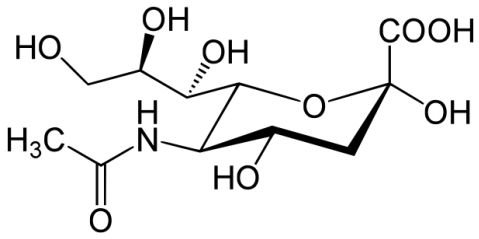
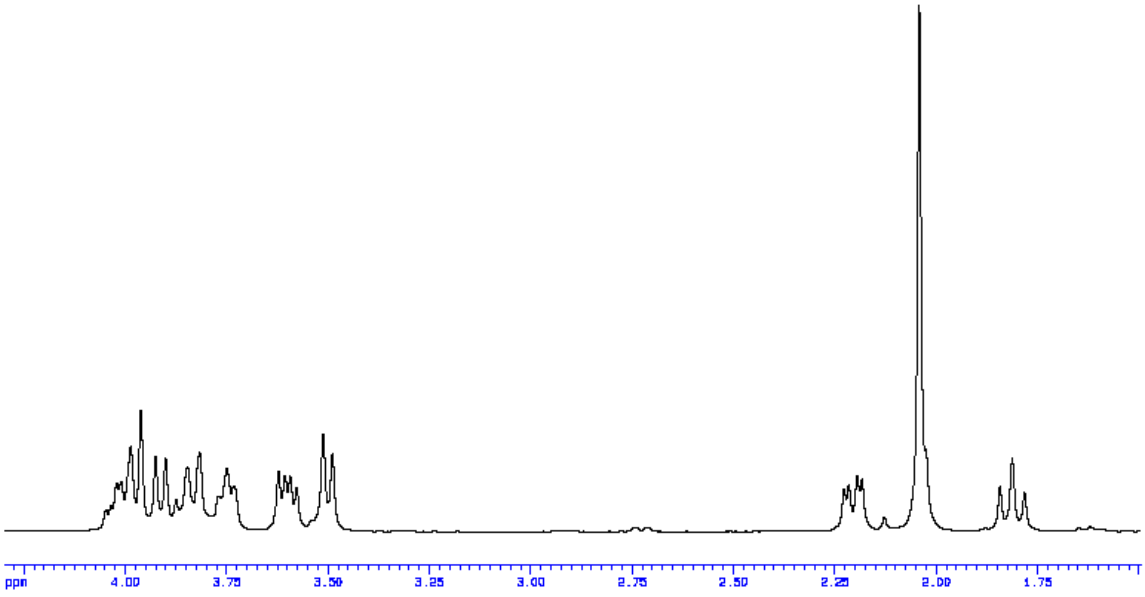
CHEM/BCMB 8190
HW/Discussion Questions

1. Assign as many protons as possible using these two spectra.

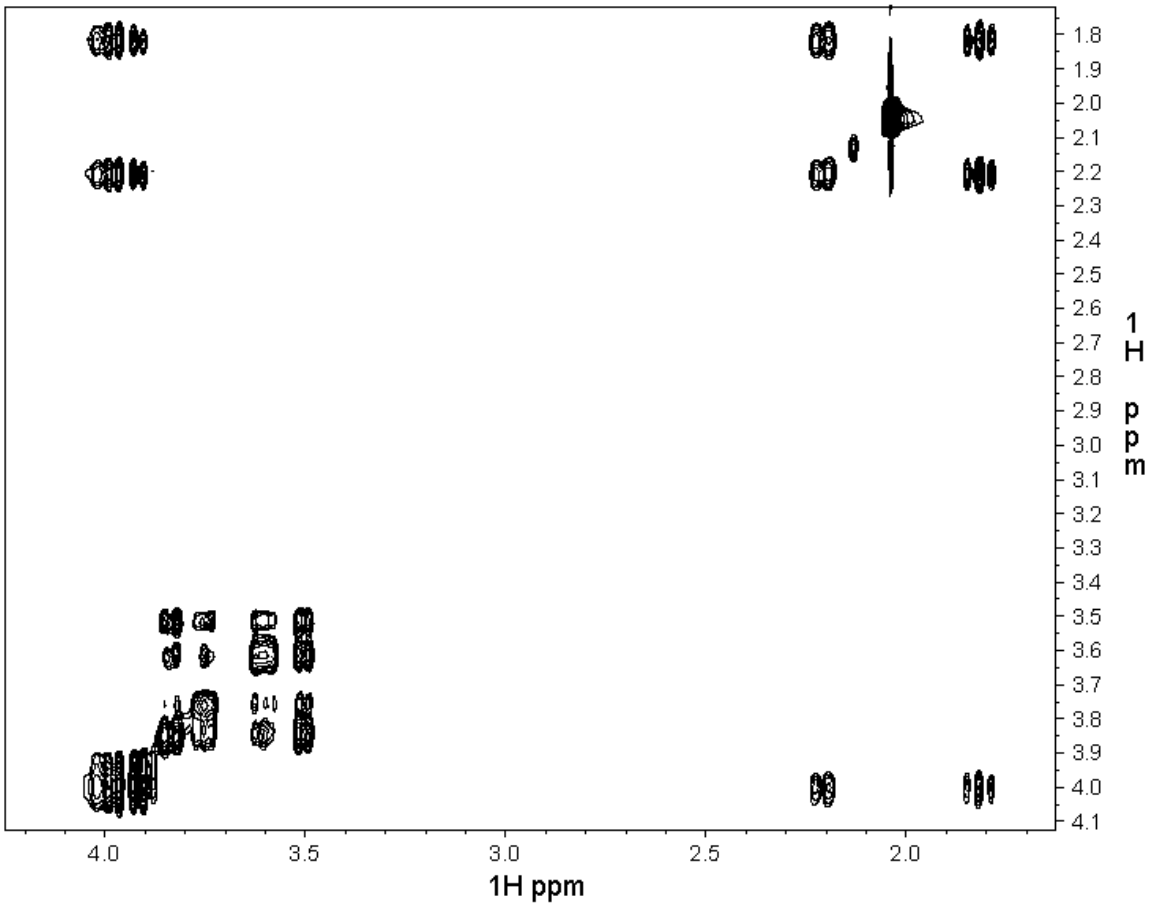
N-acetylneuraminic acid



1dH



2d 1H-1H TOCSY



2. Carbohydrate monosaccharides interconvert between alpha and beta in solution at RT. Based on the NMR spectrum of glucose, do you expect this exchange to be slow or fast on the NMR timescale? Based on your answer, could you develop an experiment to quantify this exchange using NMR? Also, the predominant hypothesis indicates that an aldehyde is the intermediate species. Could you think of both an NMR and a non-NMR method to determine if this species is formed in water?

3. I am expressing glycoproteins in HEK293 cells, using metabolic 13C-glucose labeling. However, I would really like to observe the N-acetyl protons of N-acetylglucoseamine. Is there and NMR or labeling strategy I could use to enrich or detect these signals specifically?

4. My favorite glycoprotein, CD16a/Fc gamma receptor IIIa, has five N-glycans. Though the protein is small (20 kDa), the N-glycans reduce tumbling of the molecule substantially. I believe one of these N-glycans, at N45, but not the others, interacts with the surface of the protein. Is there an NMR-based strategy I could use to detect this interaction? Due to the exchange regime NOEs are not helpful.