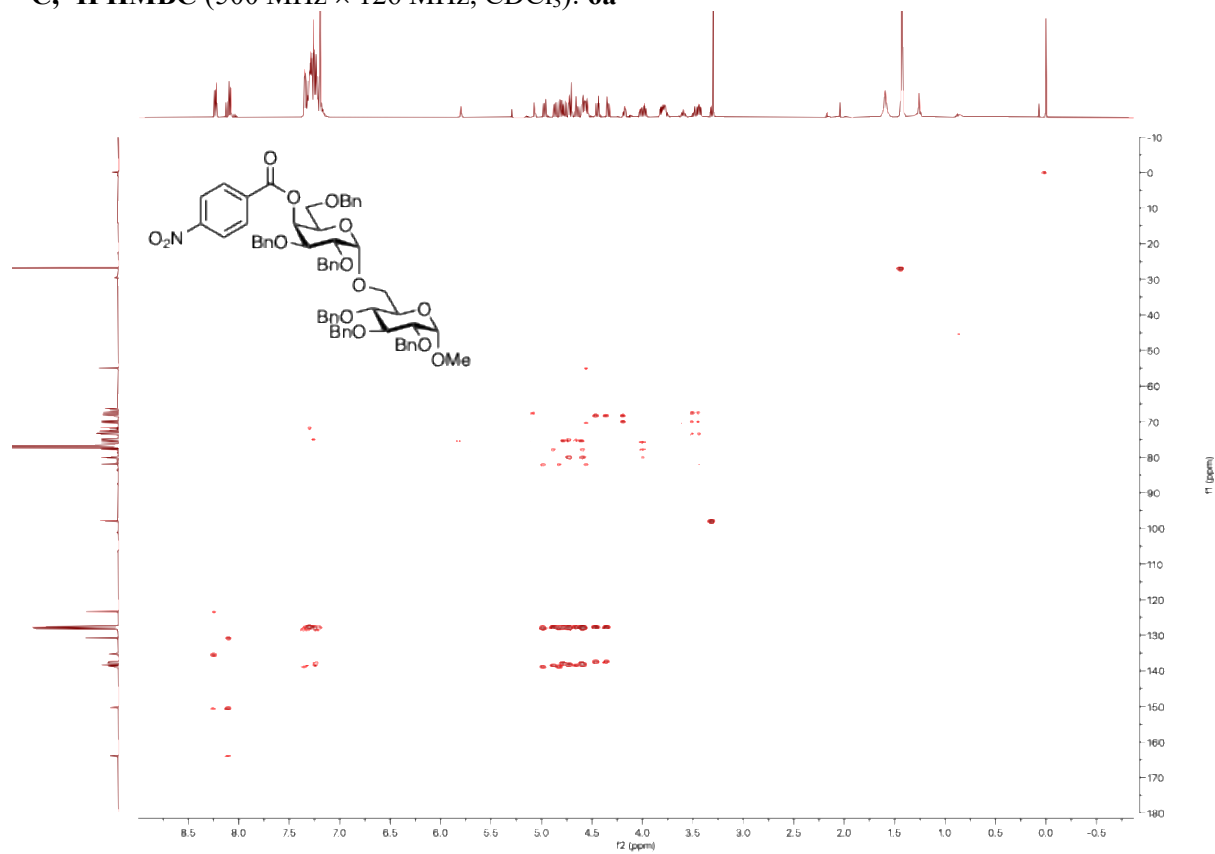
^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): **6a**



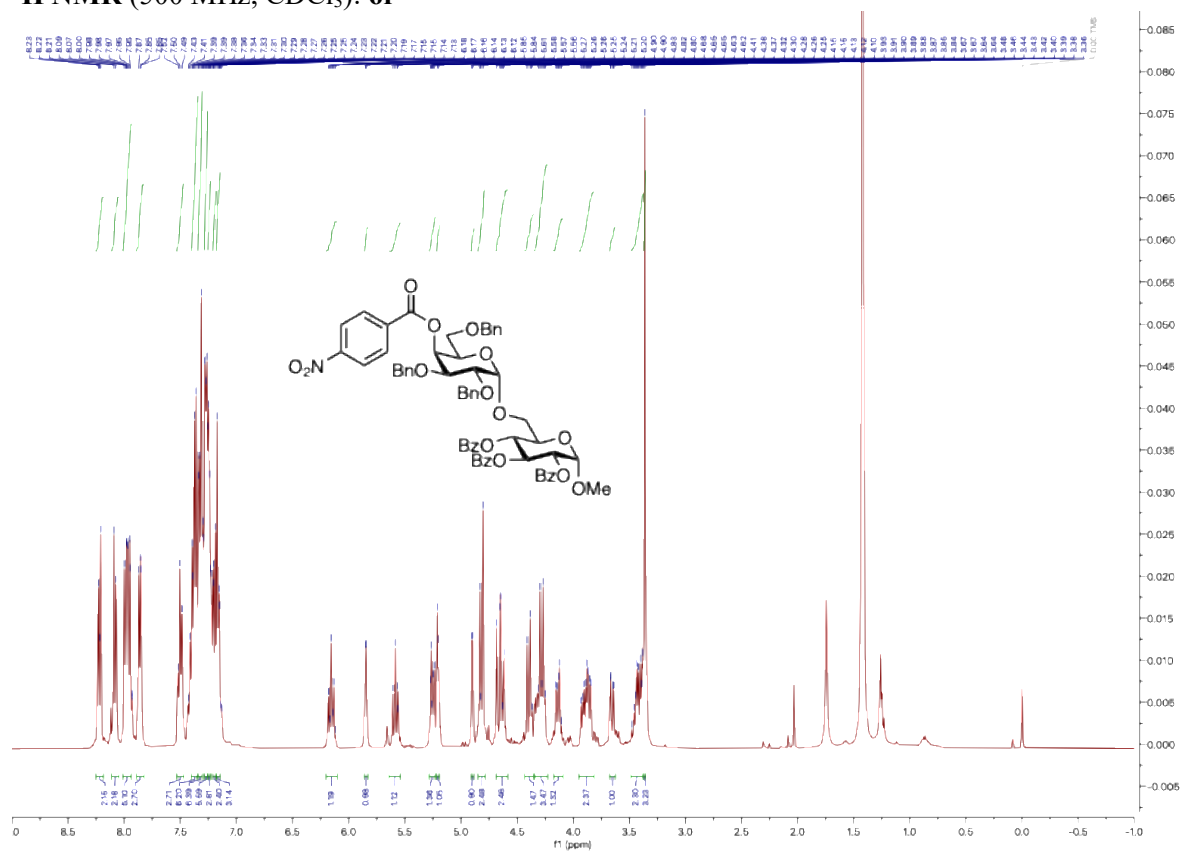
^1H , ^1H COSY (500 MHz, CDCl_3): **6a**



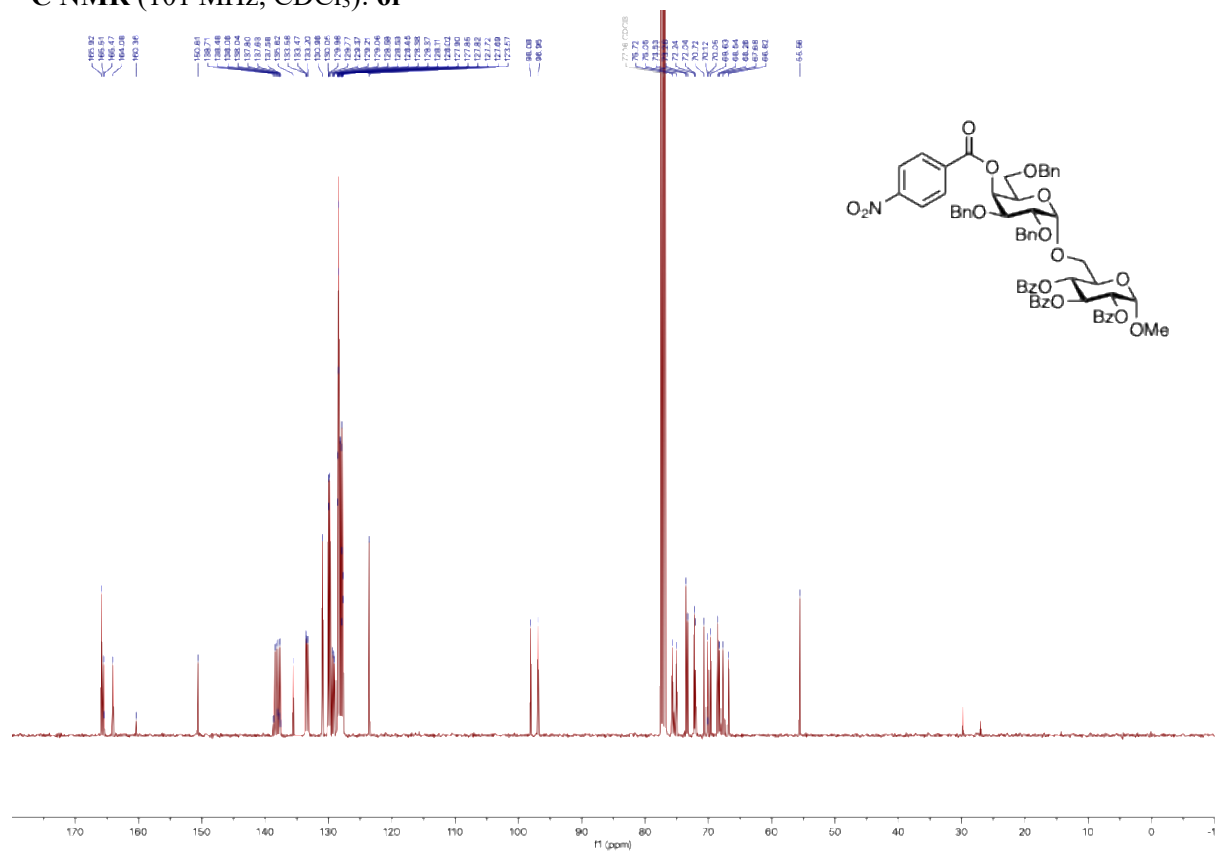
^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): **6a**



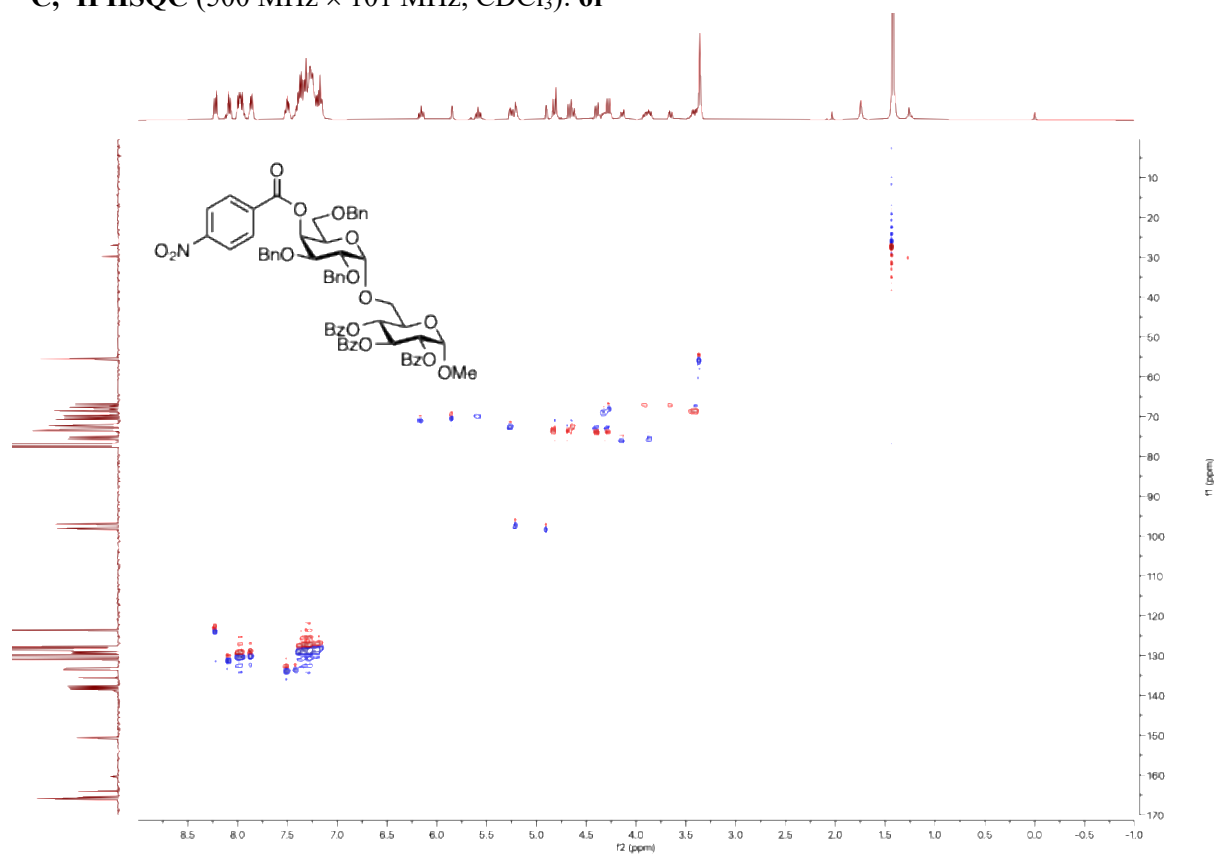
¹H NMR (500 MHz, CDCl₃): **6f**



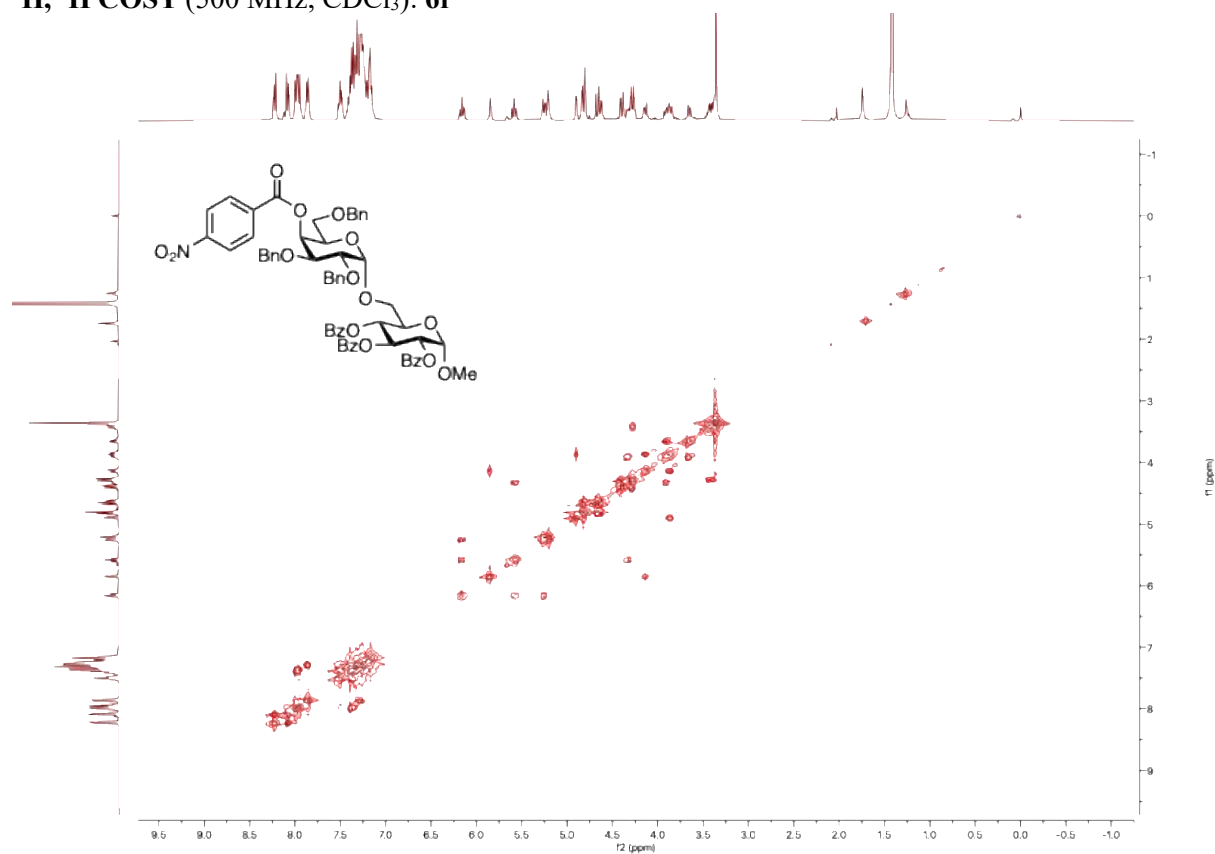
¹³C NMR (101 MHz, CDCl₃): **6f**



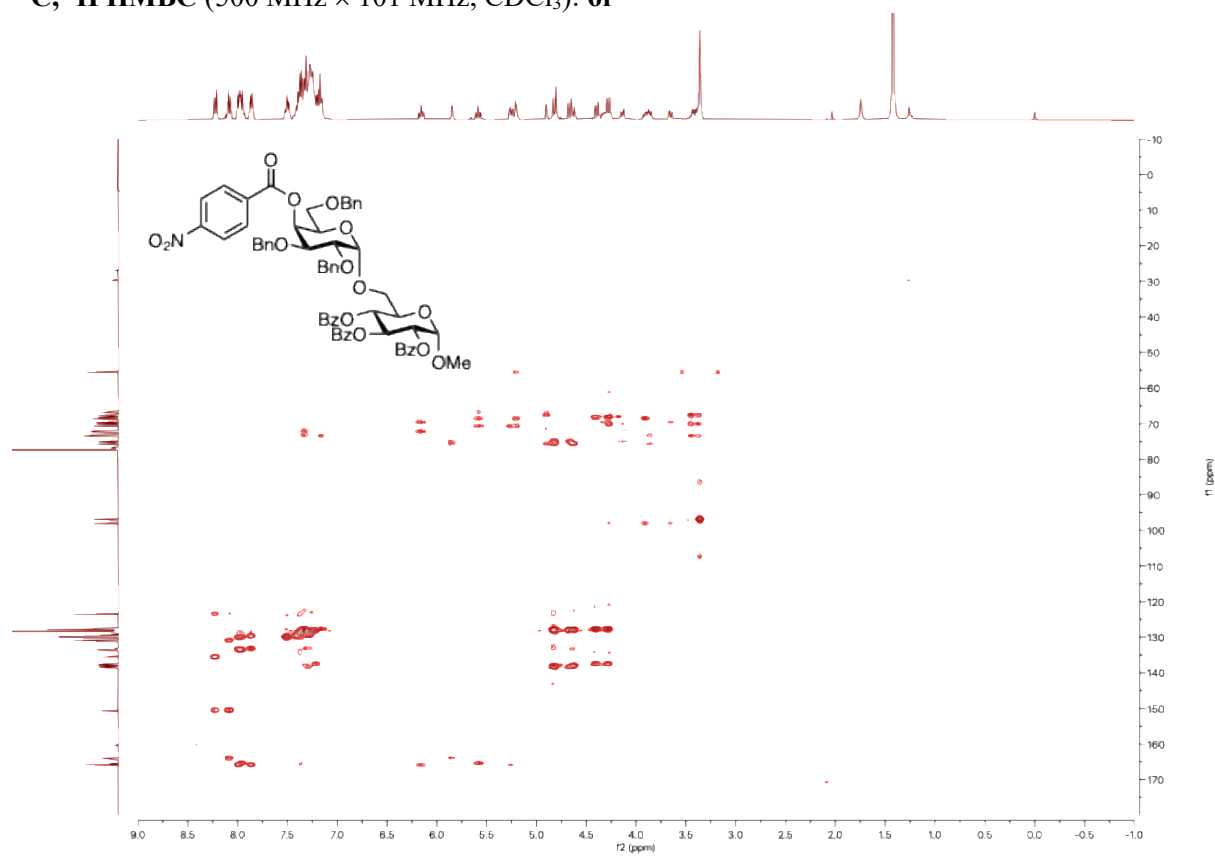
^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **6f**



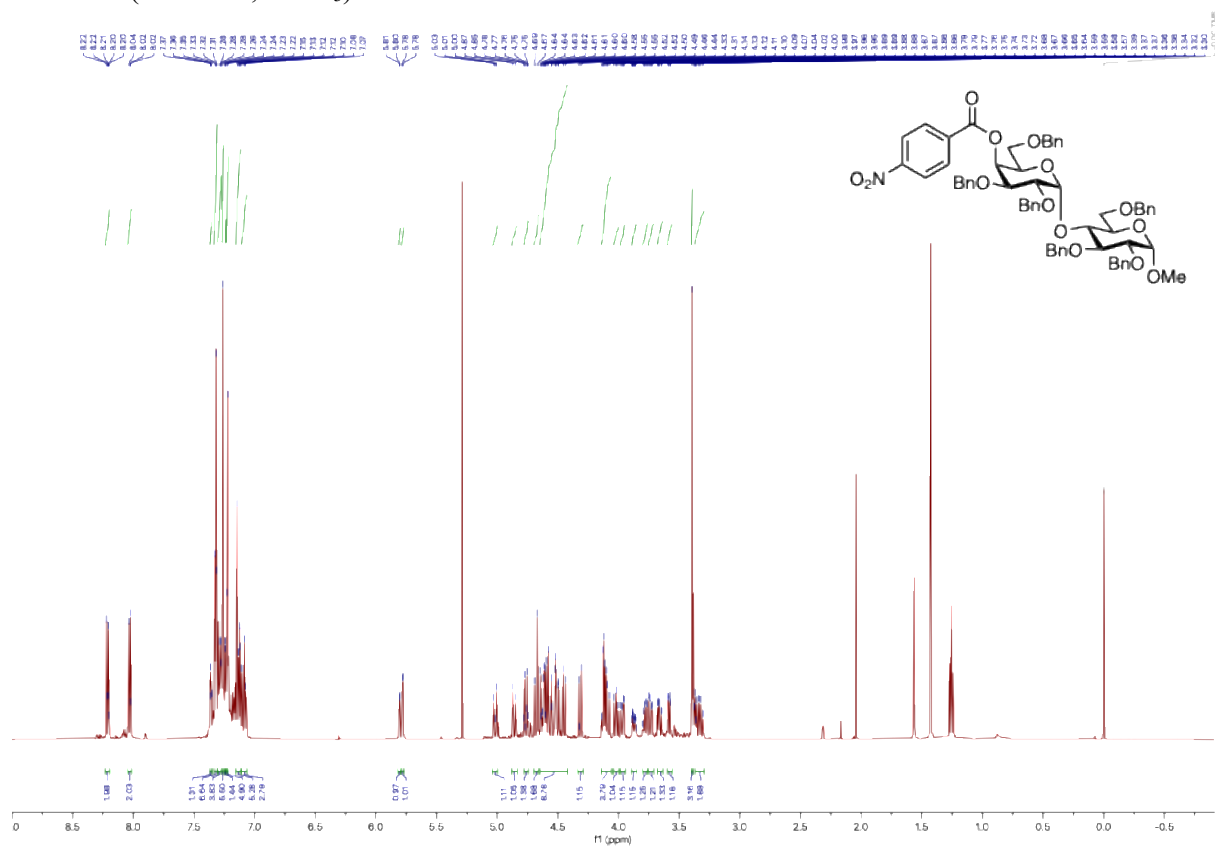
^1H , ^1H COSY (500 MHz, CDCl_3): **6f**



