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# Synthesis of Benzophenone-O-Glycosides under Basic Conditions

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## Introduction to the Problem

Benzophenone Glycosides are a class of Molecules that can be found in some traditional medicinal plants. This compound is important because it has been shown to have inhibitory properties toward  $\alpha$ -Glucosidase, an enzyme that controls the breakdown of sugar in the intestine. Previous study have focused on isolating and creating new variations based on the one isolated from the plant with the goal of increasing the inhibitory properties.

## Introduction to Project

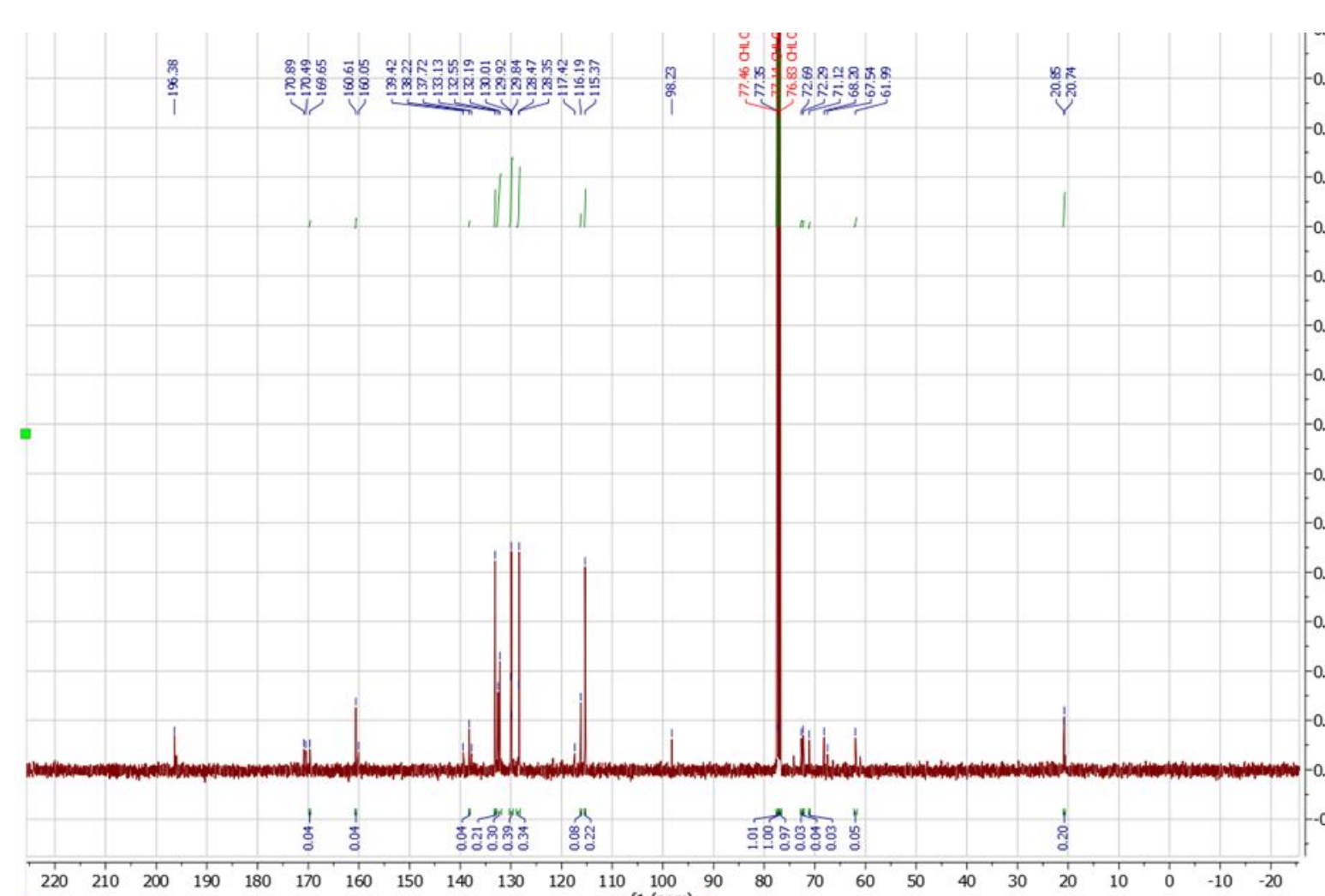
In order to synthesize a Benzophenone Glycoside derivative, first Glucose or Galactose undergo a reaction to protect the OH groups. The sugars can then be reacted with HBr to create a good electrophile for further reaction.