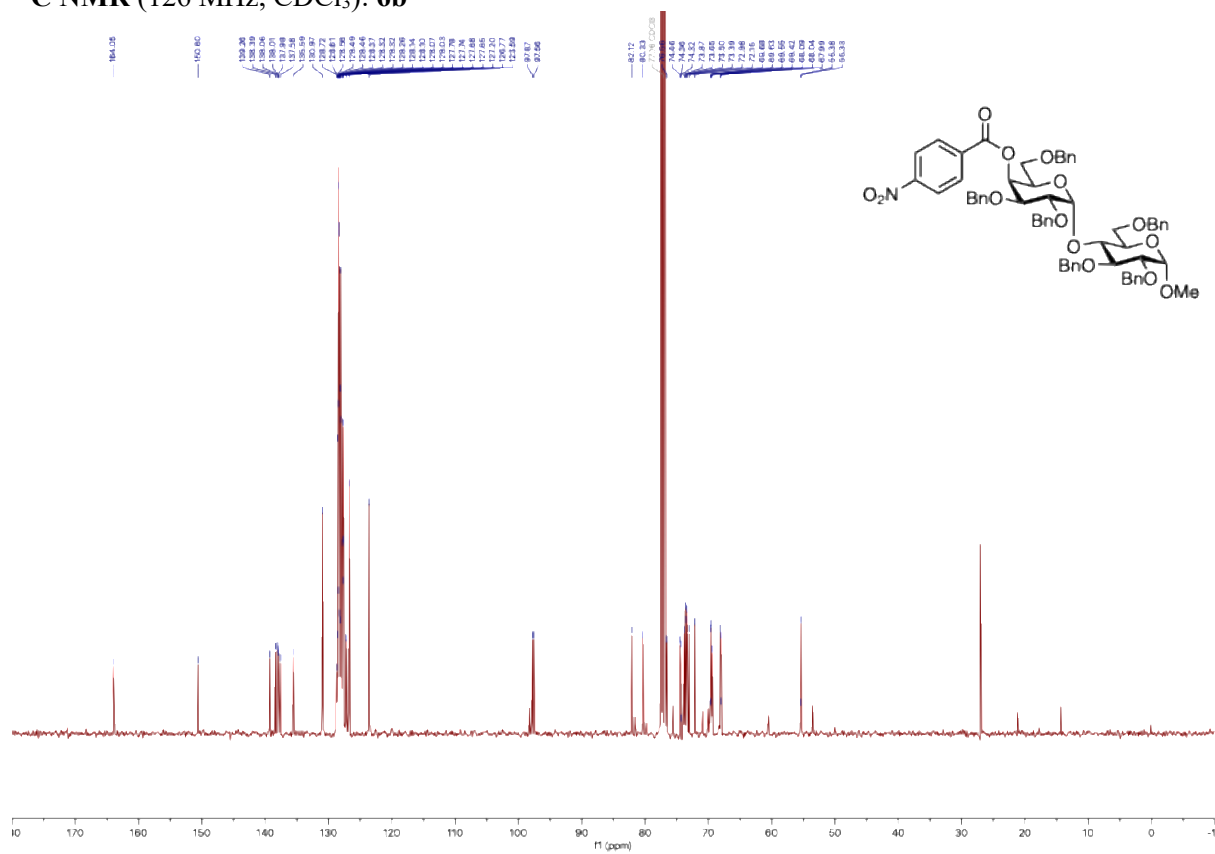
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): **6f**



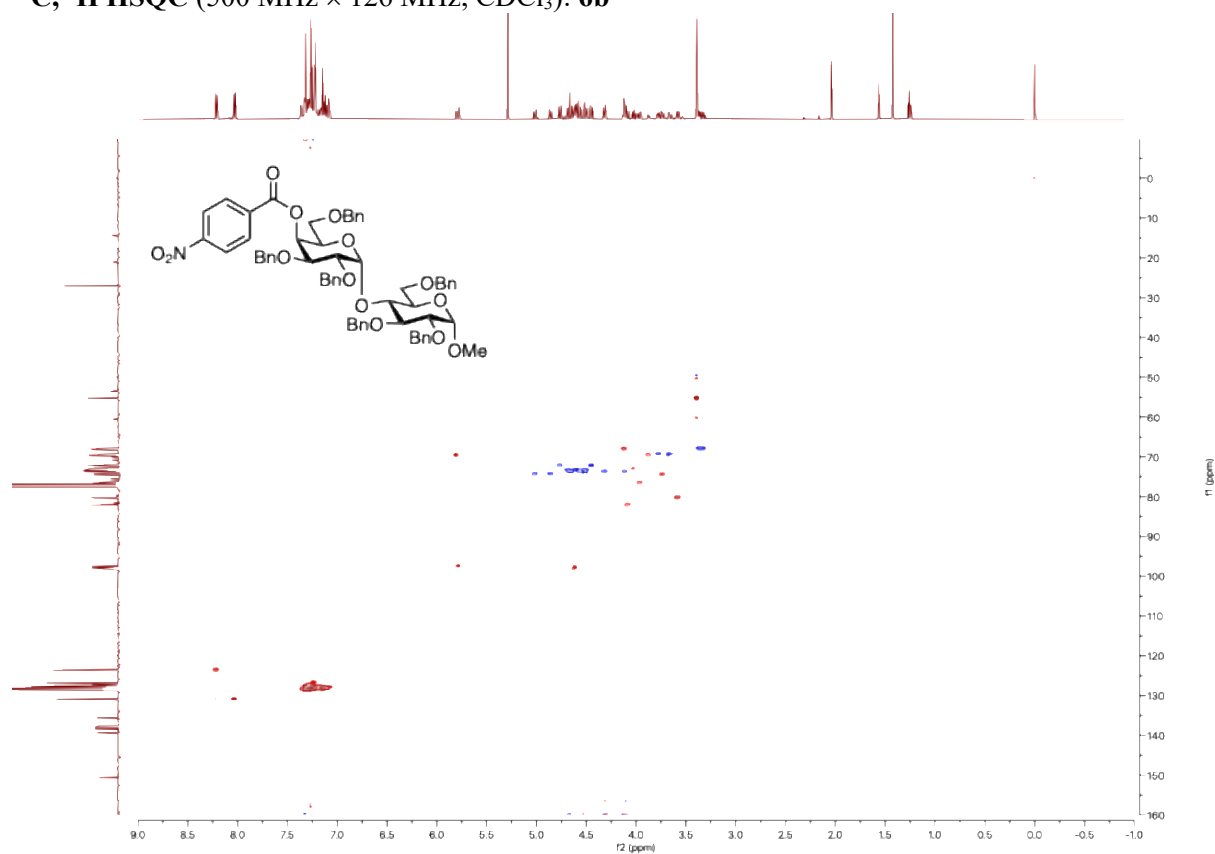
¹H NMR (500 MHz, CDCl₃): **6b**



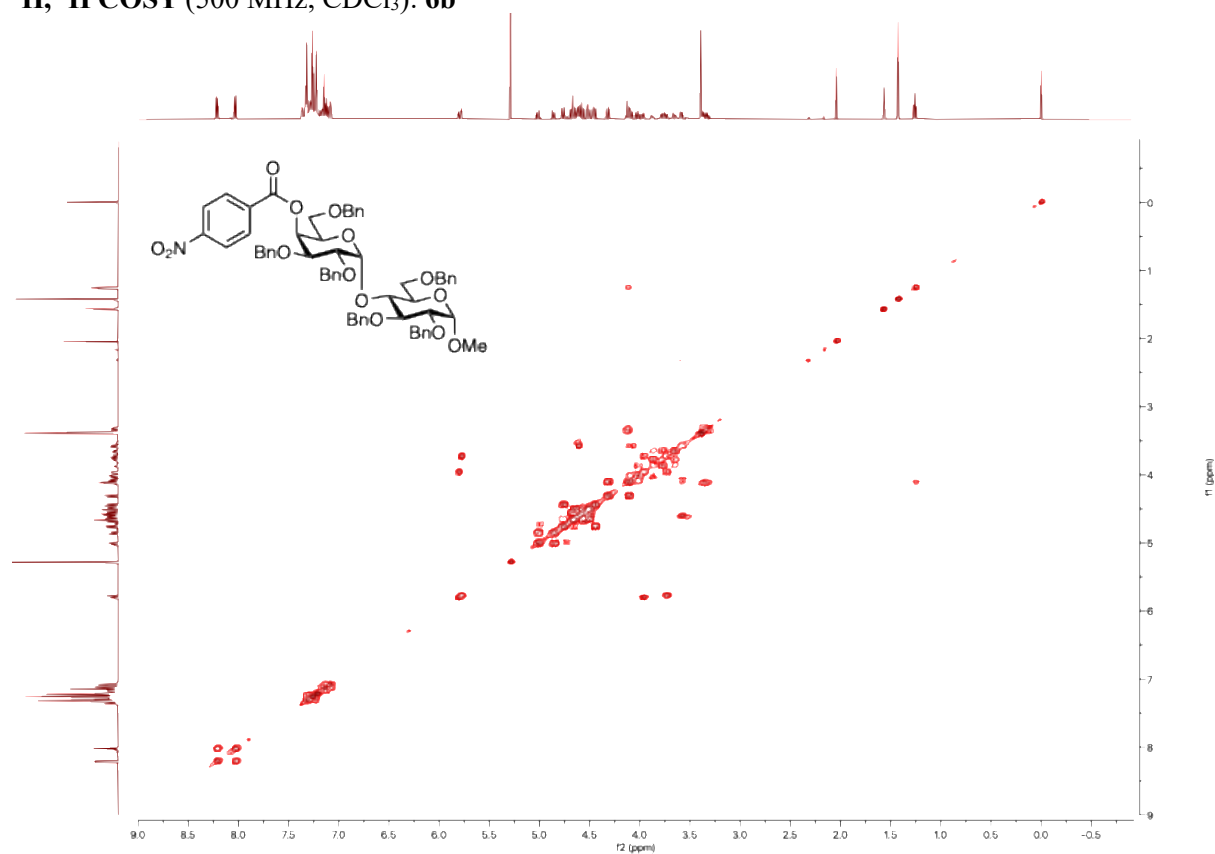
¹³C NMR (126 MHz, CDCl₃): **6b**



^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): **6b**

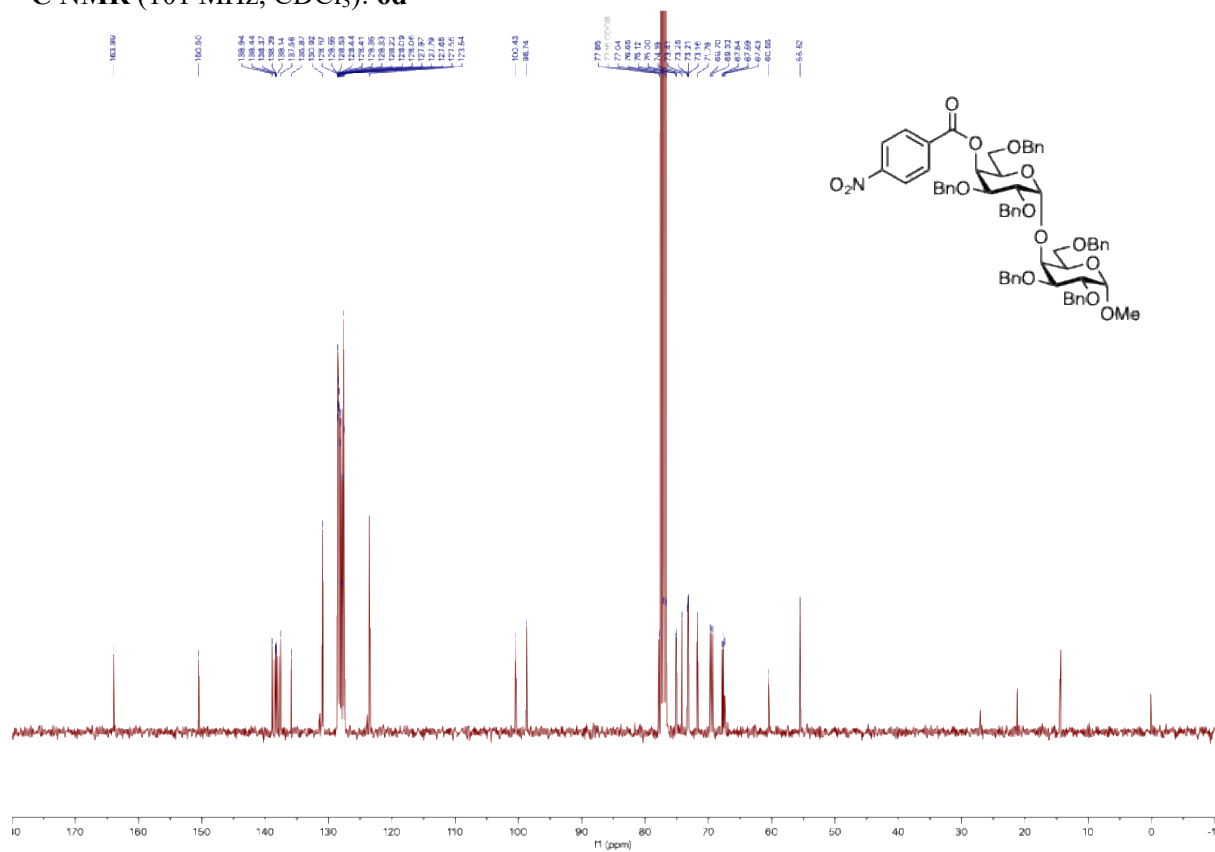


^1H , ^1H COSY (500 MHz, CDCl_3): **6b**

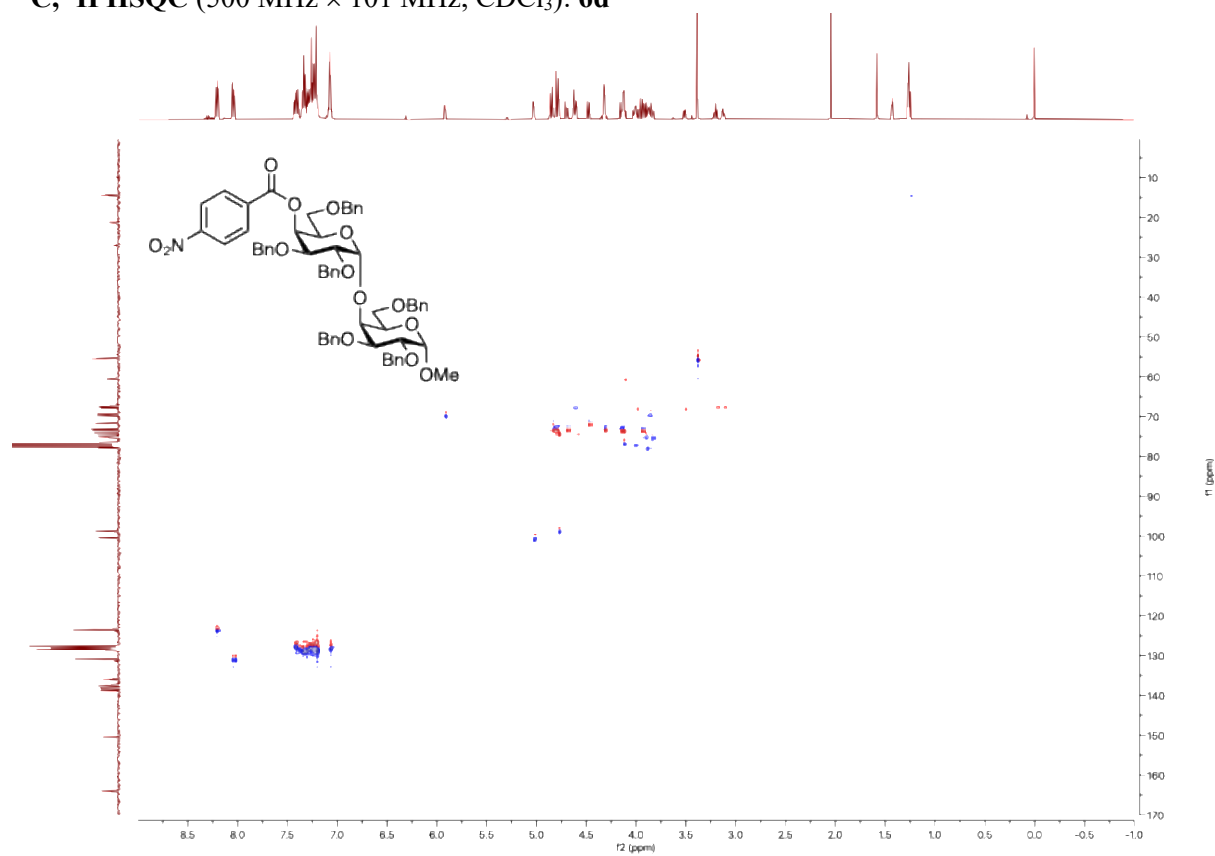


Chemical structure of compound 10 is shown in the top left. The structure is a dimeric glycoside: 4-nitrobenzoate linked to a glucose unit, which is linked to a mannose unit, which is linked to a glucose unit with a methoxy group at C6. The spectrum shows correlations between the protons and carbons of these units.

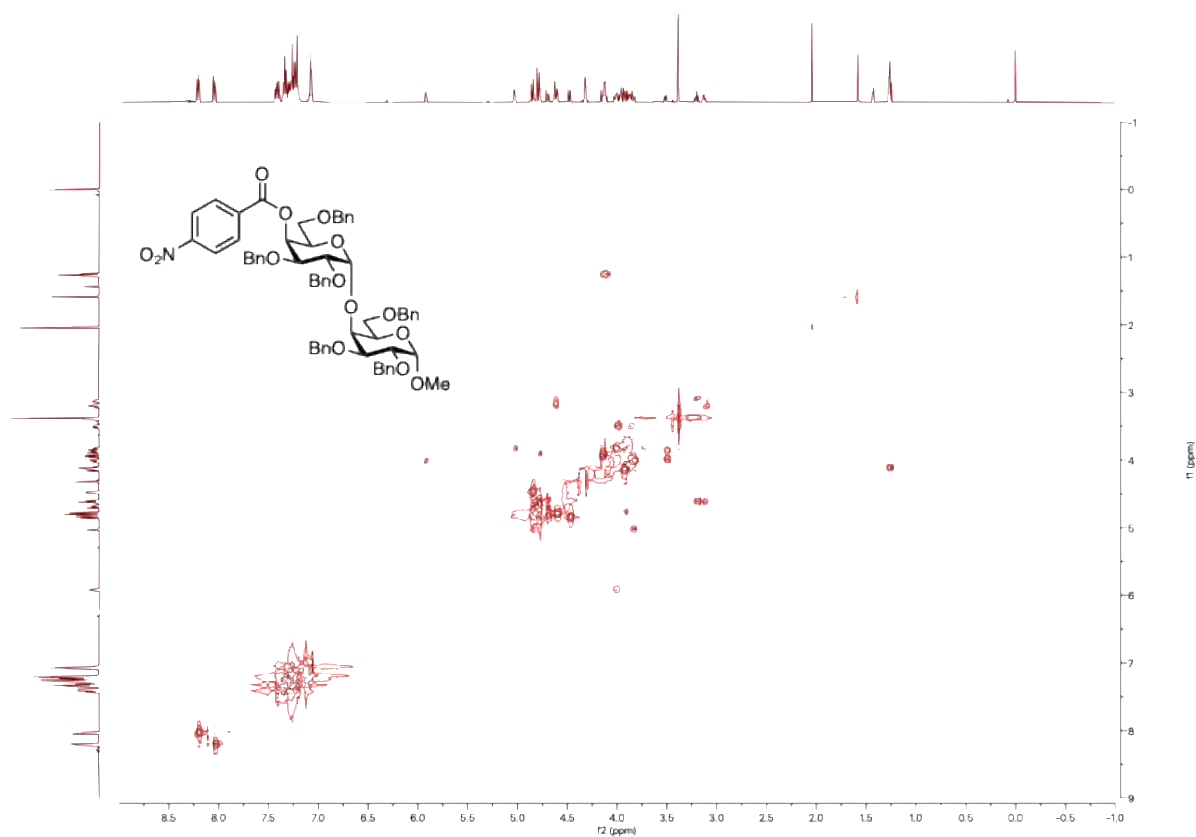
^{13}C NMR (101 MHz, CDCl_3): **6d**



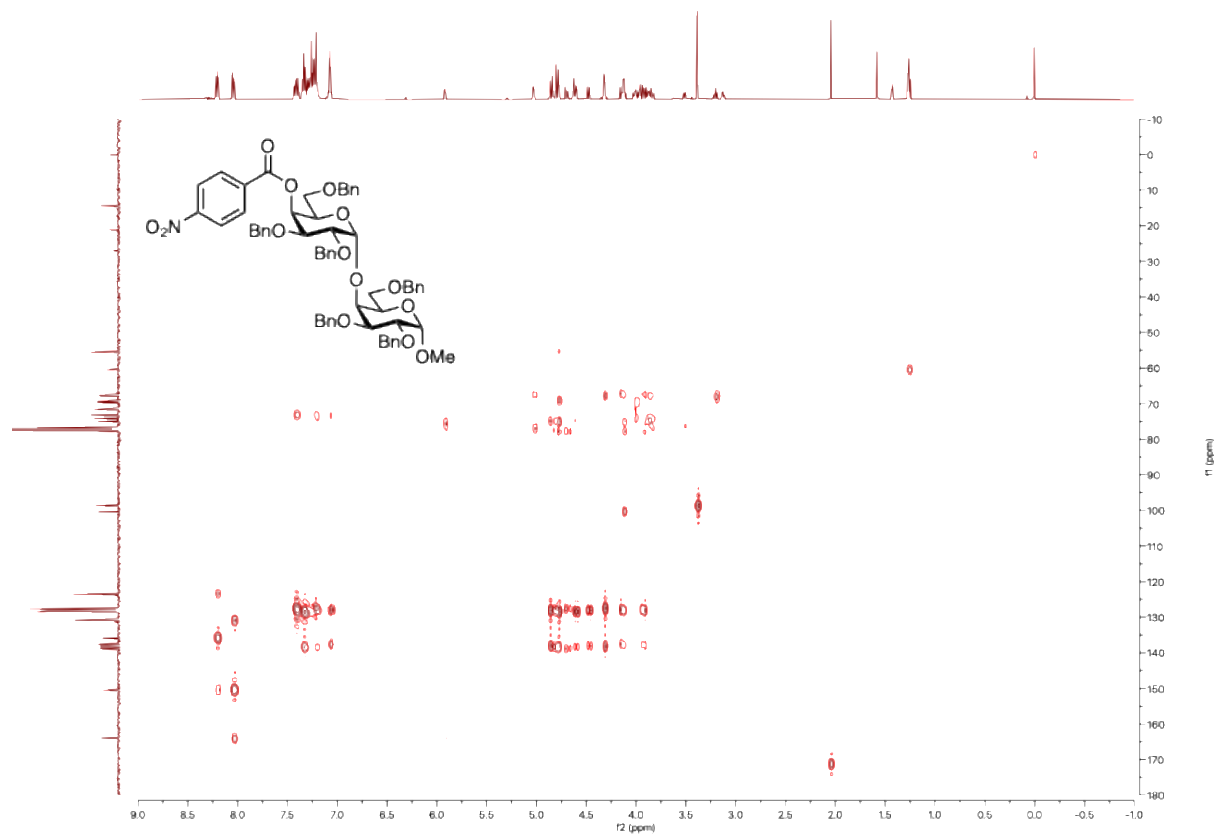
^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **6d**