Glycosidation between the Benzophenone and the Sugar is accomplished under basic conditions, turning Benzophenone into a nucleophile capable of replacing the Bromide on the Sugar.

## Negative Results

$K_2CO_3$  did not create a basic enough solution to allow the glycosidation to occur between the sugar and benzophenone.

This resulted in the recovery in no recovery of product from the column chromatography purification or the product that was recovered showing not to have been successfully coupled via NMR. The NMR to the left was supposed to be coupled together but is missing the the peaks in the 120-100 ppm region in the  $C^{13}$  NMR that indicates the successful glycosidation.



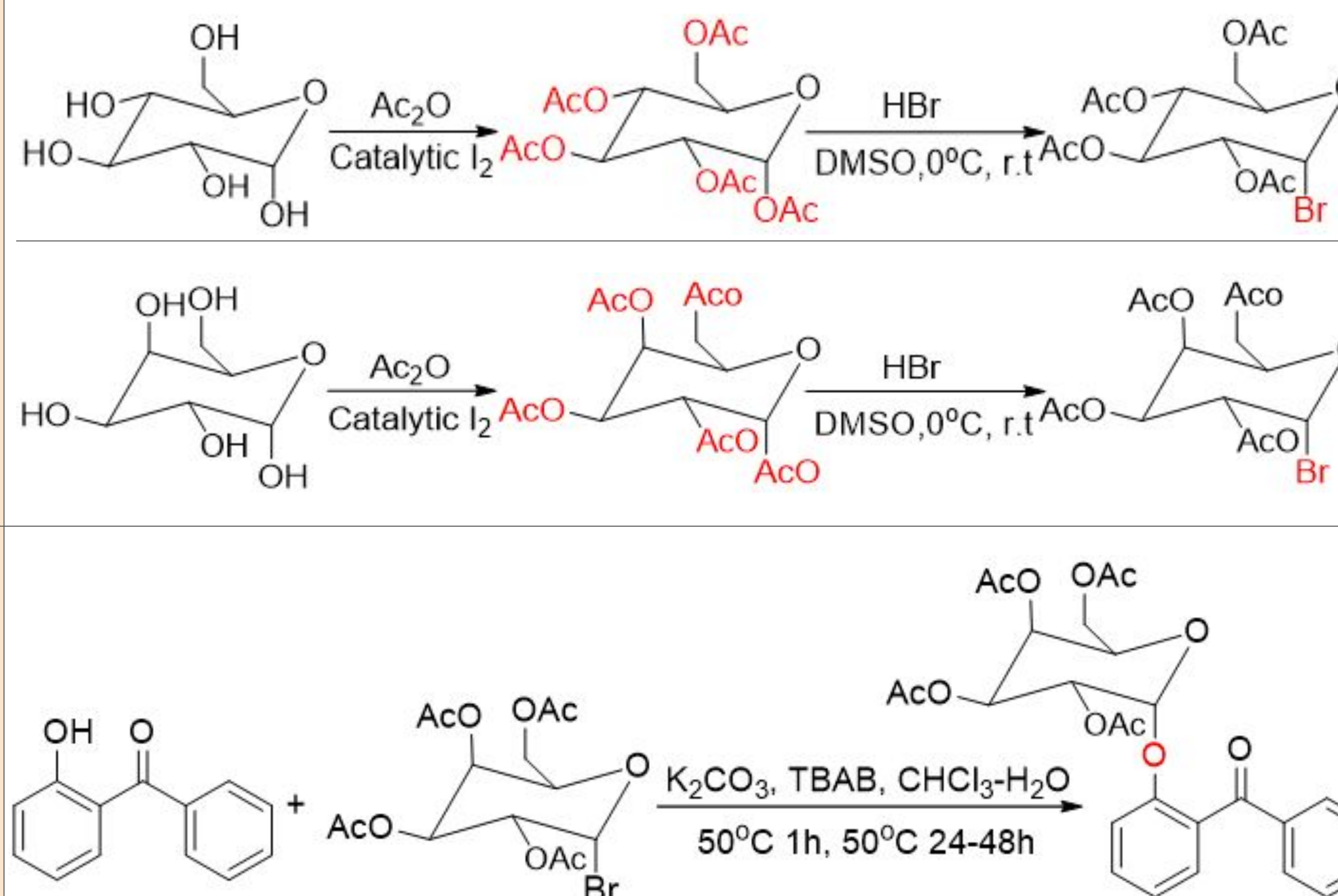
## References

- (1) Liu, Q; Guo, T; Li, W; Li, D; F, Z; Synthesis and Evaluation of Benzophenone O-glycosides as  $\alpha$ -Glucosidase Inhibitors, Arch. Pharm. Chem. Life Sci. 2012, 345, 771-783
- (2) Mukhopadhyay; B, Kartha; K. P. R., Russell; D. A, Field; R. A, Streamlined Synthesis of Per- O -Acetylated Sugars, Glycosyl Iodides, or Thioglycosides from Unprotected Reducing Sugars. J. Org. Chem. 2004, 69 (22), 7758-7760.