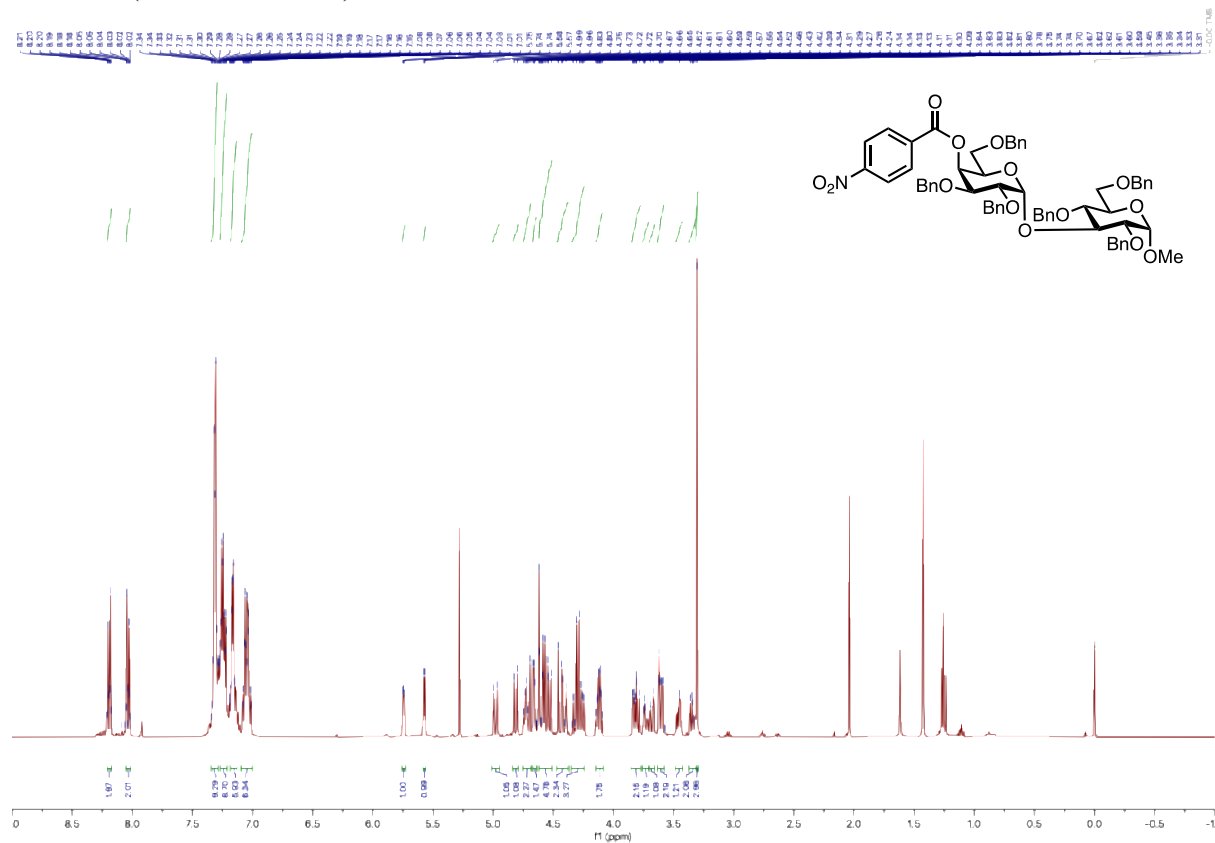
^1H , ^1H COSY (500 MHz, CDCl_3): **6d**



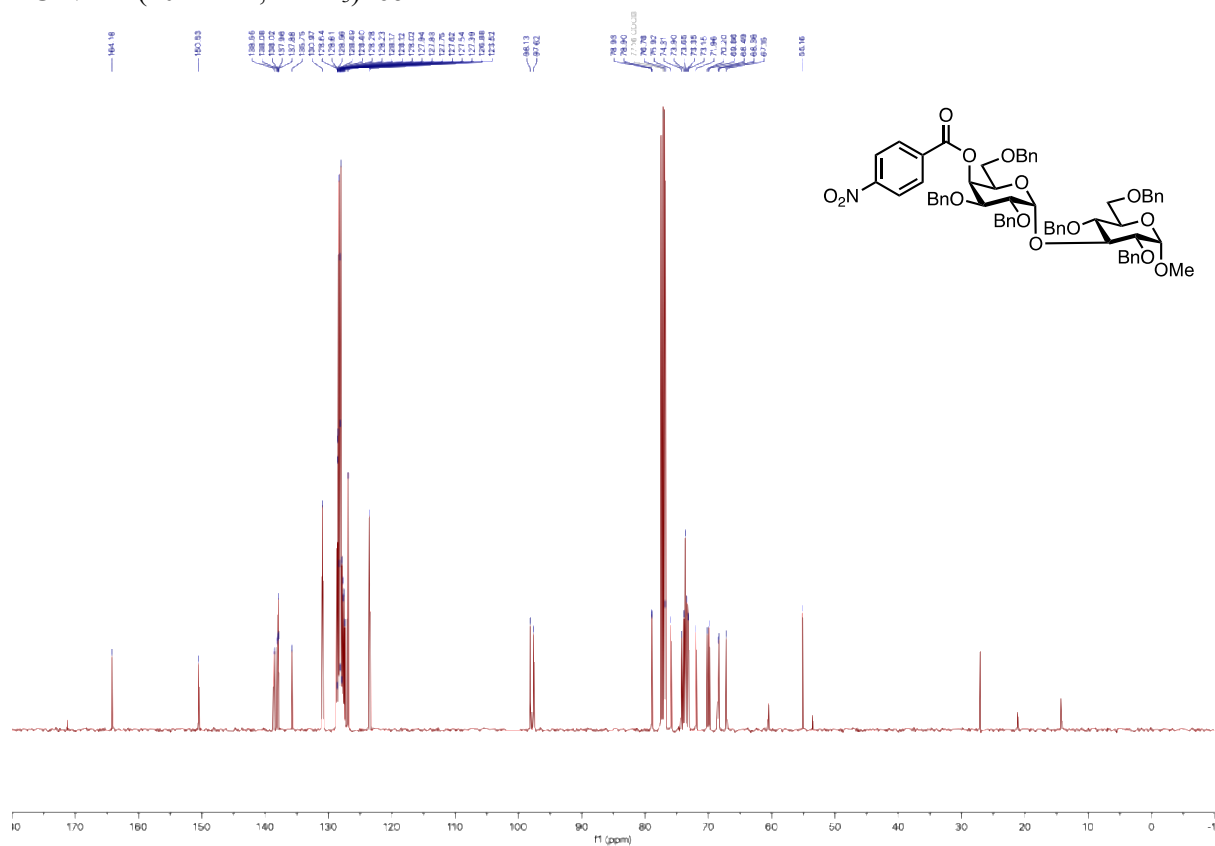
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): **6d**



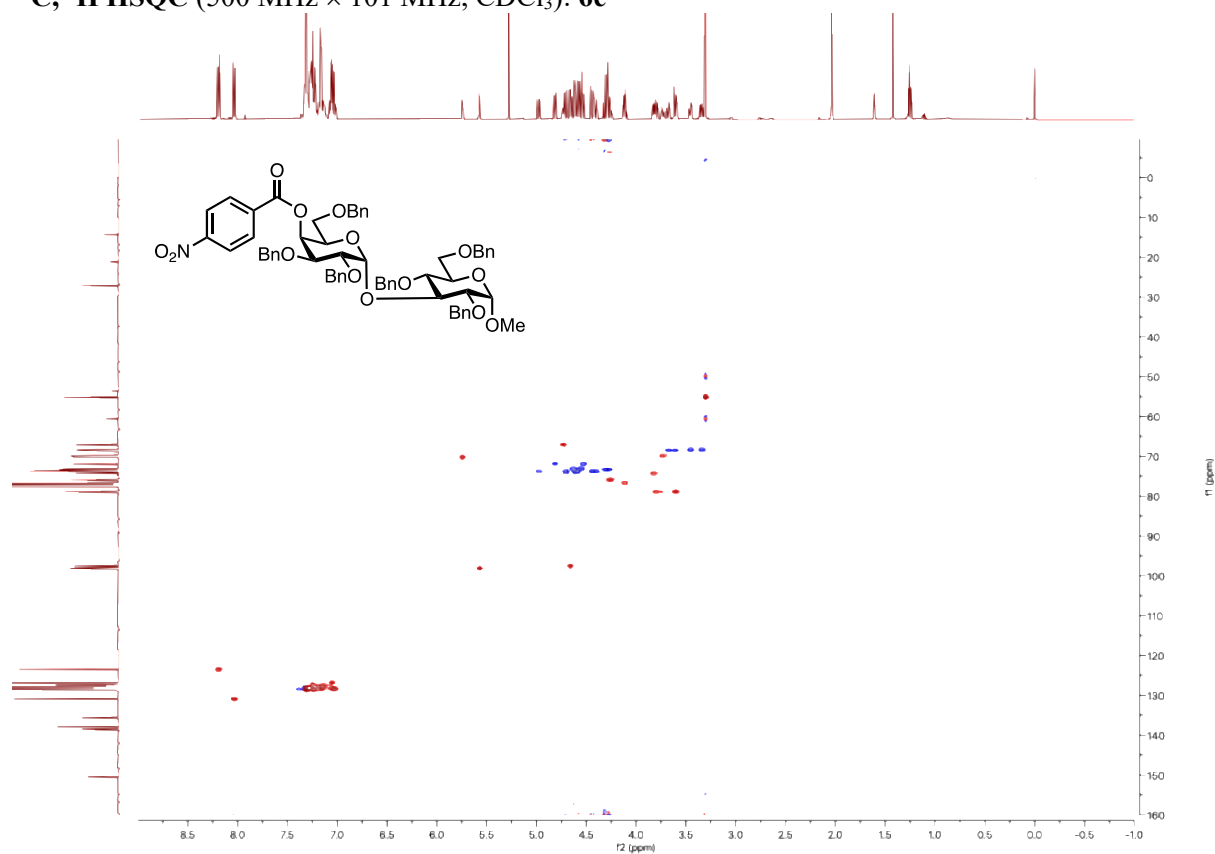
¹H NMR (500 MHz, CDCl₃): **6e**



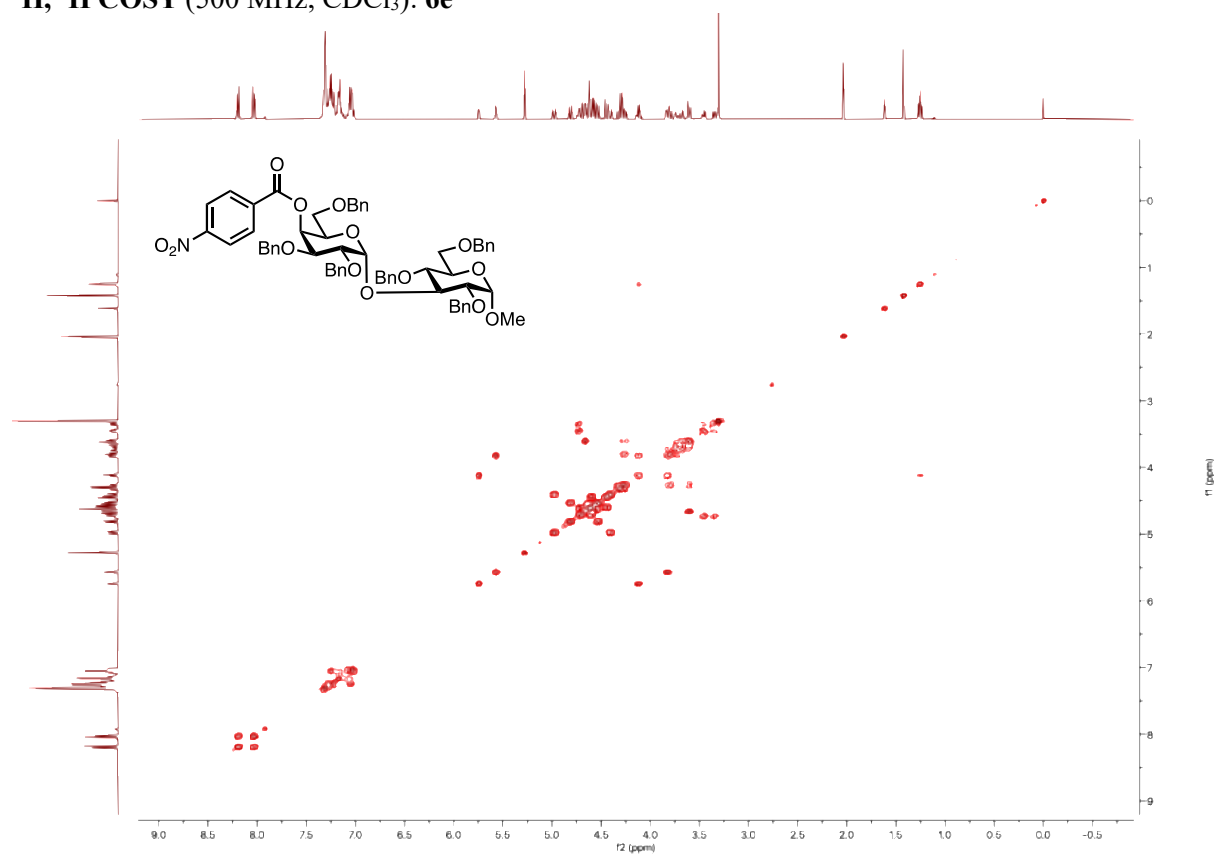
¹³C NMR (101 MHz, CDCl₃): **6e**



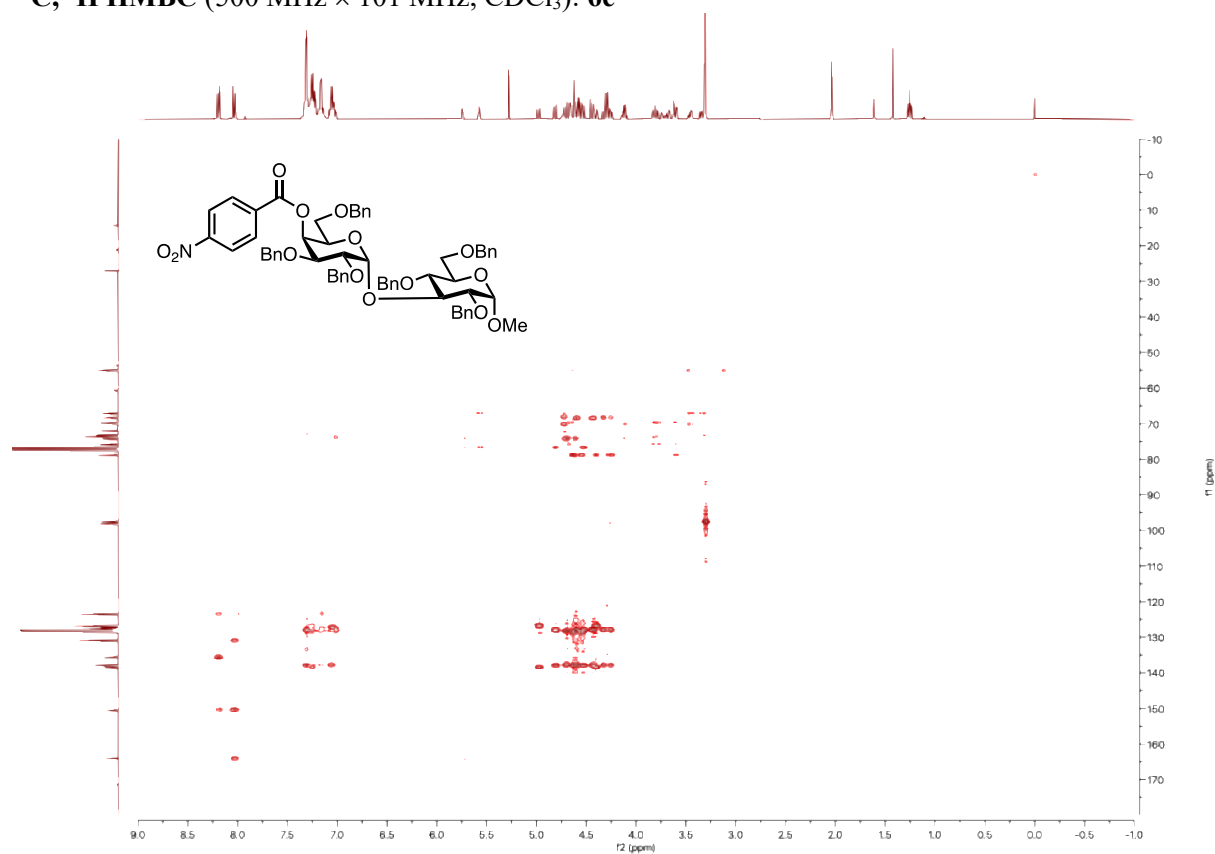
^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **6e**



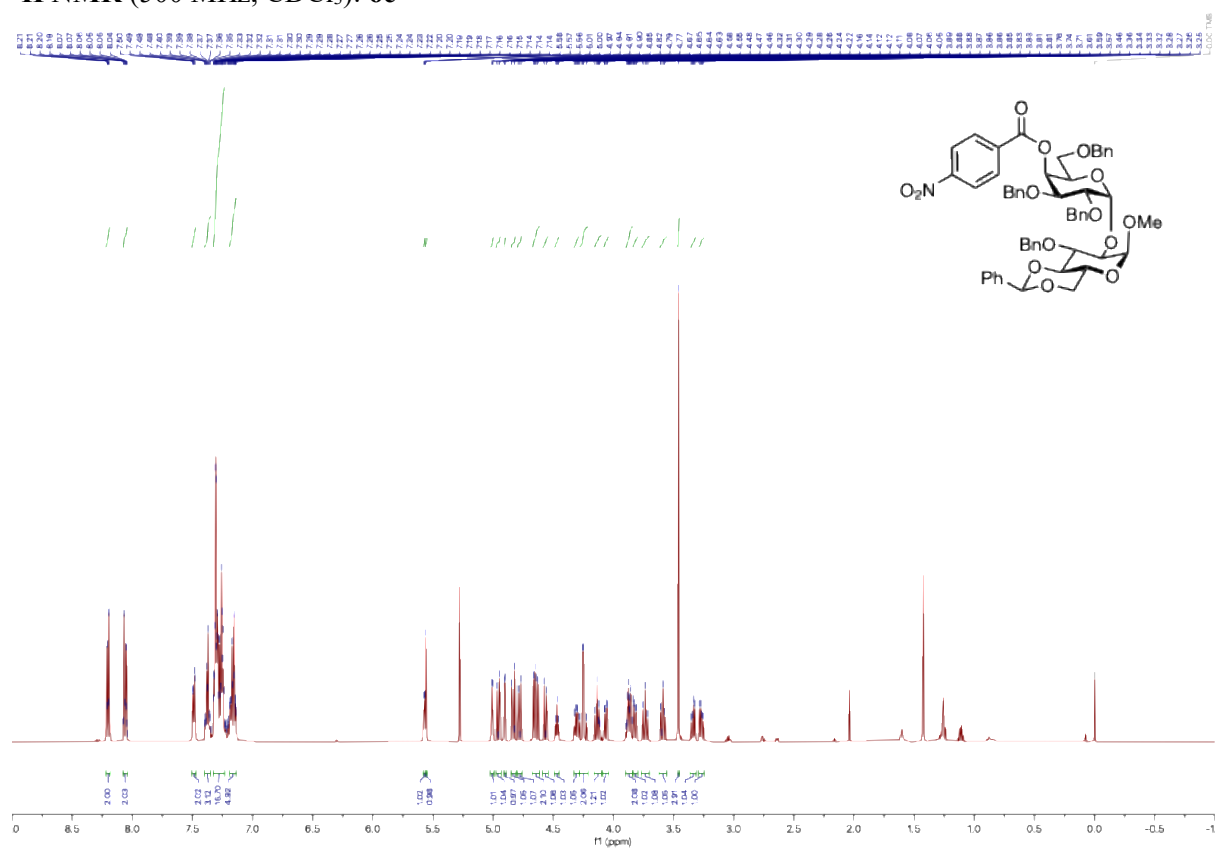
^1H , ^1H COSY (500 MHz, CDCl_3): **6e**



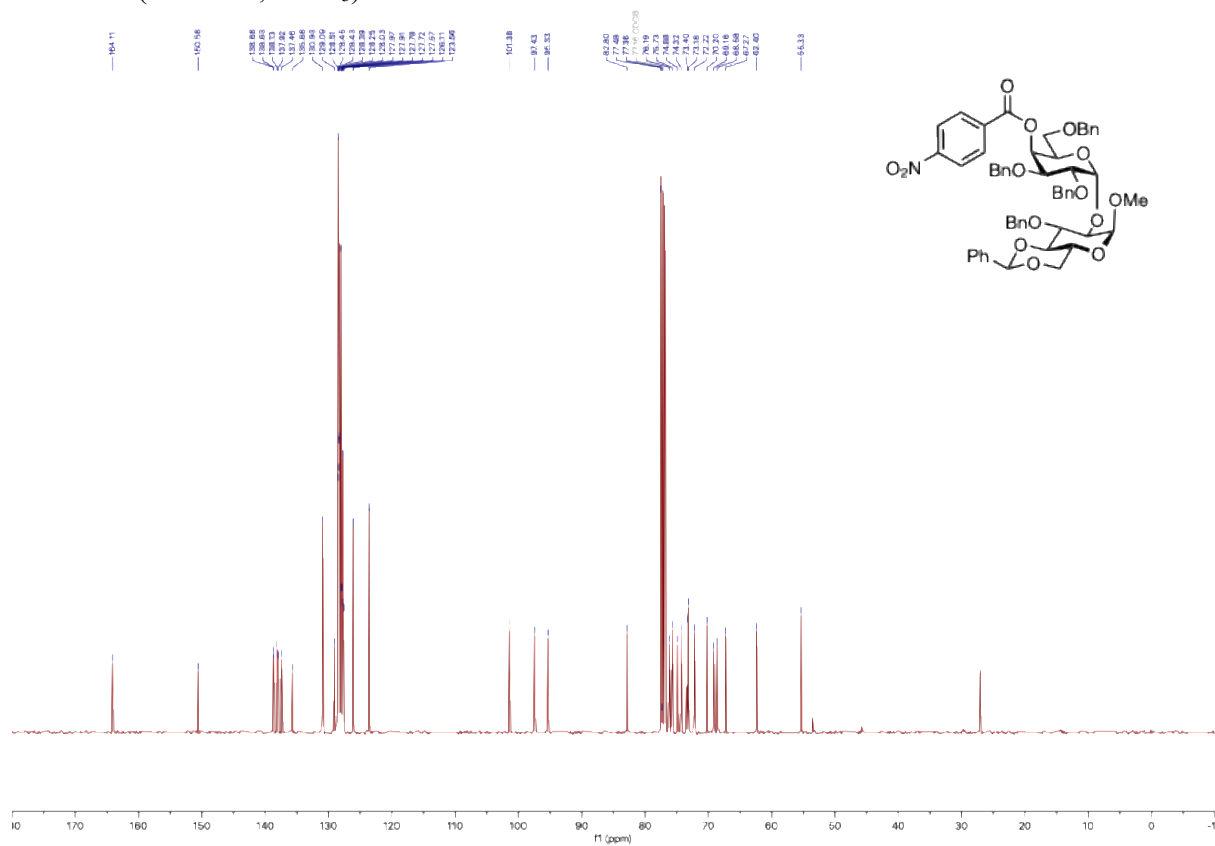
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): **6e**



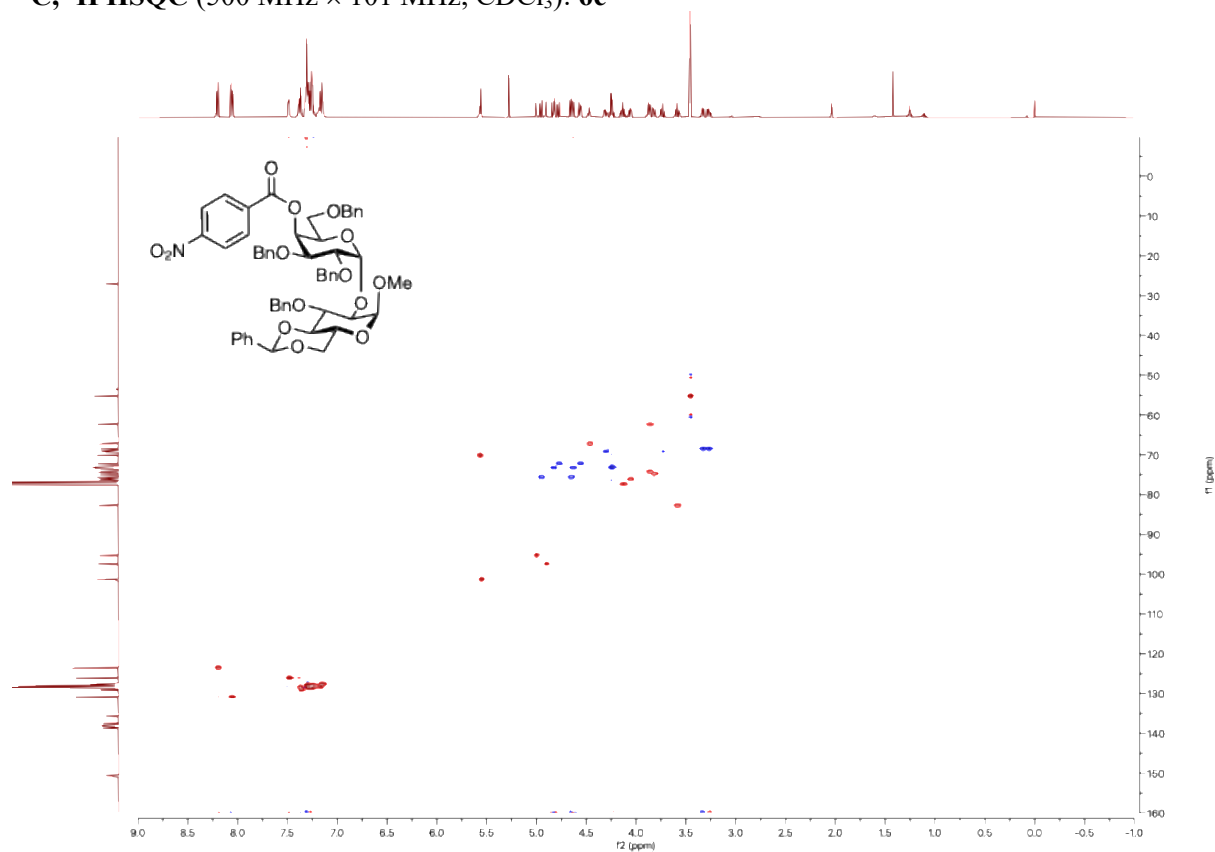
^1H NMR (500 MHz, CDCl_3): **6c**



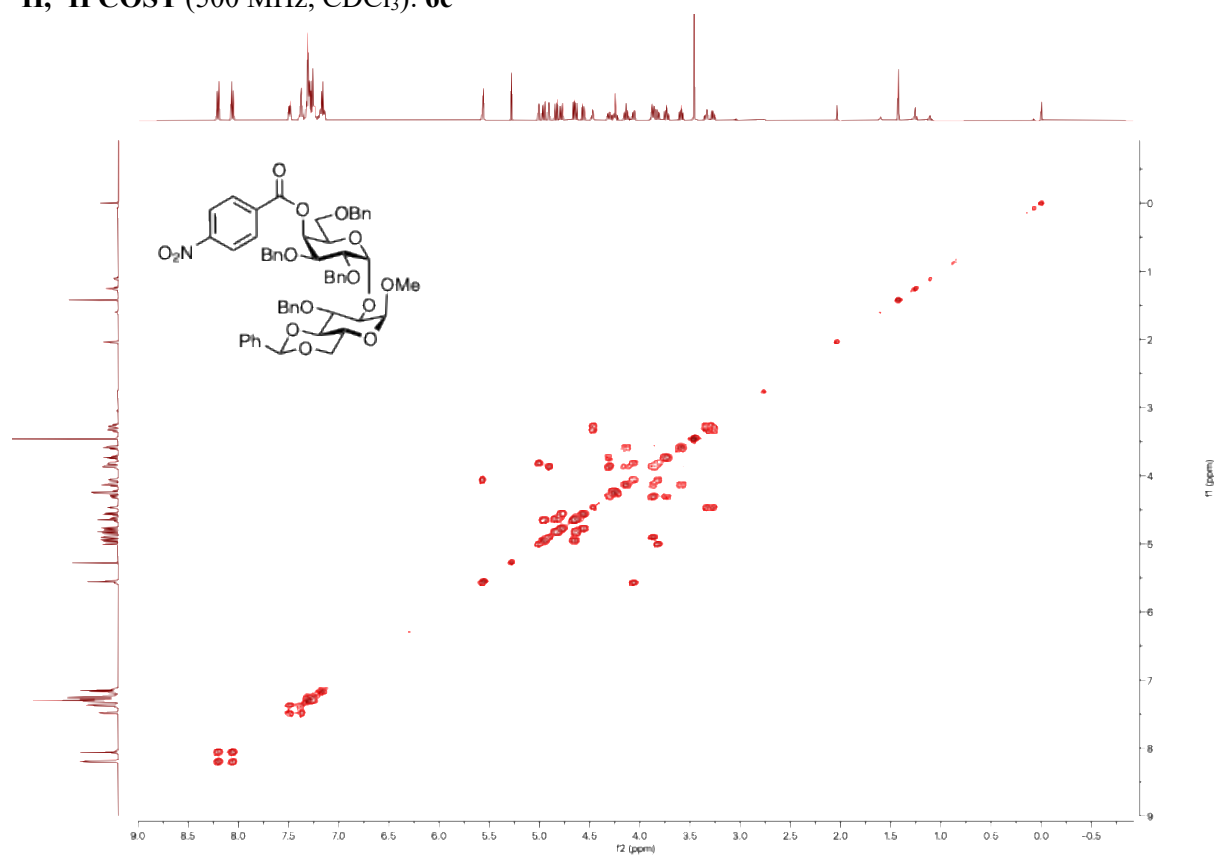
^{13}C NMR (101 MHz, CDCl_3): **6c**



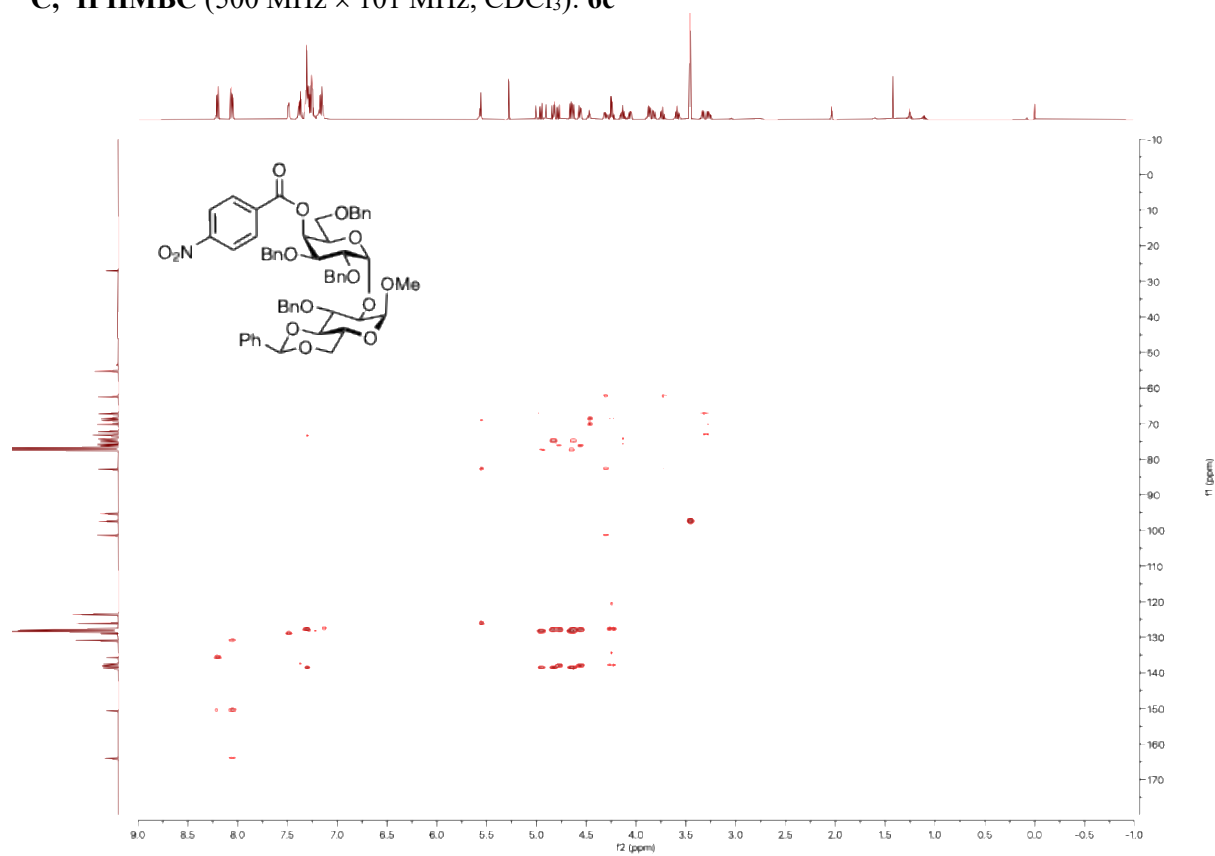
^{13}C , ^1H HSQC (500 MHz $\times$ 101 MHz, CDCl_3): **6c**



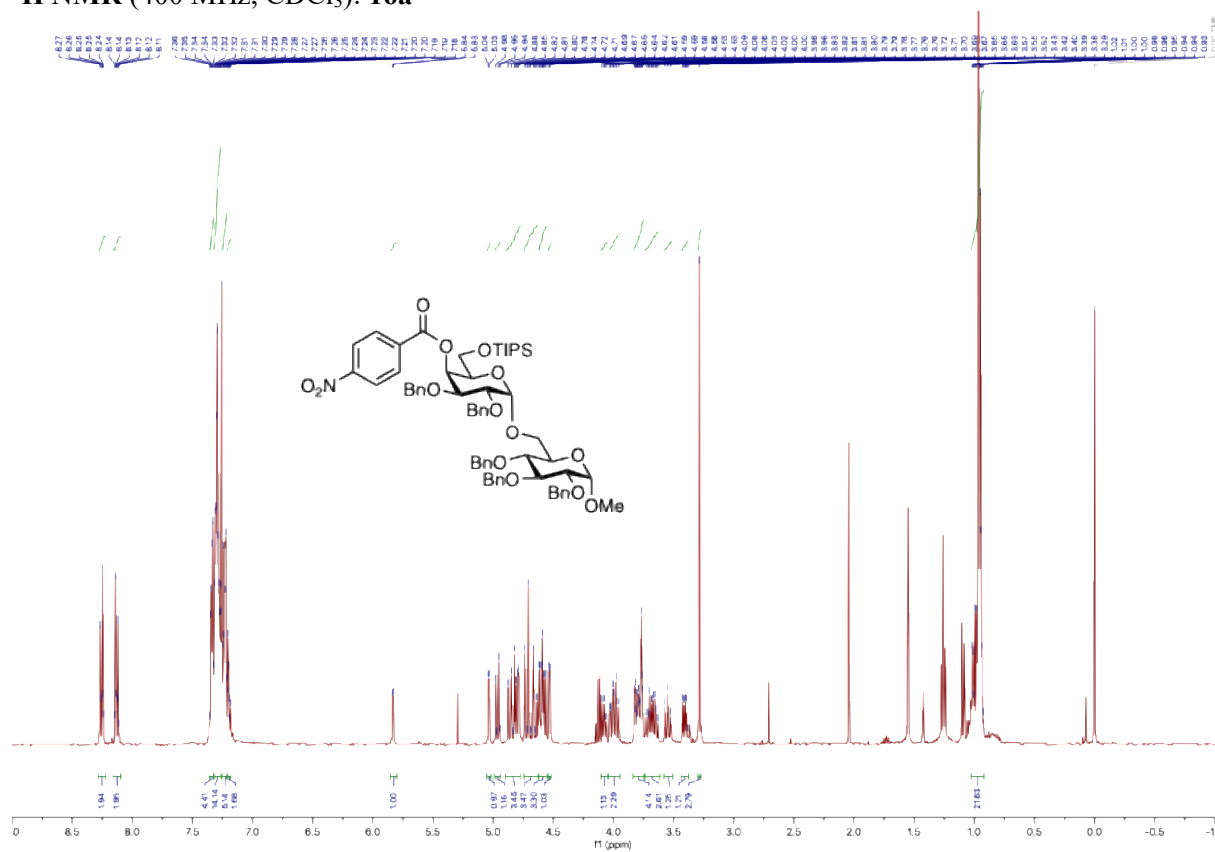
^1H , ^1H COSY (500 MHz, CDCl_3): **6c**



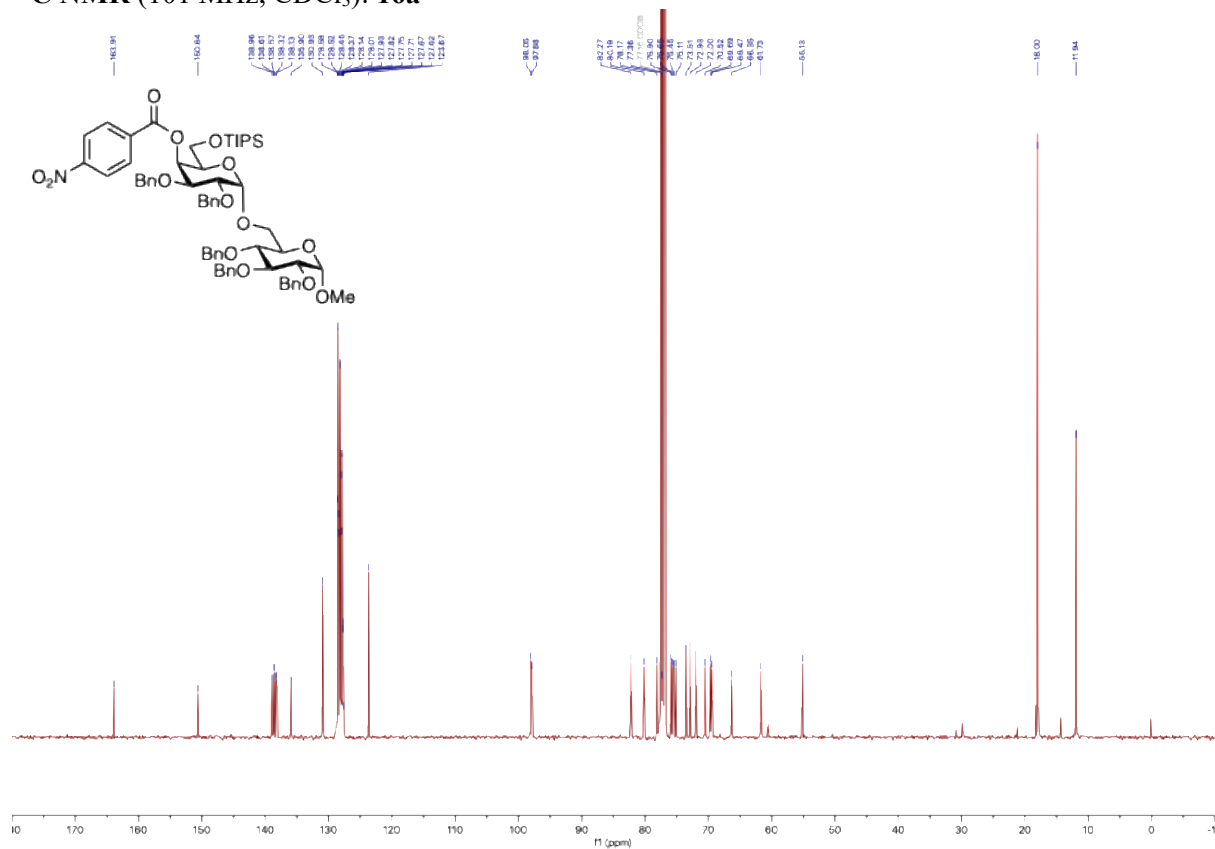
^{13}C , ^1H HMBC (500 MHz $\times$ 101 MHz, CDCl_3): **6c**



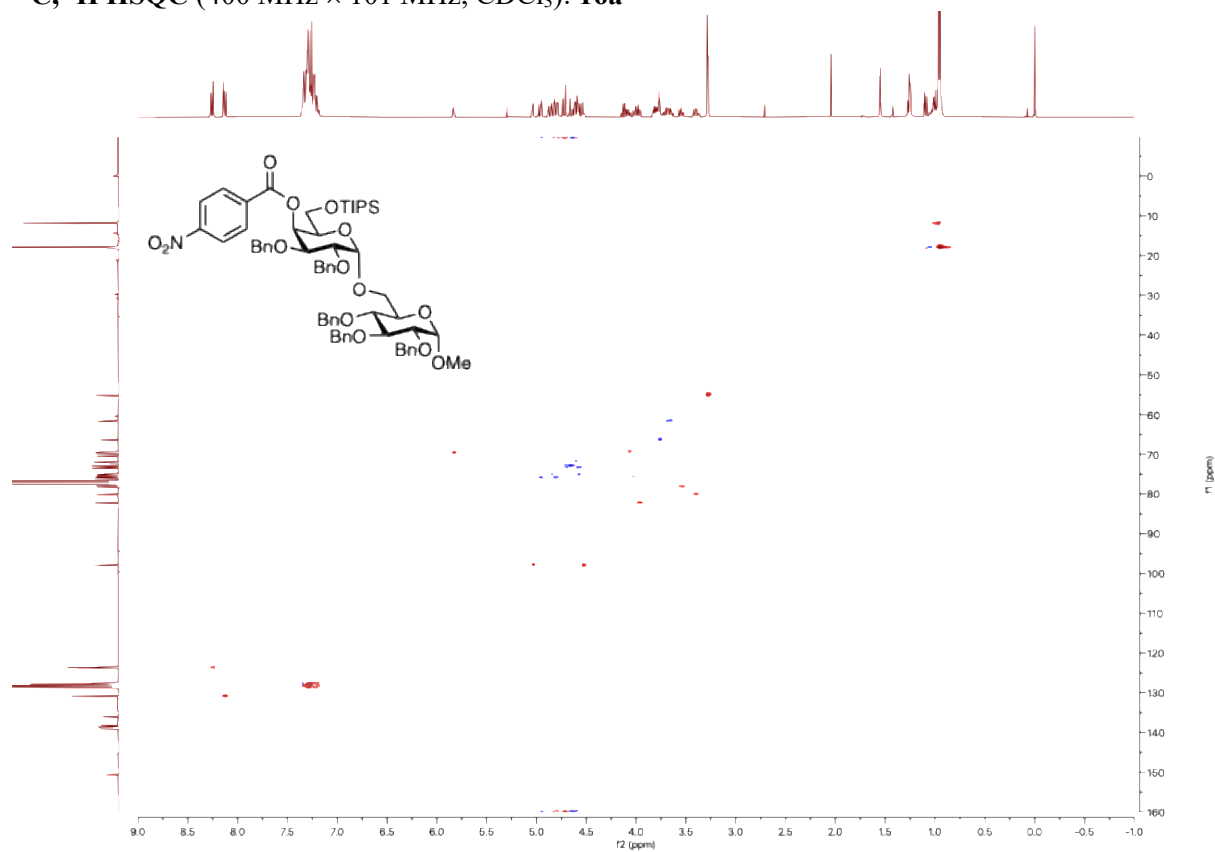
¹H NMR (400 MHz, CDCl₃): **16a**



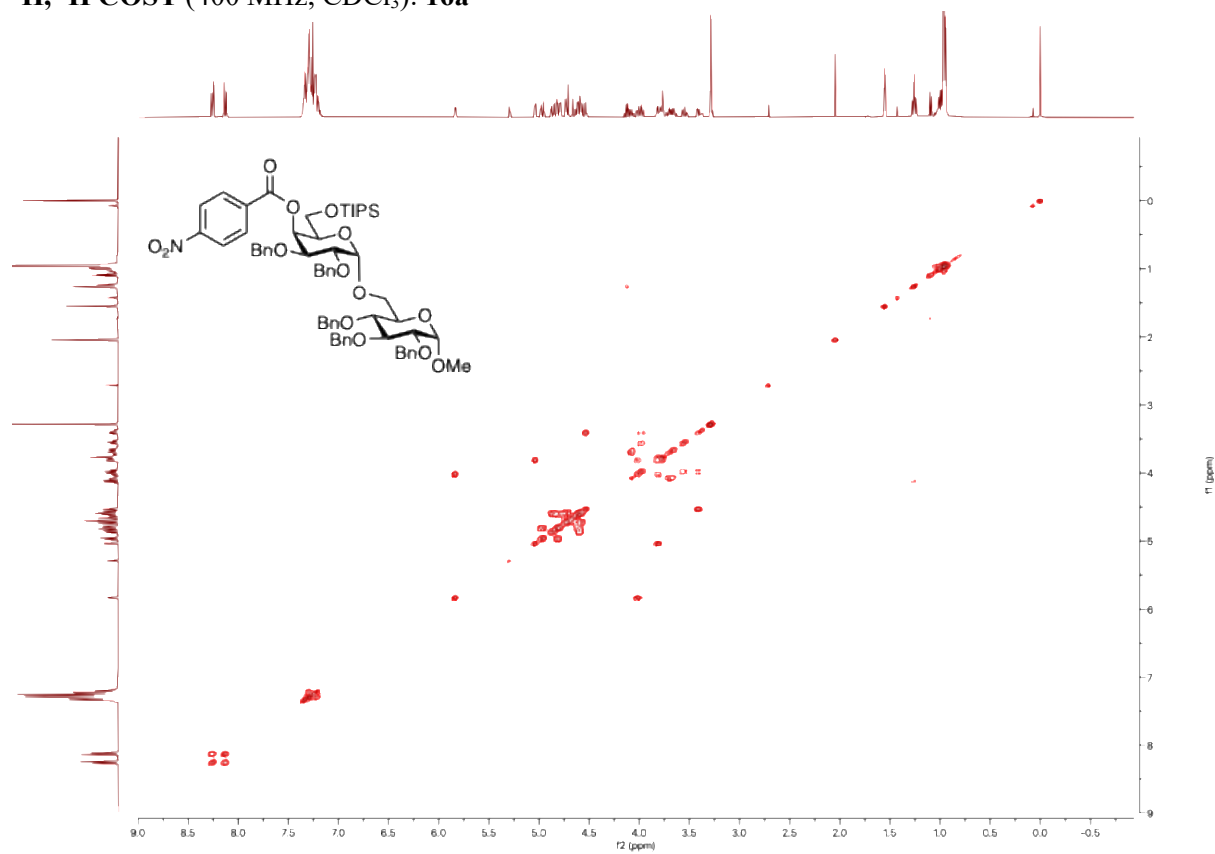
¹³C NMR (101 MHz, CDCl₃): **16a**



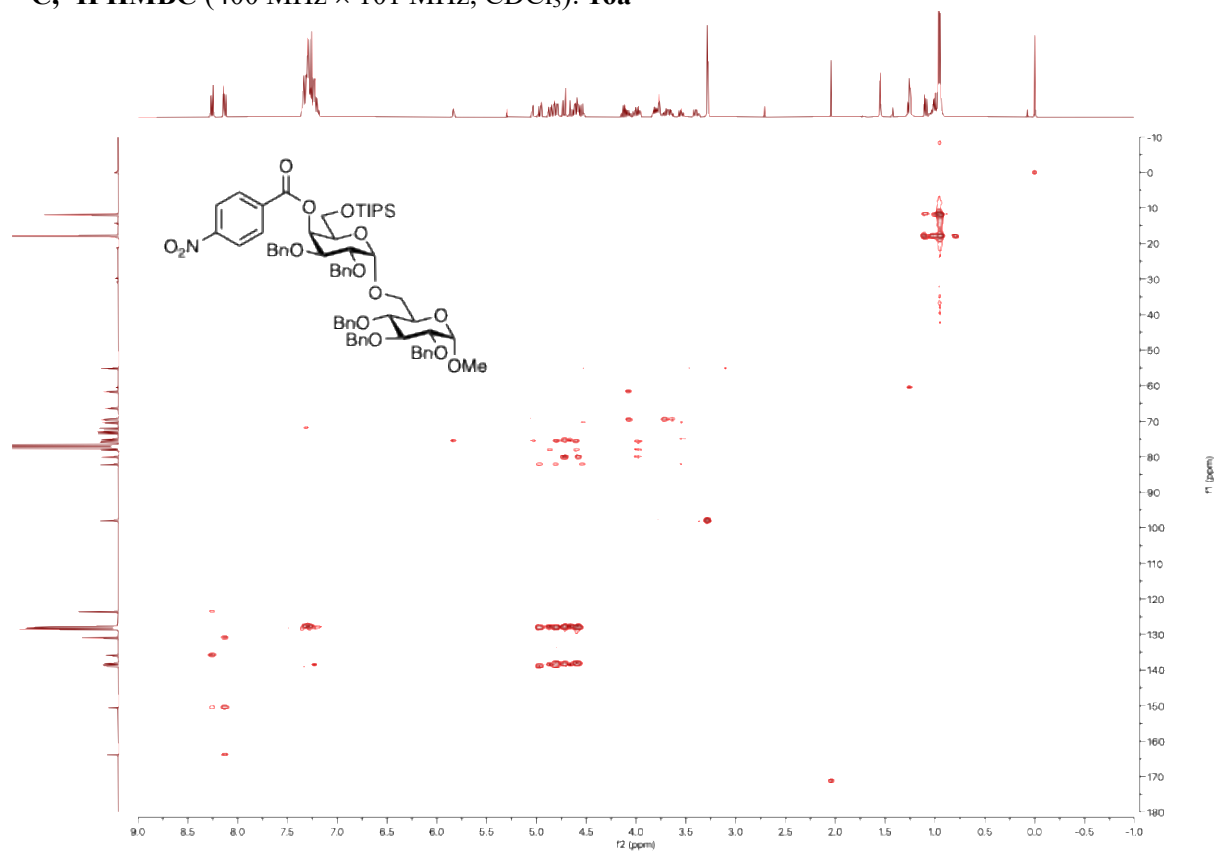
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **16a**



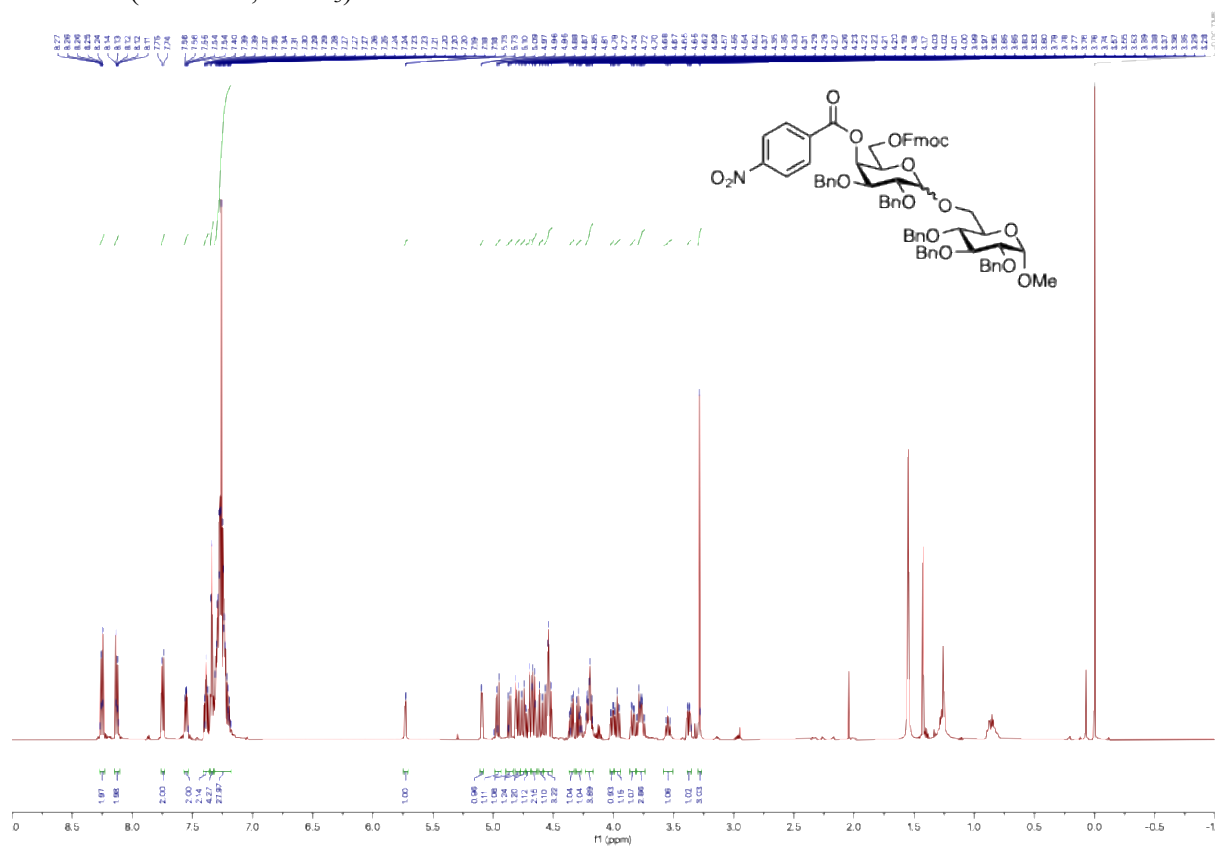
^1H , ^1H COSY (400 MHz, CDCl_3): **16a**



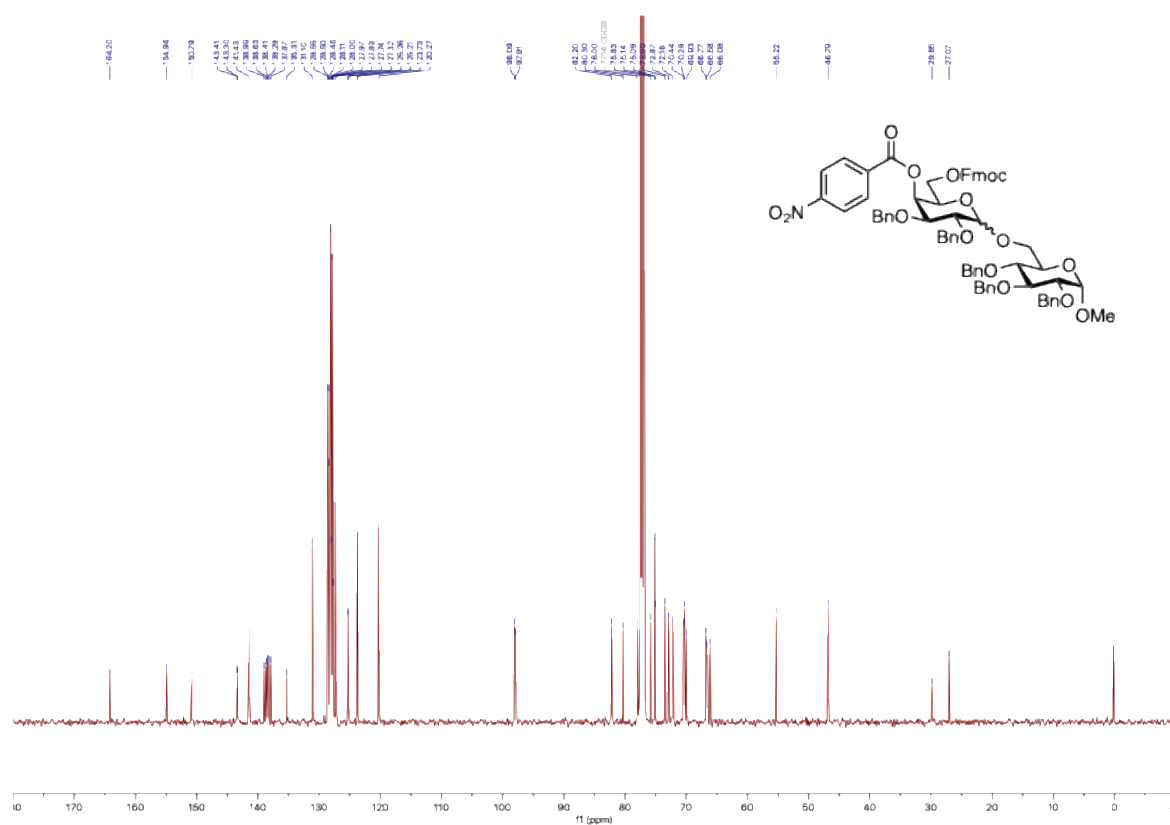
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **16a**



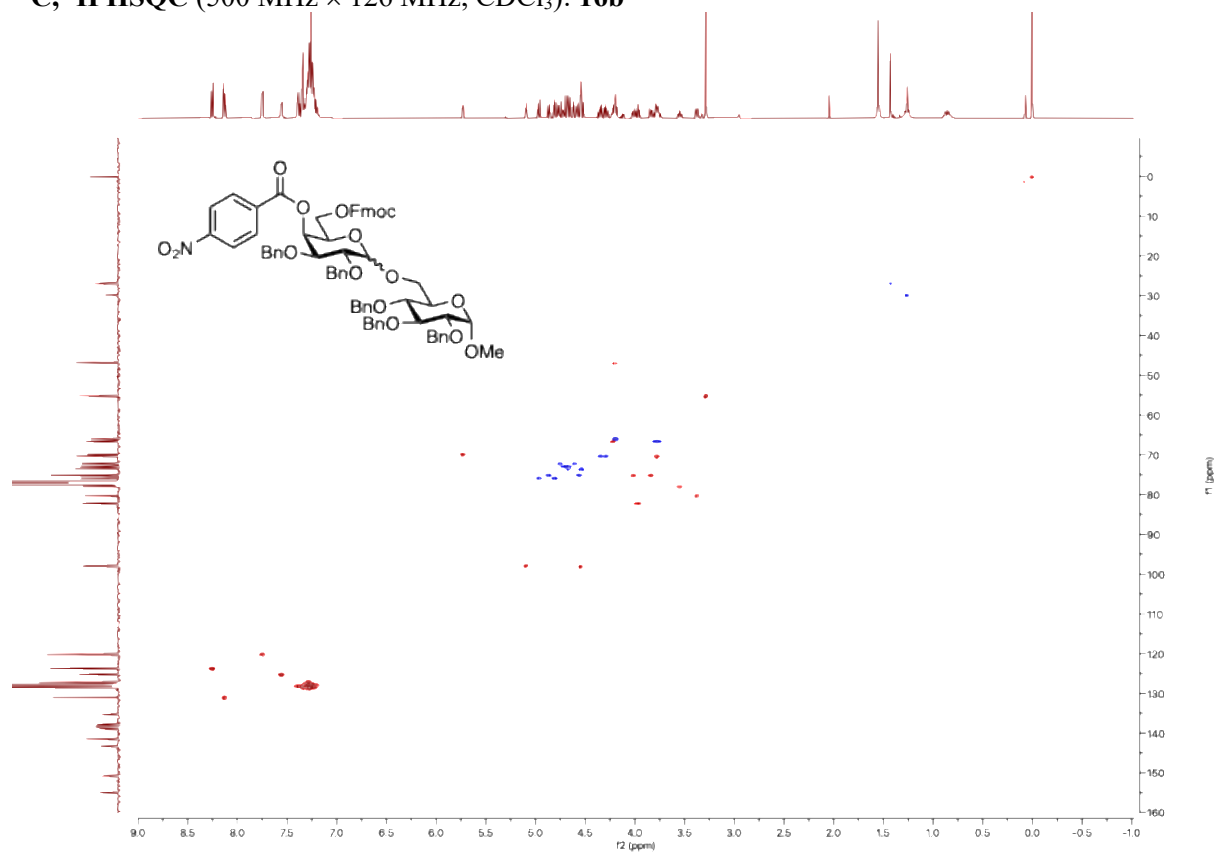
^1H NMR (500 MHz, CDCl_3): **16b**



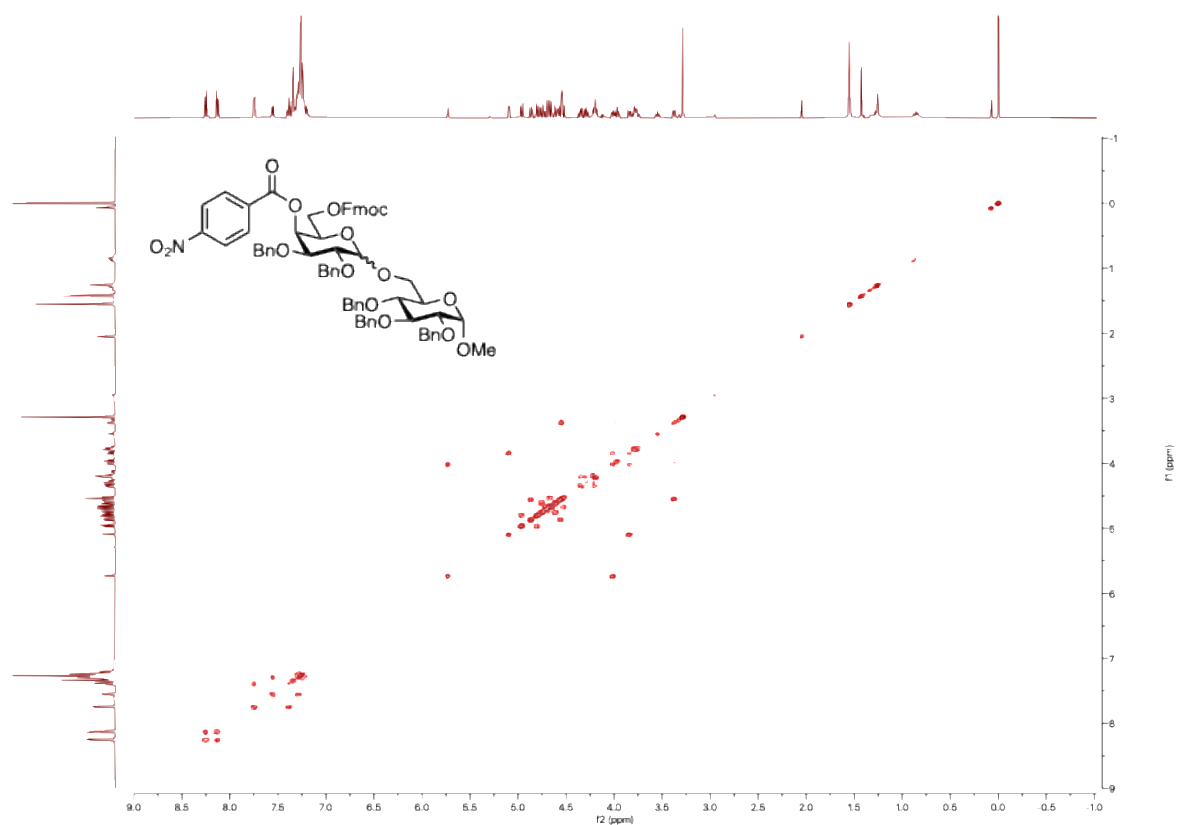
^{13}C NMR (126 MHz, CDCl_3): 16b



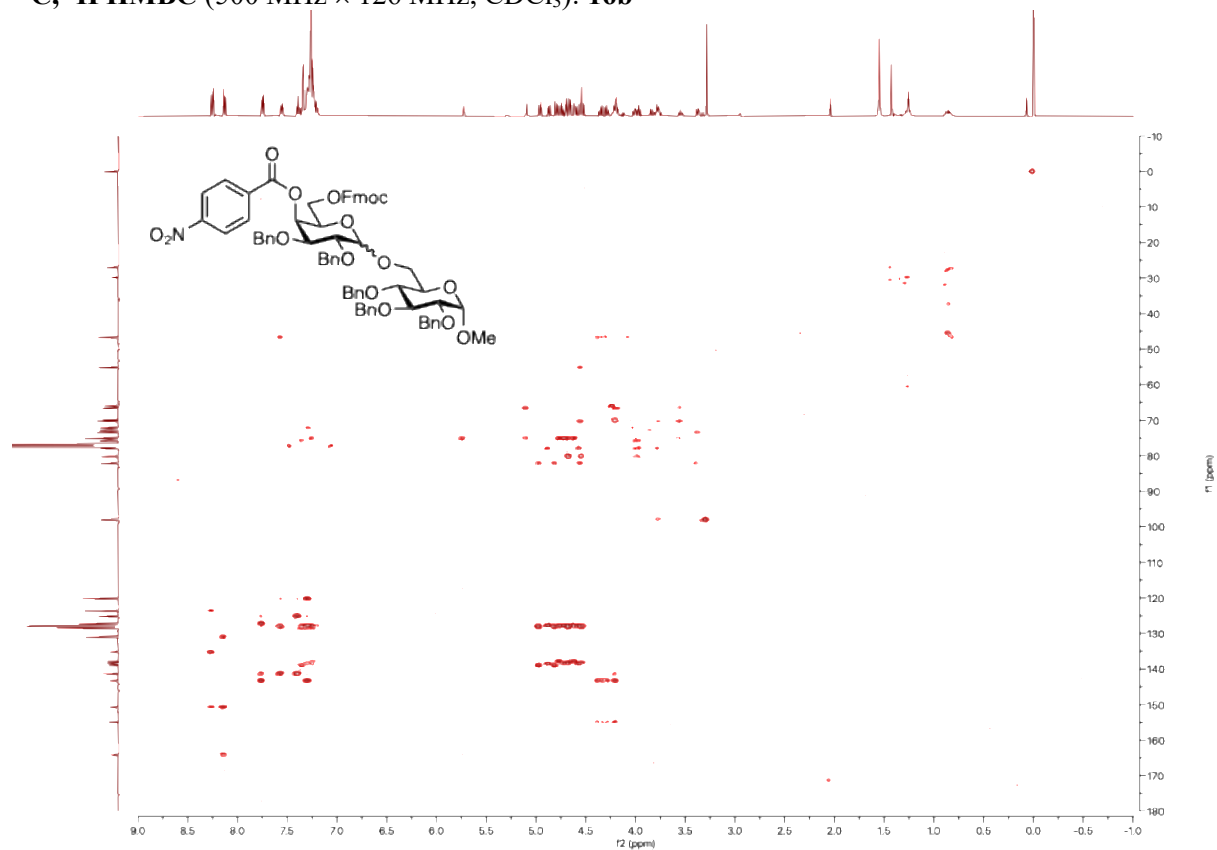
^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): 16b



^1H , ^1H COSY (500 MHz, CDCl_3): **16b**

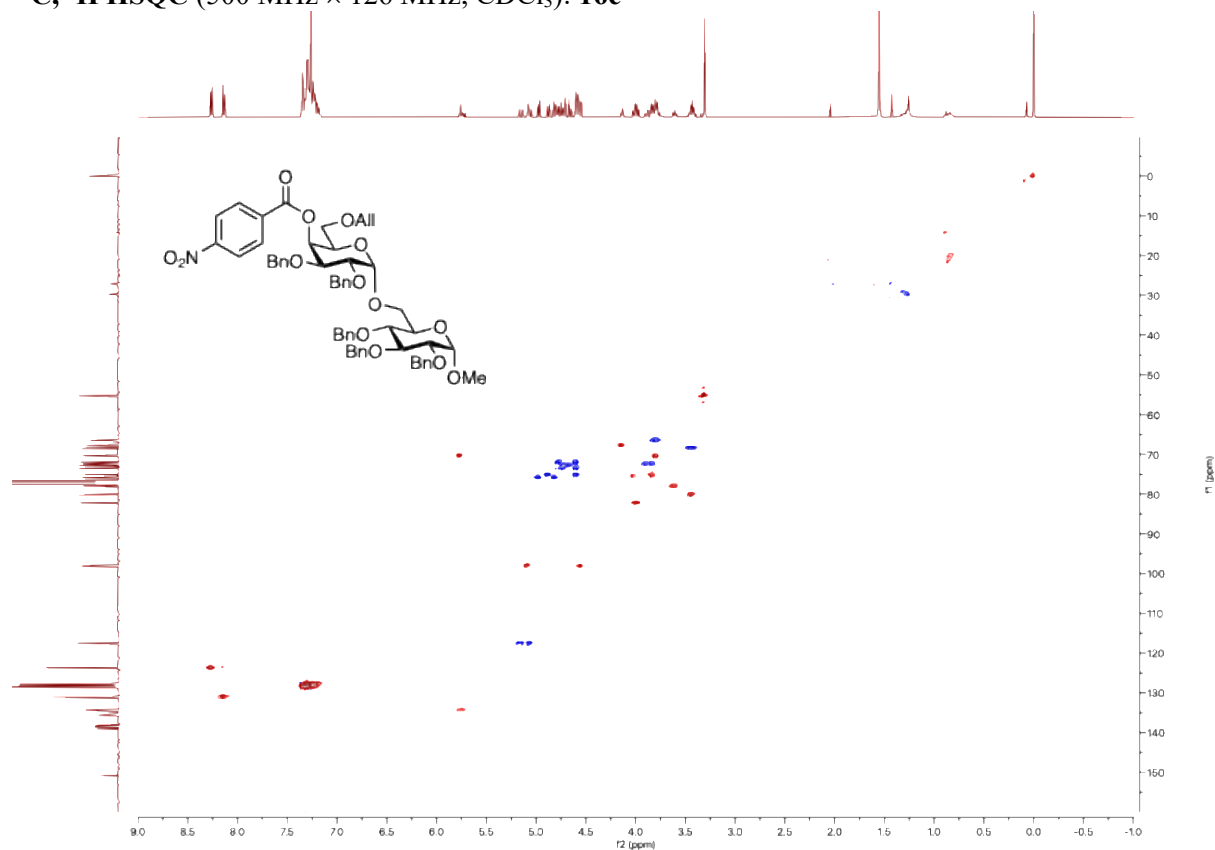


^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): **16b**

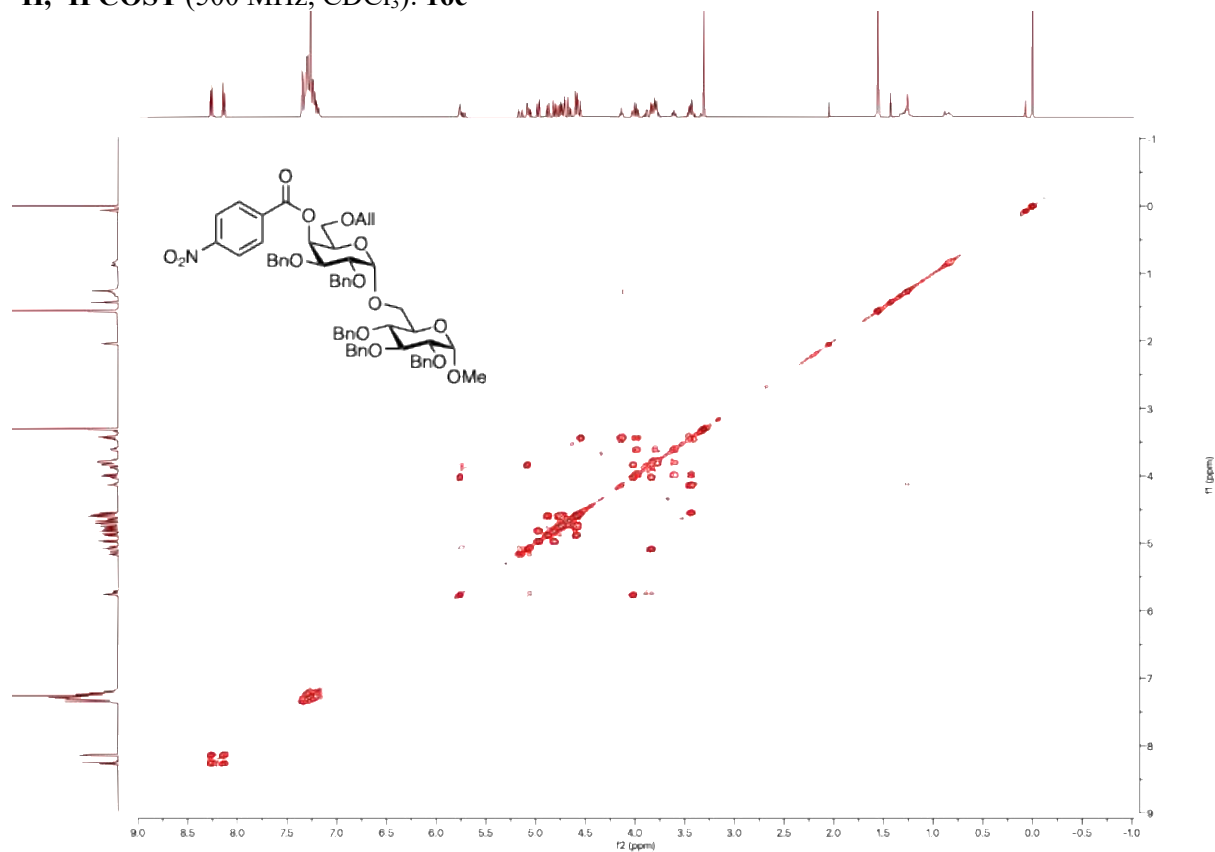


[illegible]

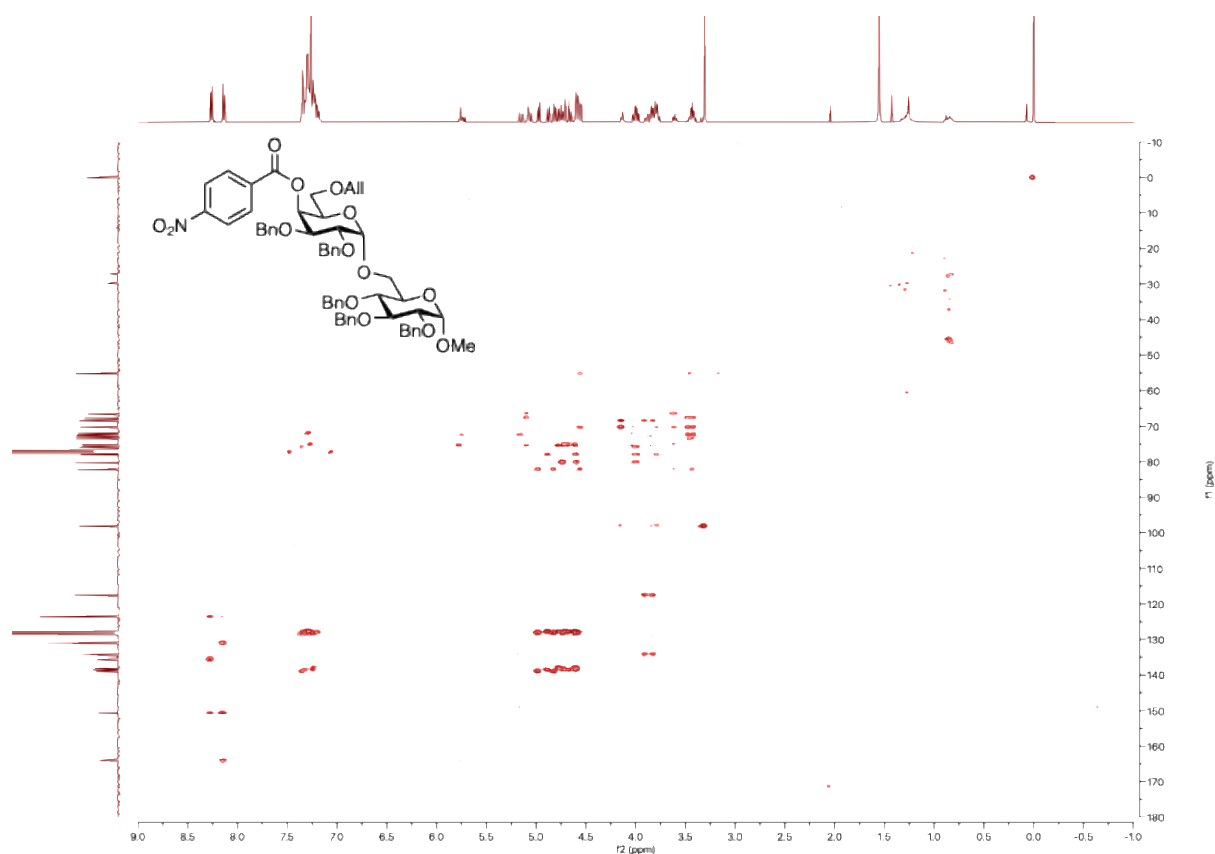
^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): **16c**



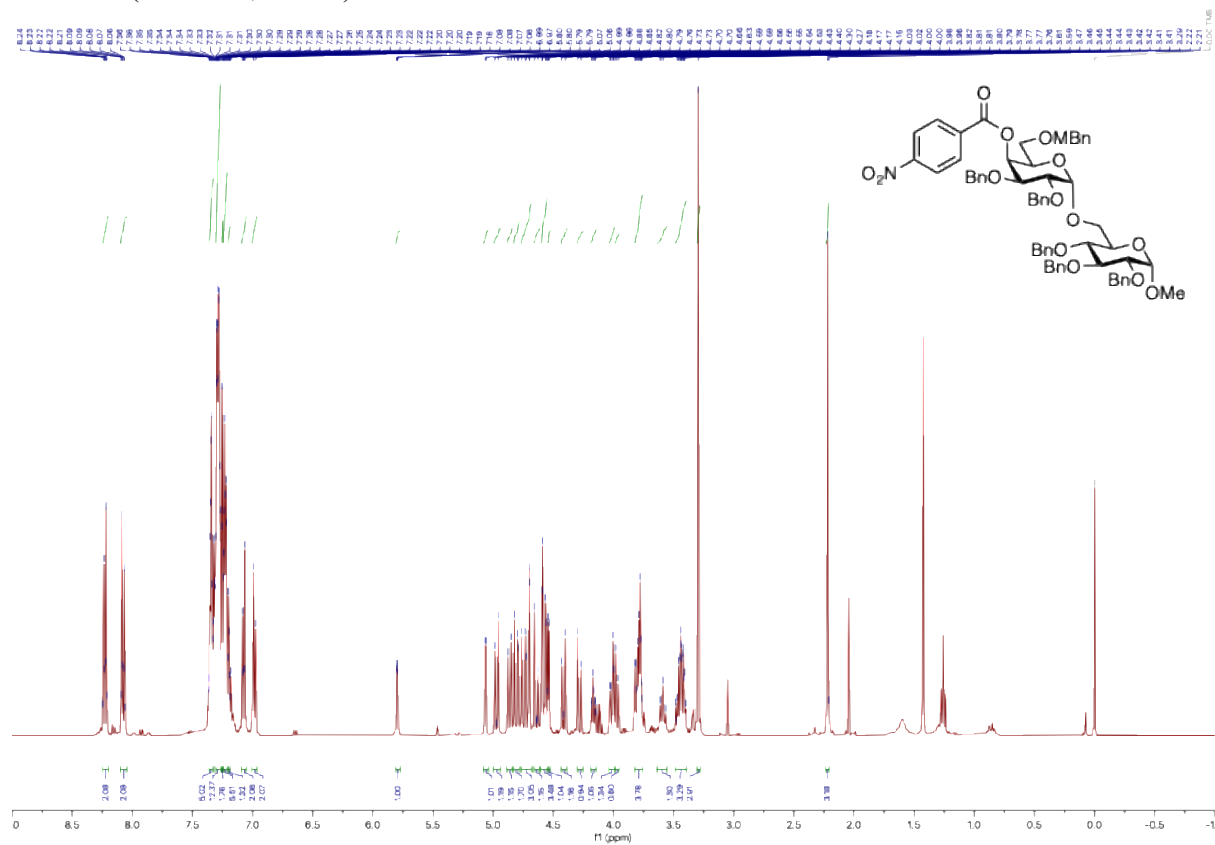
^1H , ^1H COSY (500 MHz, CDCl_3): **16c**



^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): **16c**



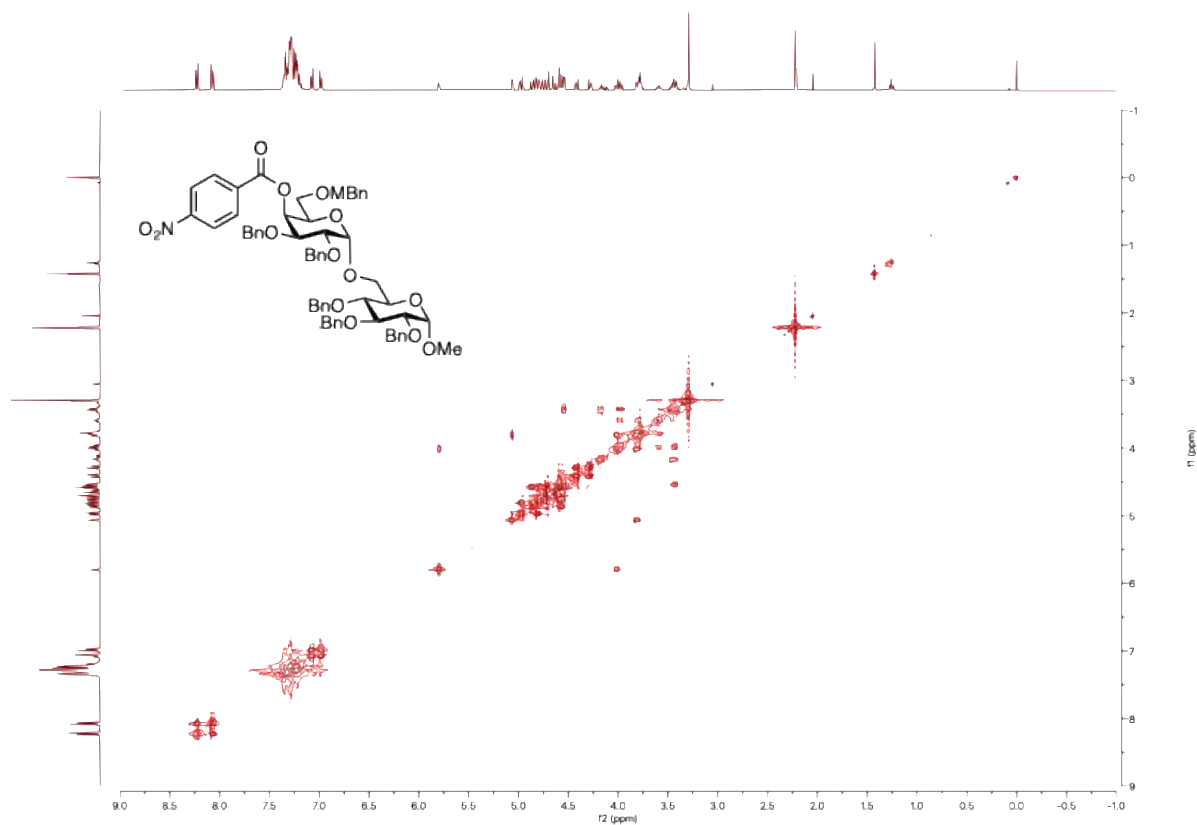
^1H NMR (400 MHz, CDCl_3): **16c**



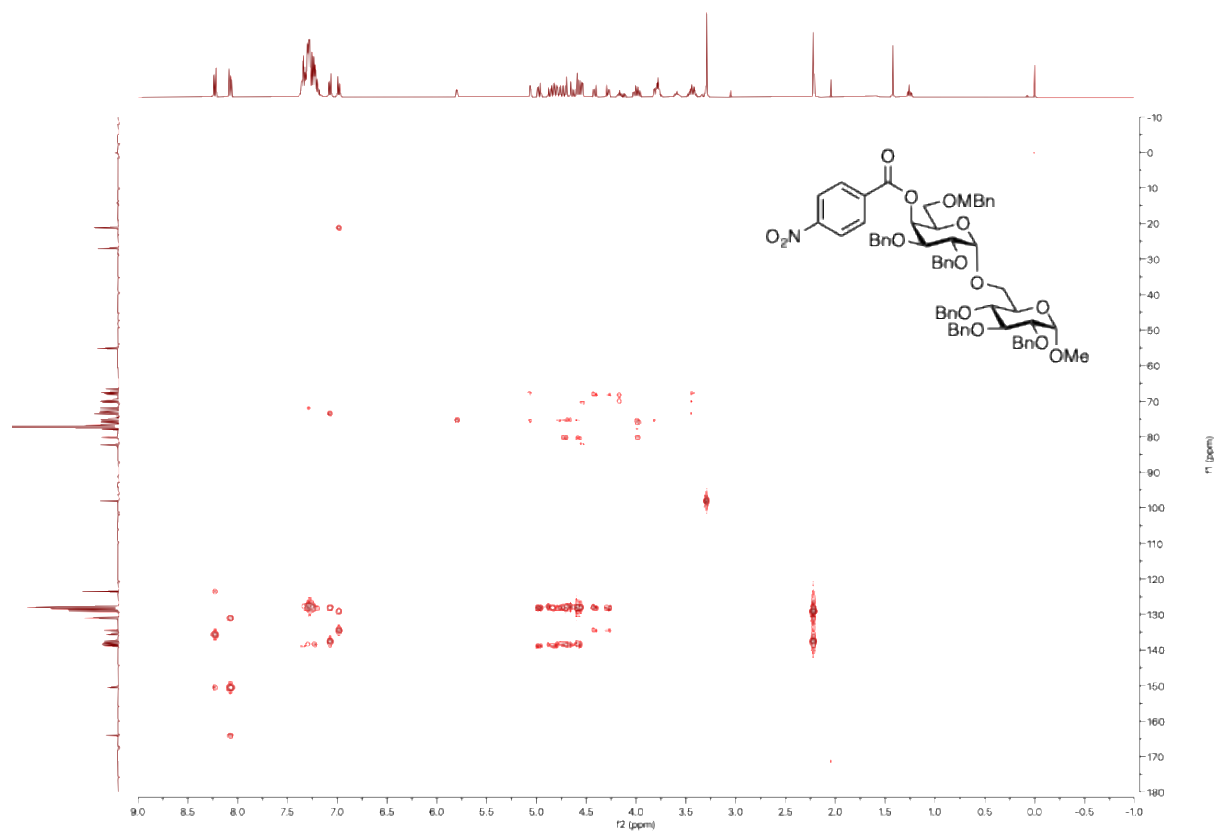
[illegible]

The figure displays a 2D NMR spectrum (likely HSQC or HMQC) of compound 10. The horizontal axis represents the ^1H chemical shift (F2) in ppm, ranging from 9.0 to -1.0. The vertical axis represents the ^{13}C chemical shift (F1) in ppm, ranging from -10 to -160. The spectrum shows several cross-peaks, with a prominent cluster between 7.0 and 8.5 ppm (^1H) and 120 to 140 ppm (^{13}C), corresponding to the aromatic region. Other cross-peaks are visible in the aliphatic region, particularly around 3.5 ppm (^1H) and 40 to 60 ppm (^{13}C). An inset shows the chemical structure of compound 10, which is a complex molecule featuring a benzene ring with a nitro group (O_2N), a carbonyl group (C=O), and a sugar moiety with multiple benzyloxy (BnO) and methoxy (OMe) substituents.

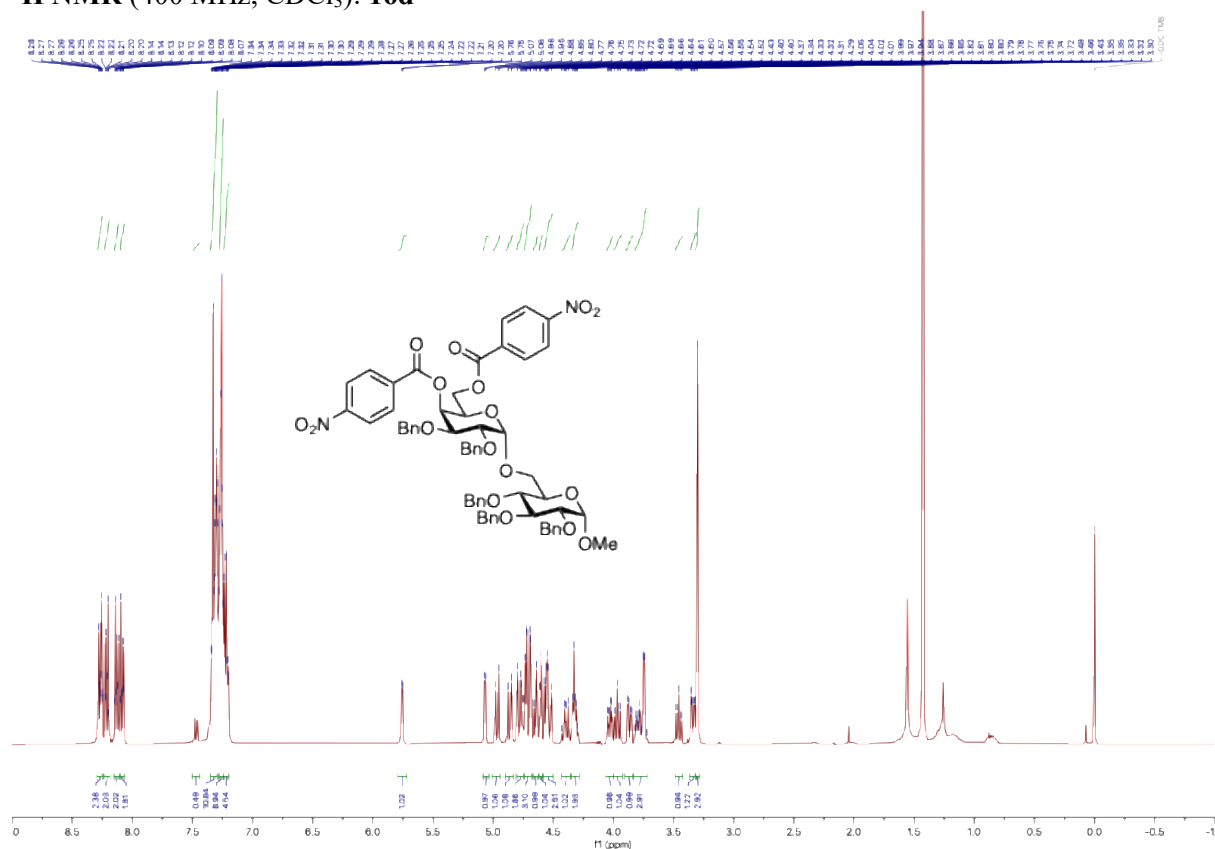
^1H , ^1H COSY (400 MHz, CDCl_3): **16e**



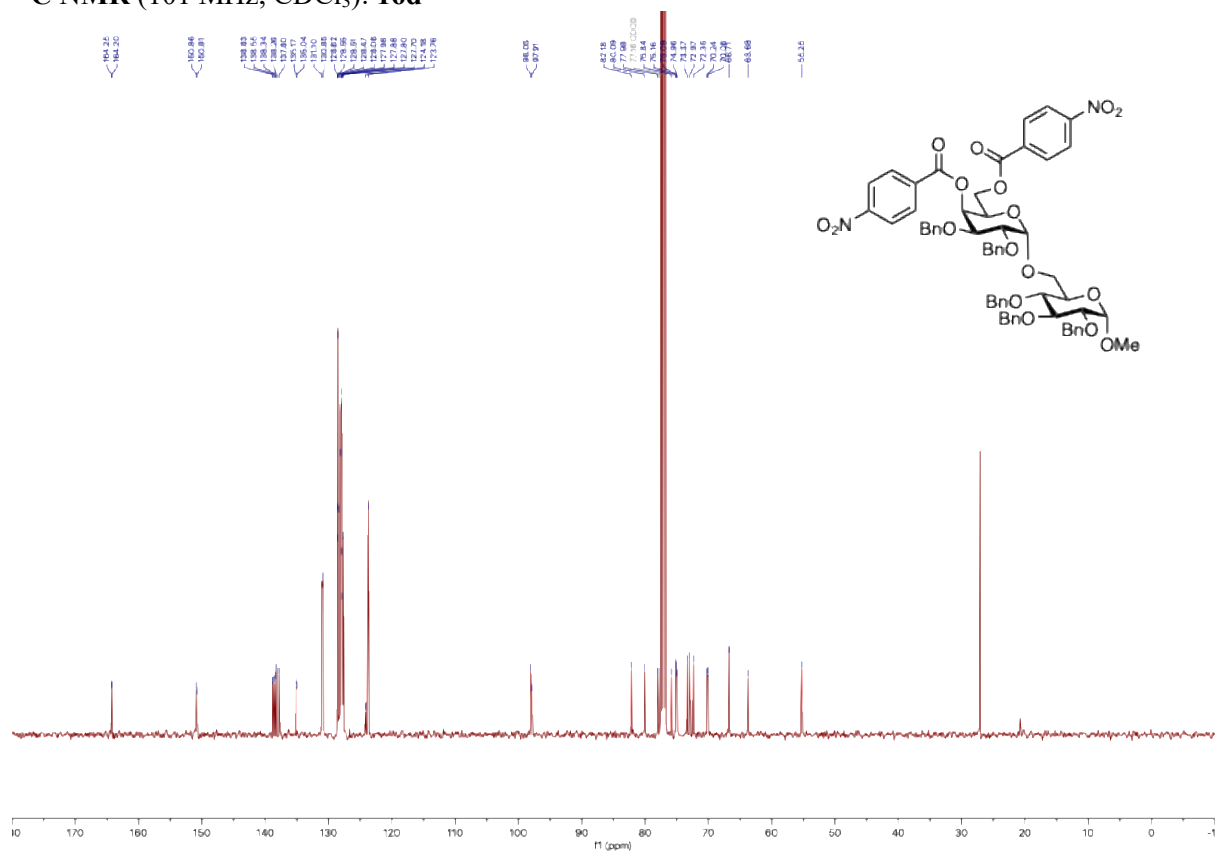
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **16e**



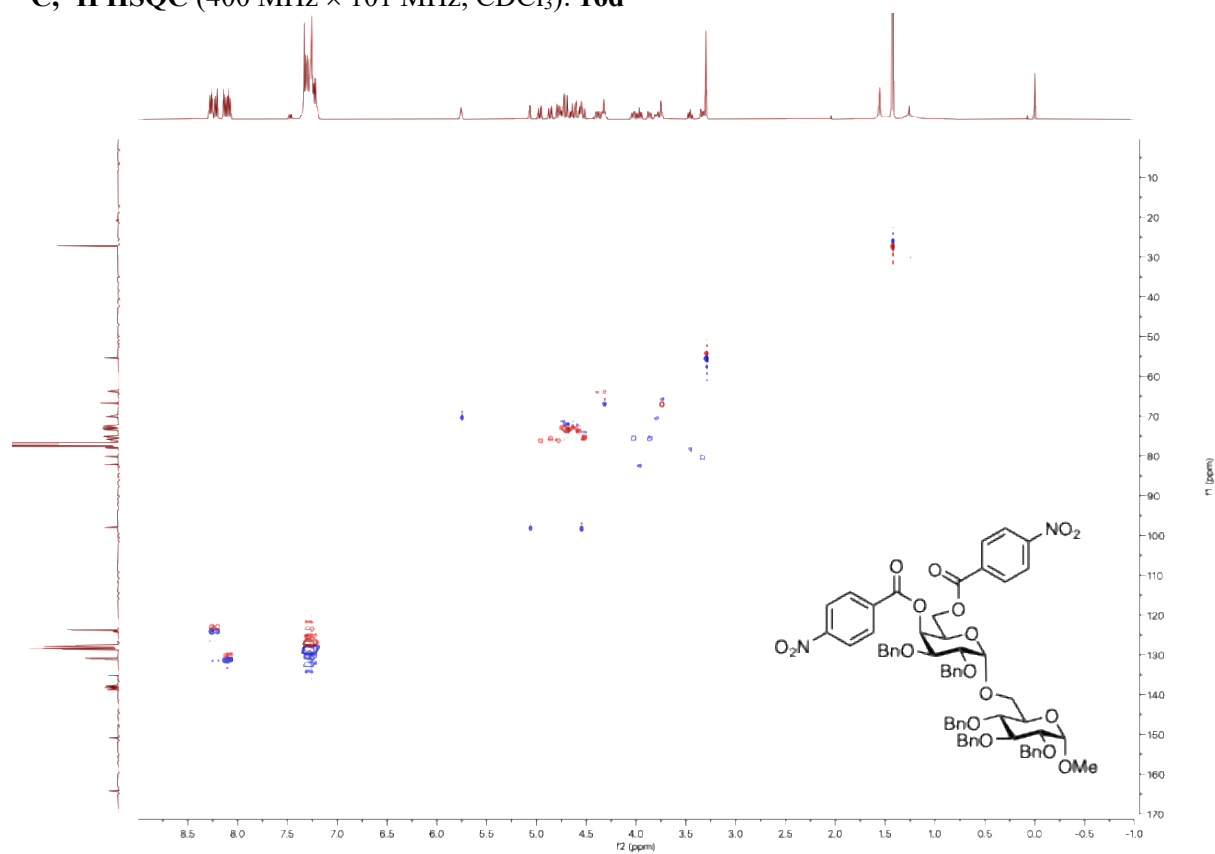
¹H NMR (400 MHz, CDCl₃): **16d**



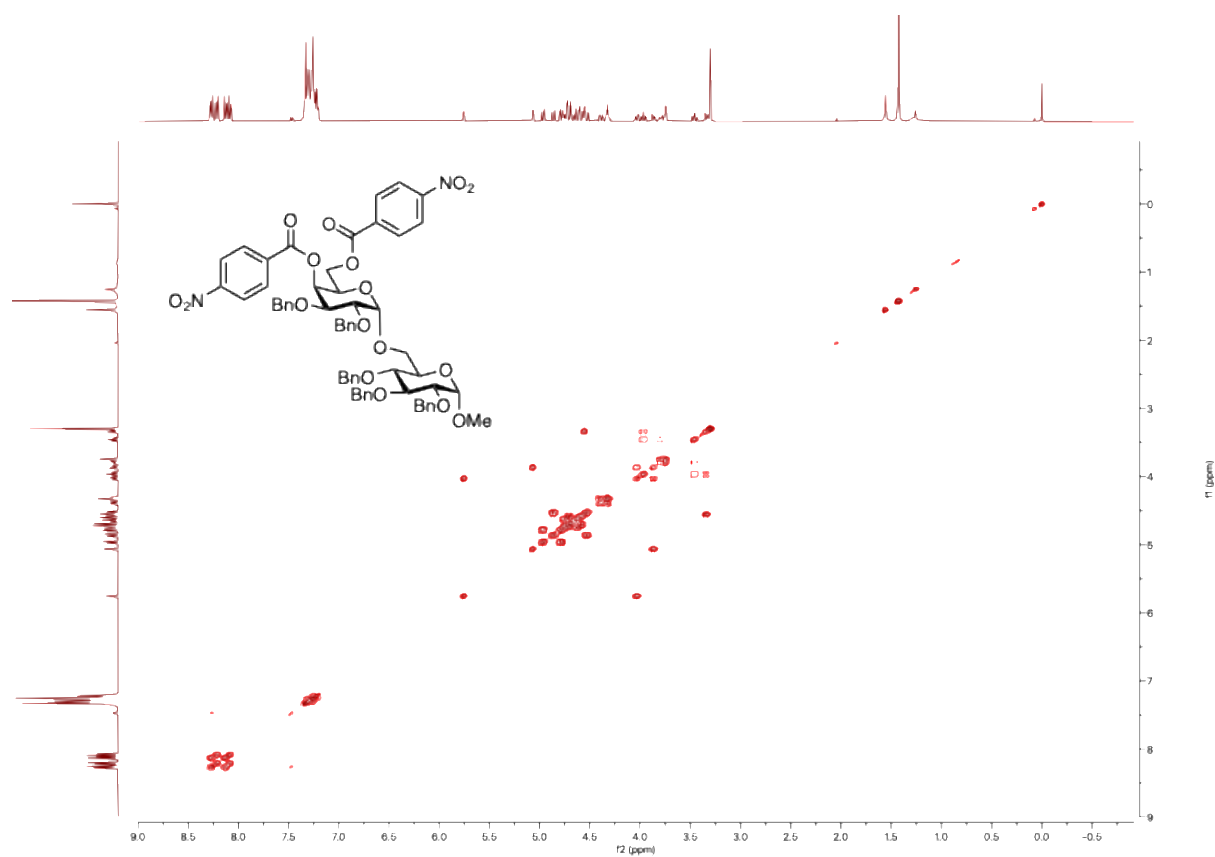
^{13}C NMR (101 MHz, CDCl_3): 16d



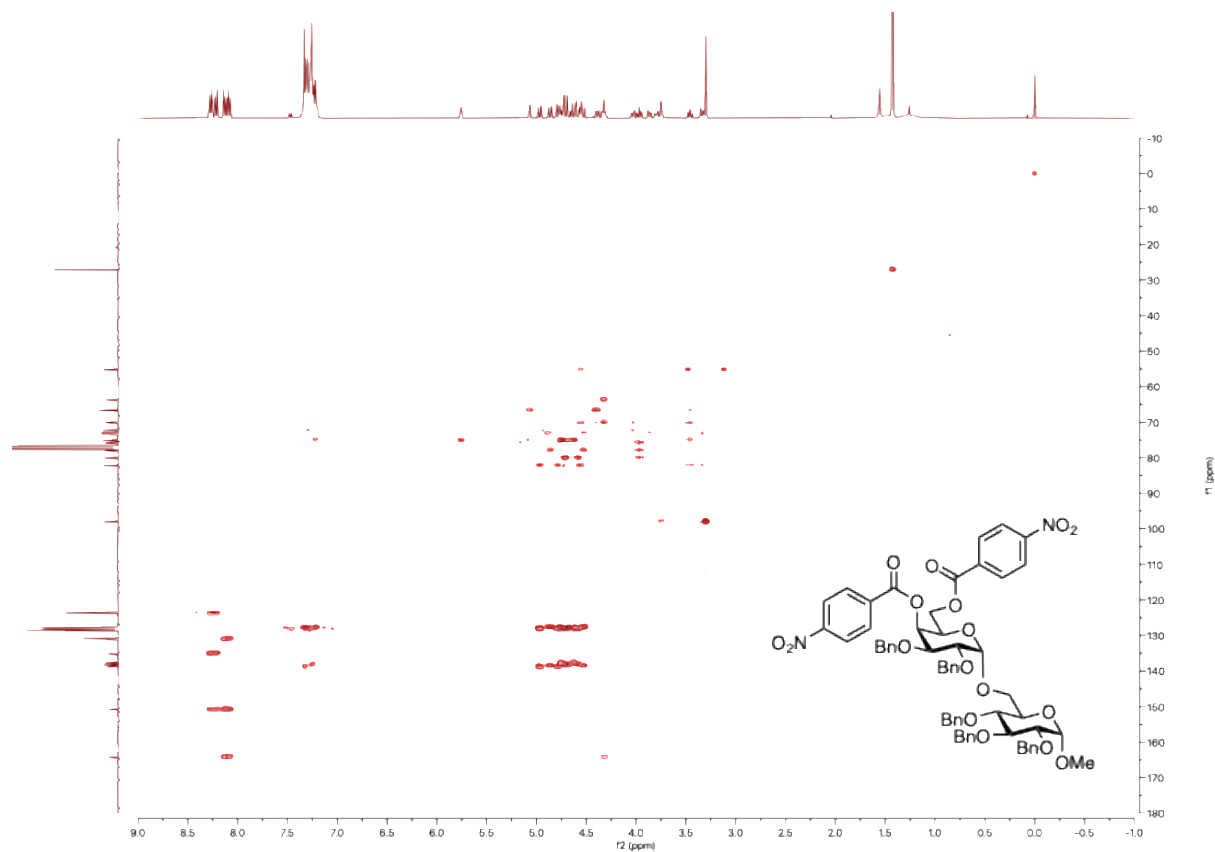
^{13}C , ^1H HSQC (400 MHz $\times$ 101 MHz, CDCl_3): **16d**



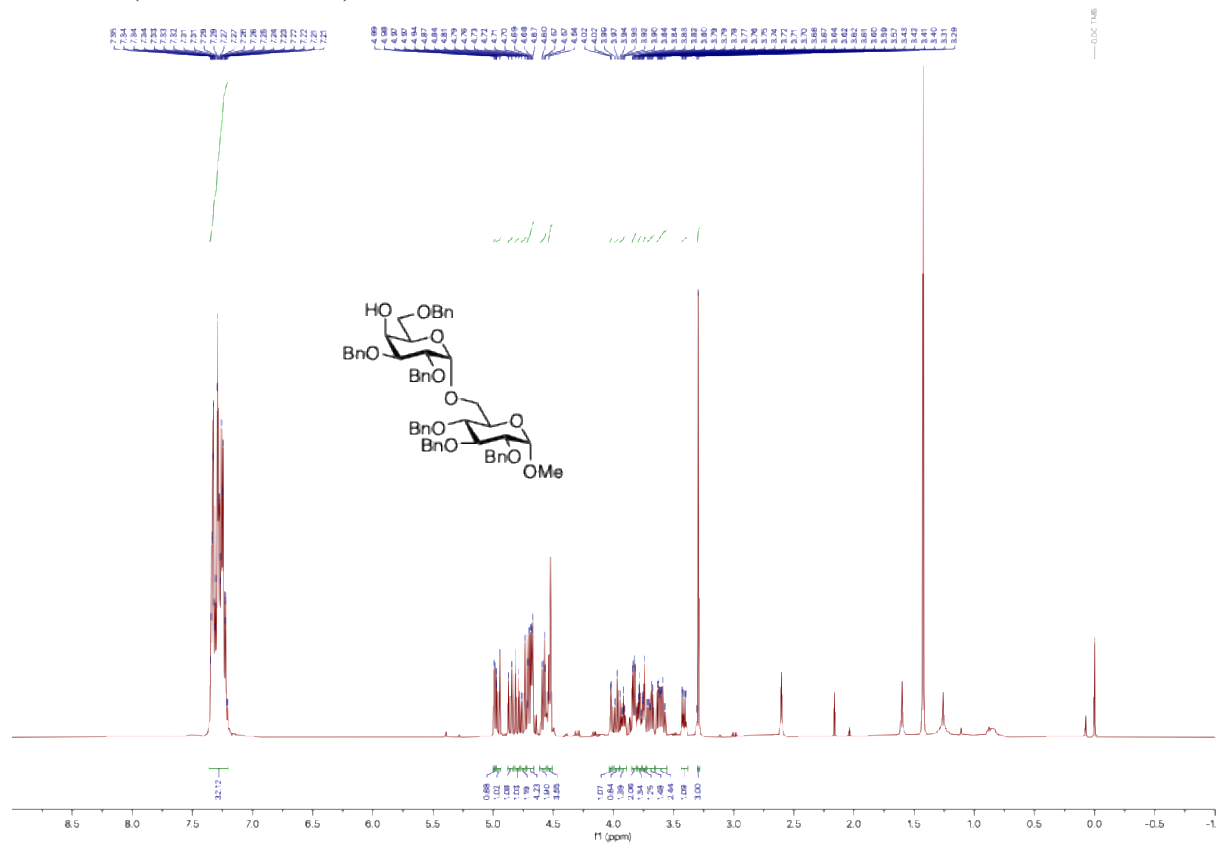
^1H , ^1H COSY (400 MHz, CDCl_3): **16d**



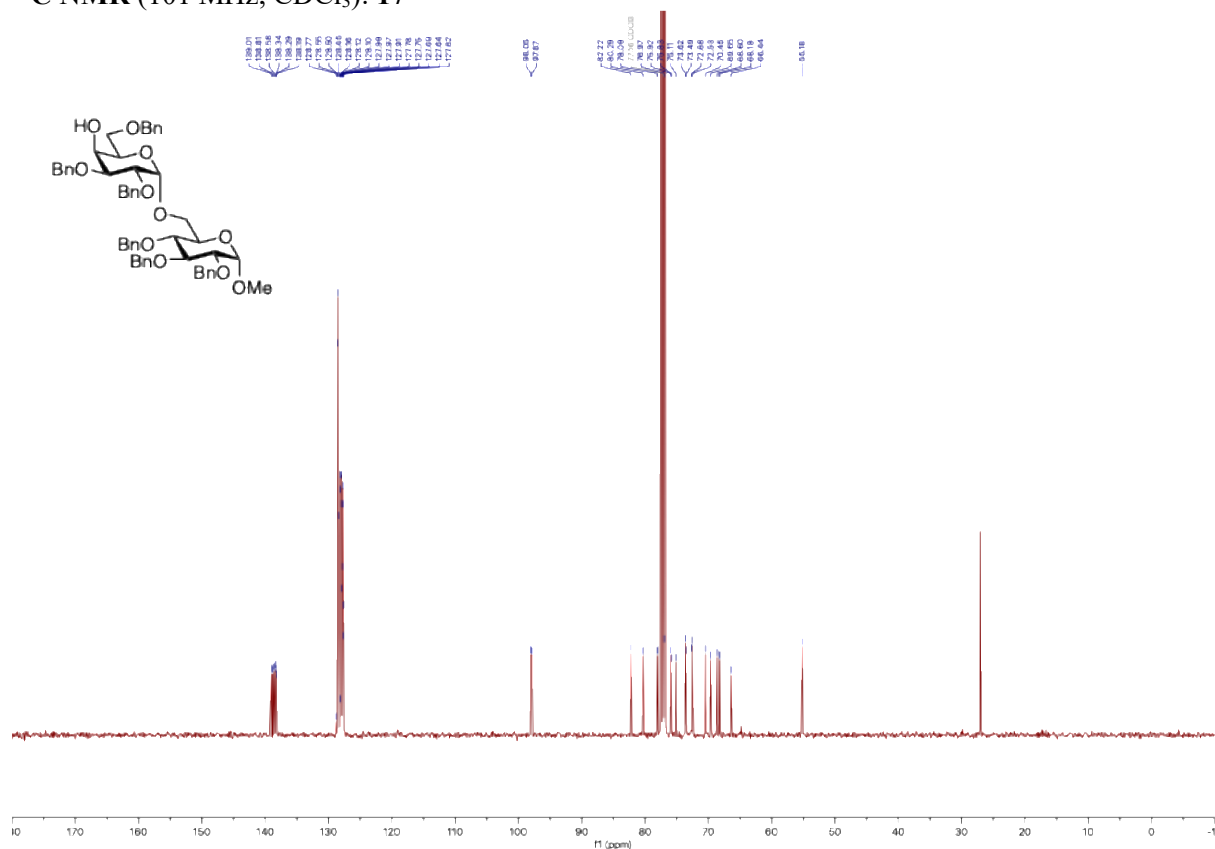
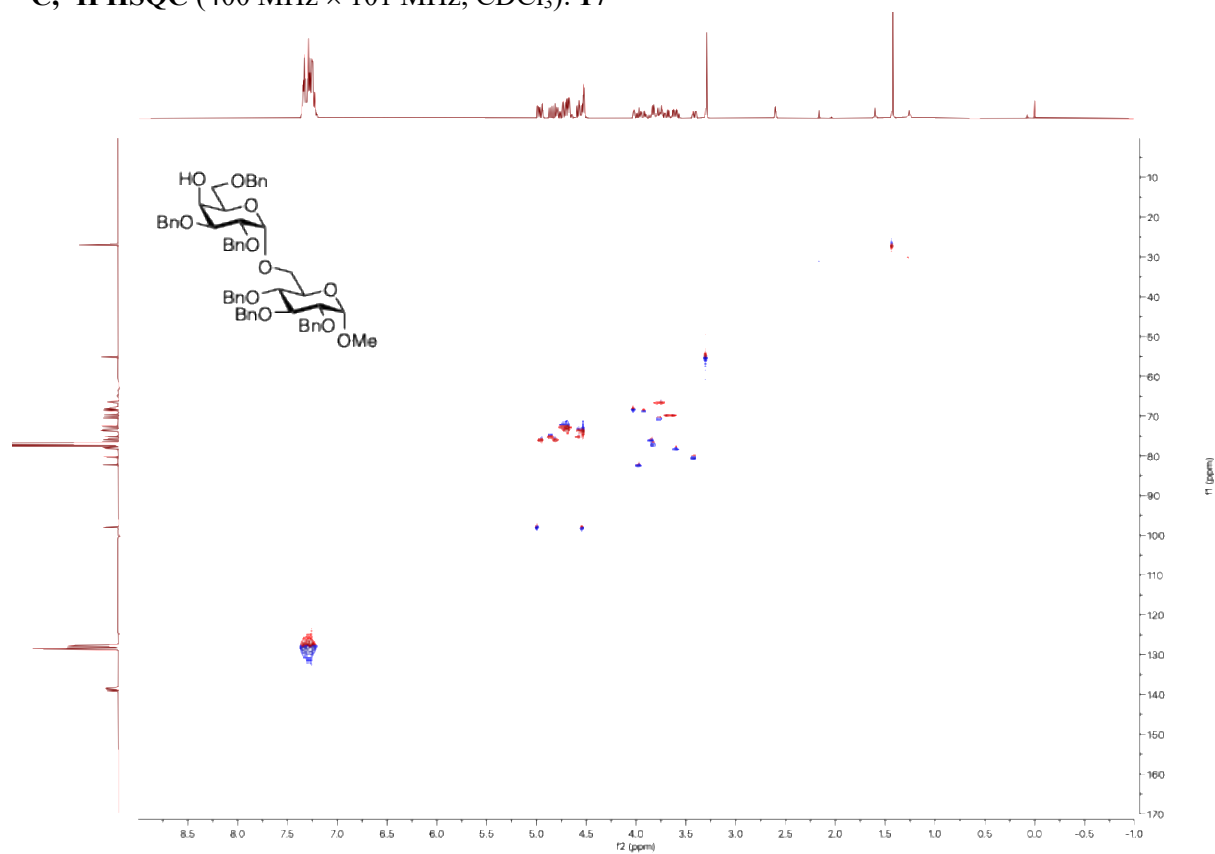
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): **16d**



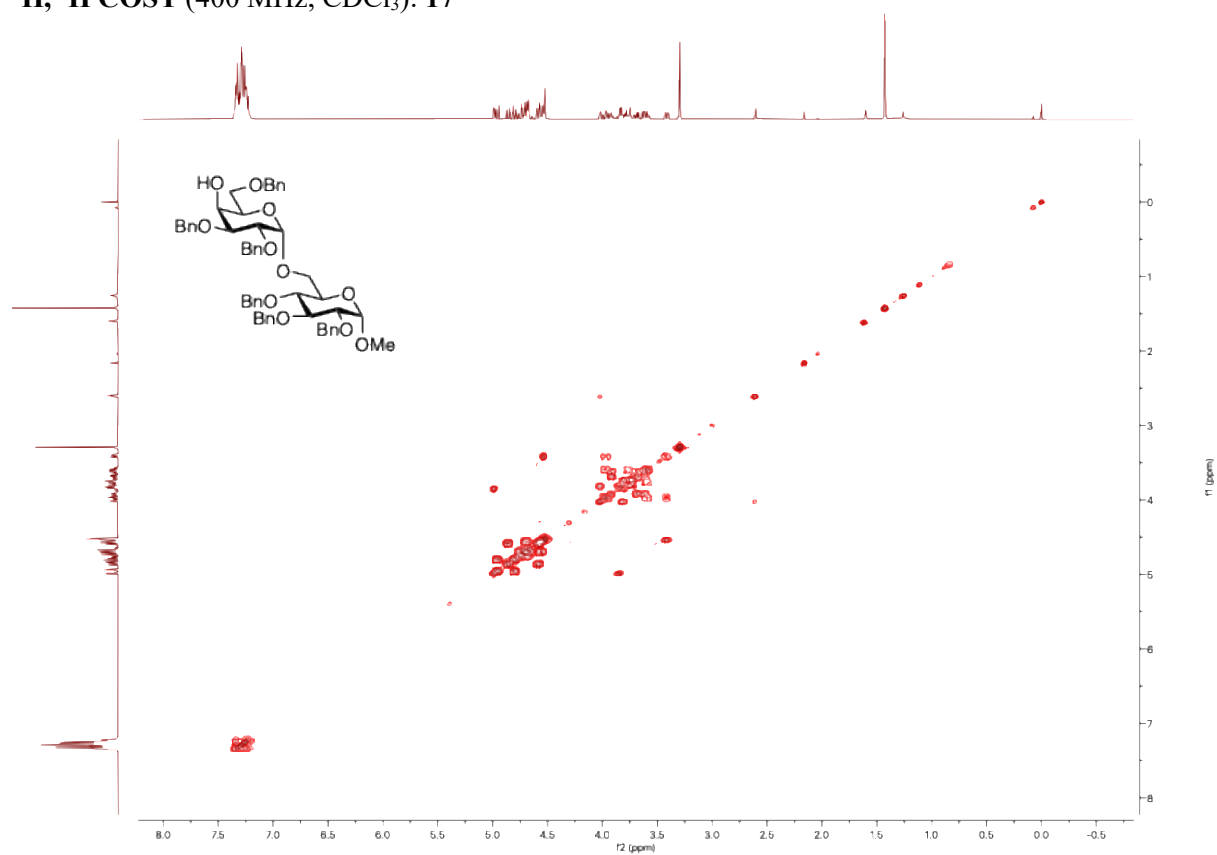
^1H NMR (400 MHz, CDCl_3): **17**



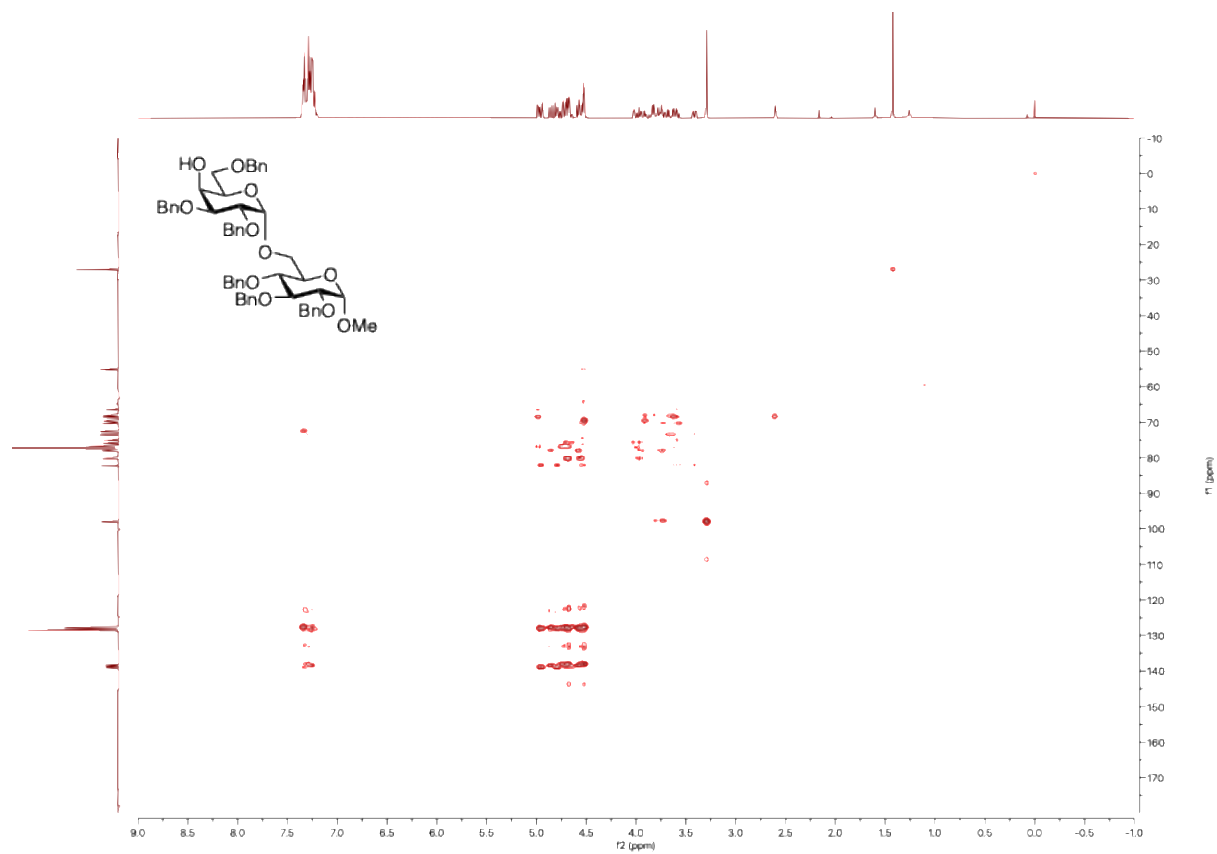
^{13}C NMR (101 MHz, CDCl_3): 17

¹³C, ¹H HSQC (400 MHz × 101 MHz, CDCl₃): 17

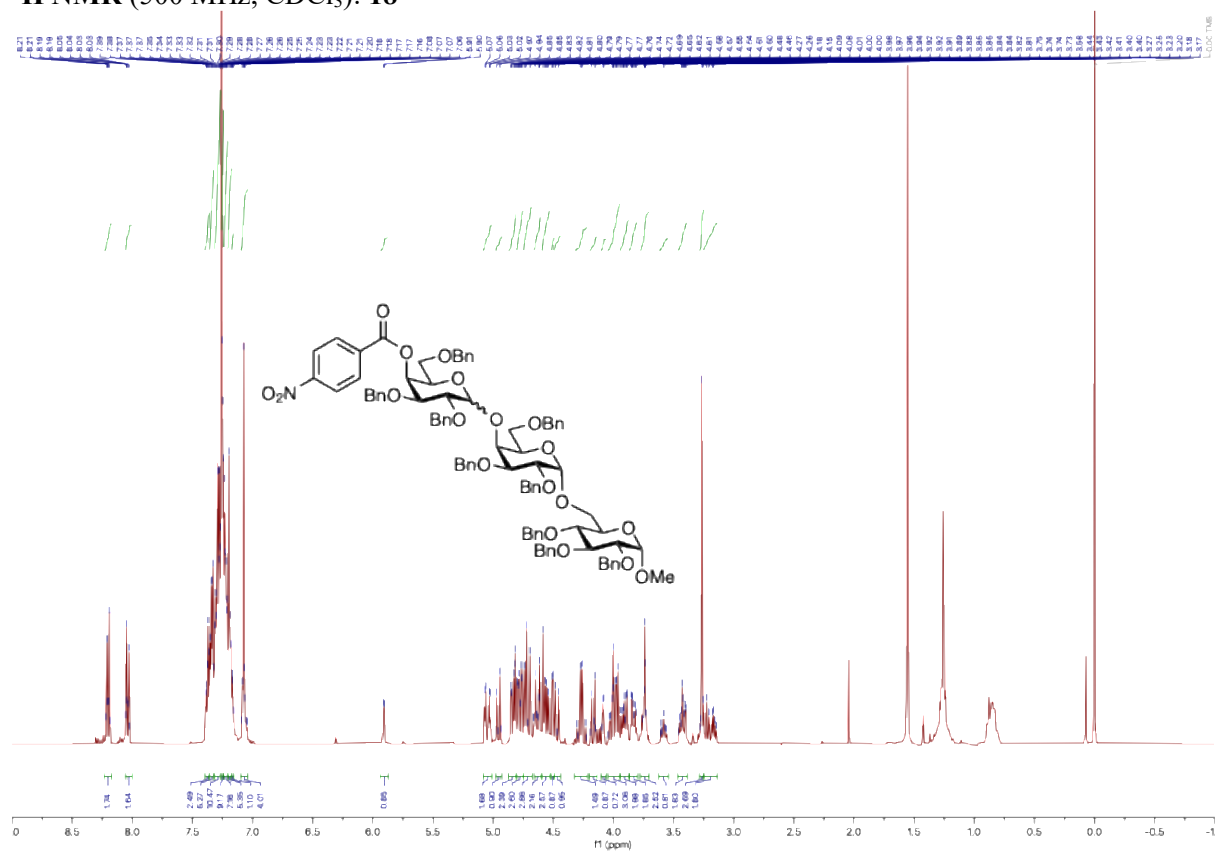
^1H , ^1H COSY (400 MHz, CDCl_3): 17



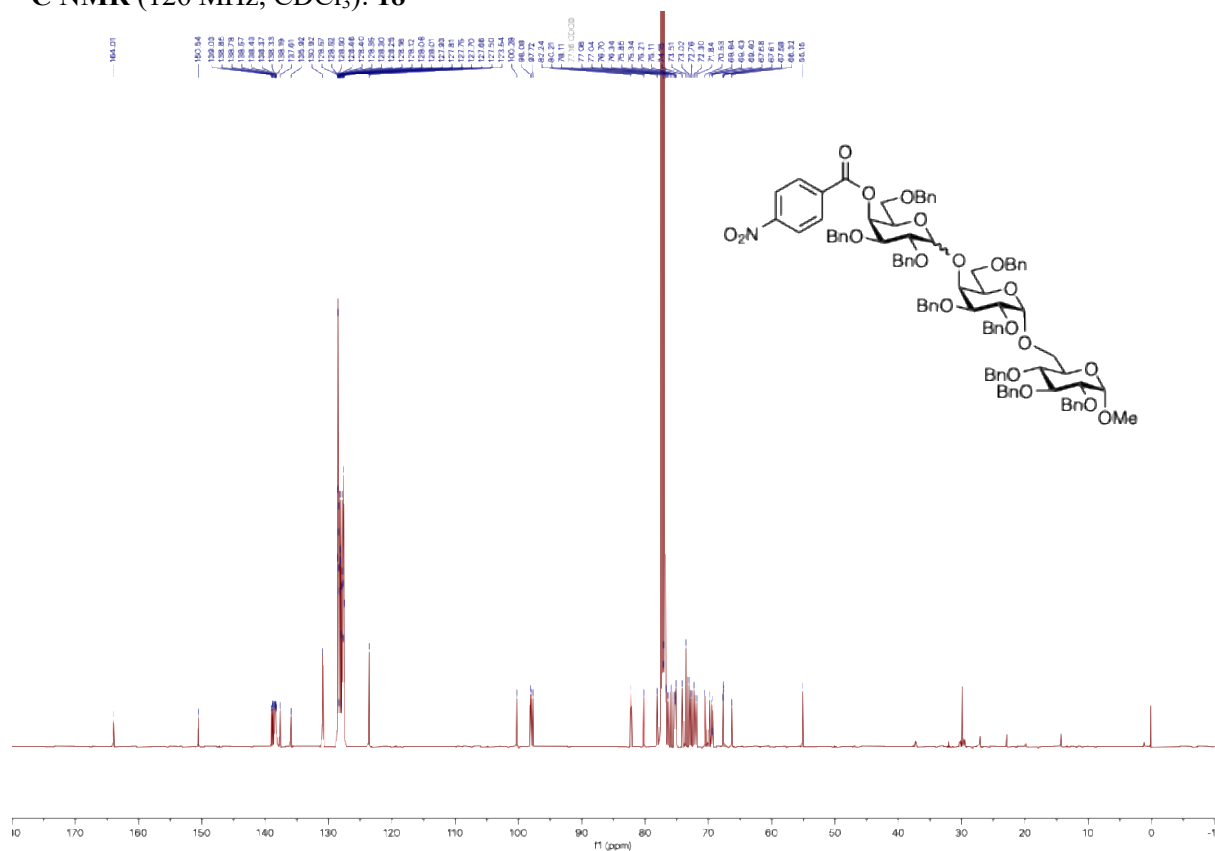
^{13}C , ^1H HMBC (400 MHz $\times$ 101 MHz, CDCl_3): 17



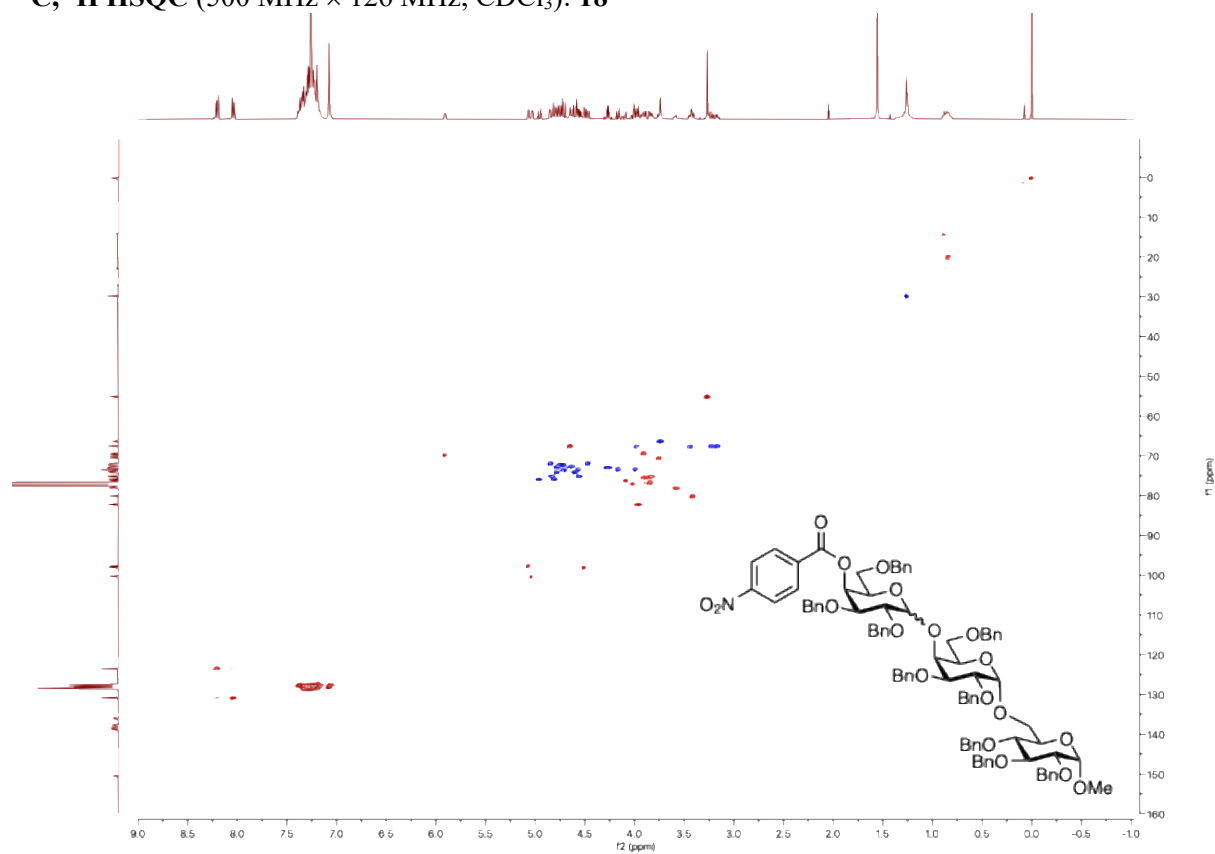
¹H NMR (500 MHz, CDCl₃): **18**



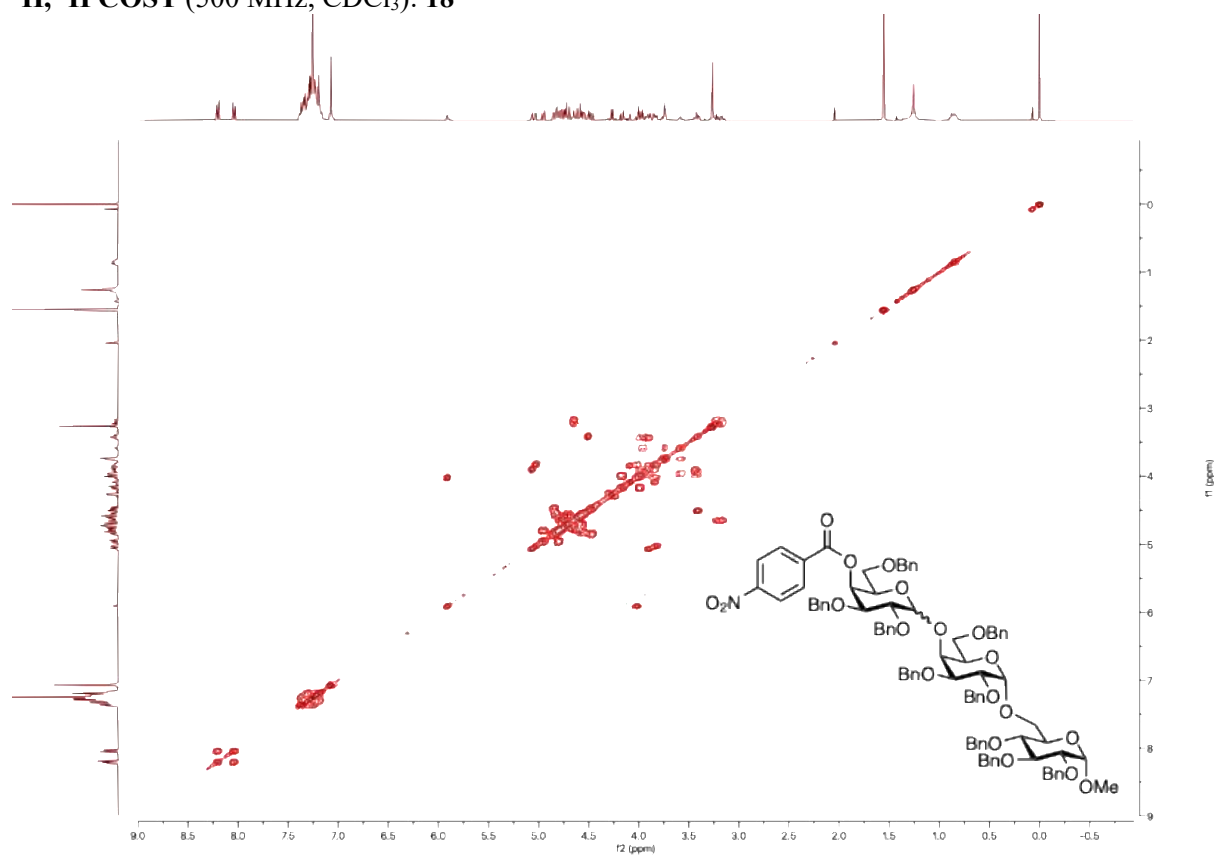
^{13}C NMR (126 MHz, CDCl_3): 18



^{13}C , ^1H HSQC (500 MHz $\times$ 126 MHz, CDCl_3): **18**



^1H , ^1H COSY (500 MHz, CDCl_3): **18**



^{13}C , ^1H HMBC (500 MHz $\times$ 126 MHz, CDCl_3): **18**