## Acknowledgements

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## Reaction Schemes



## Glycosidation Results

Trial	Benzophenone	Sugar	yield	Results
1			0%	Unsuccessful via TLC
2			0%	Unsuccessful via TLC
3			0%	Unsuccessful via NMR
4			17%	Successful via TLC and NMR

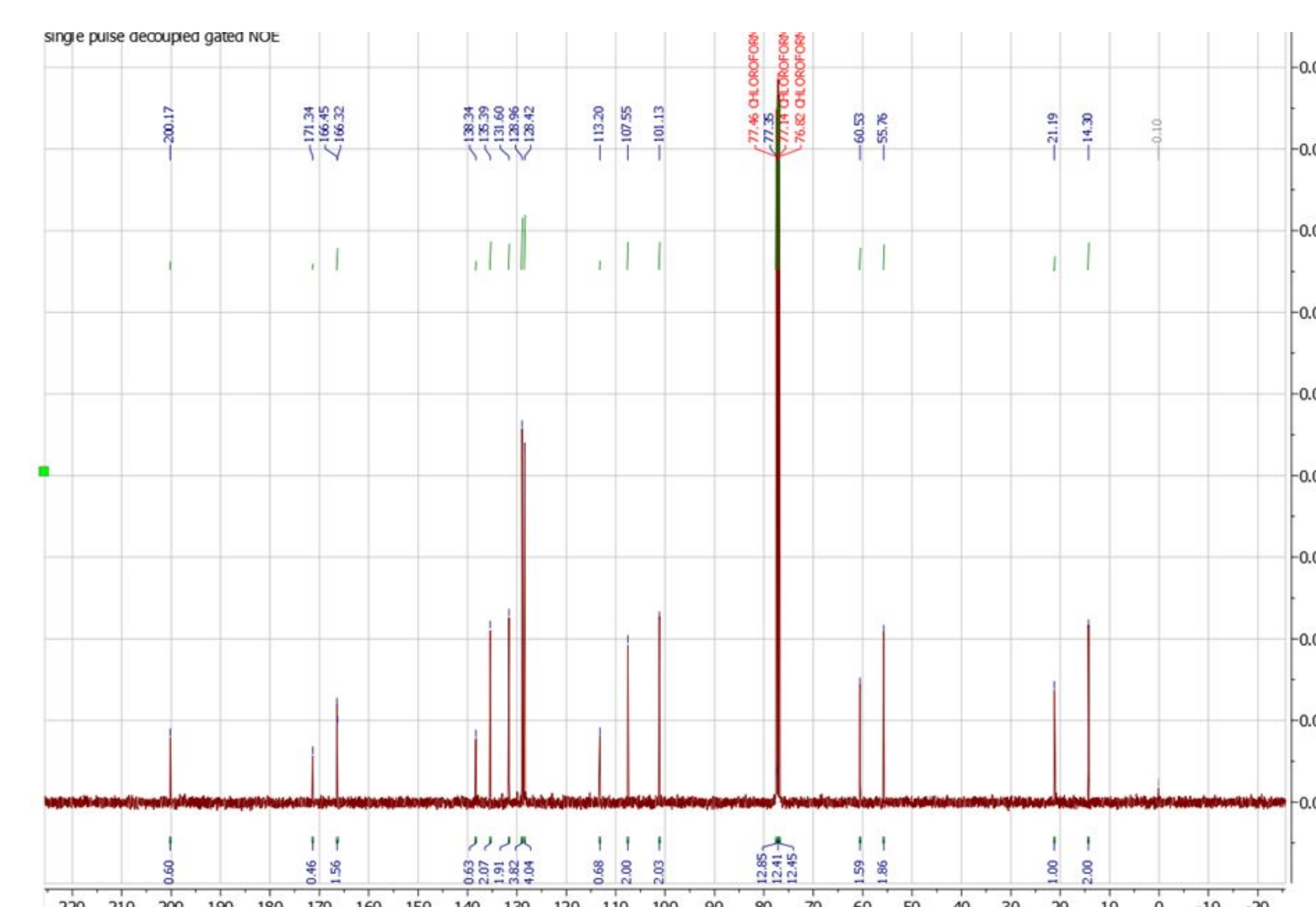
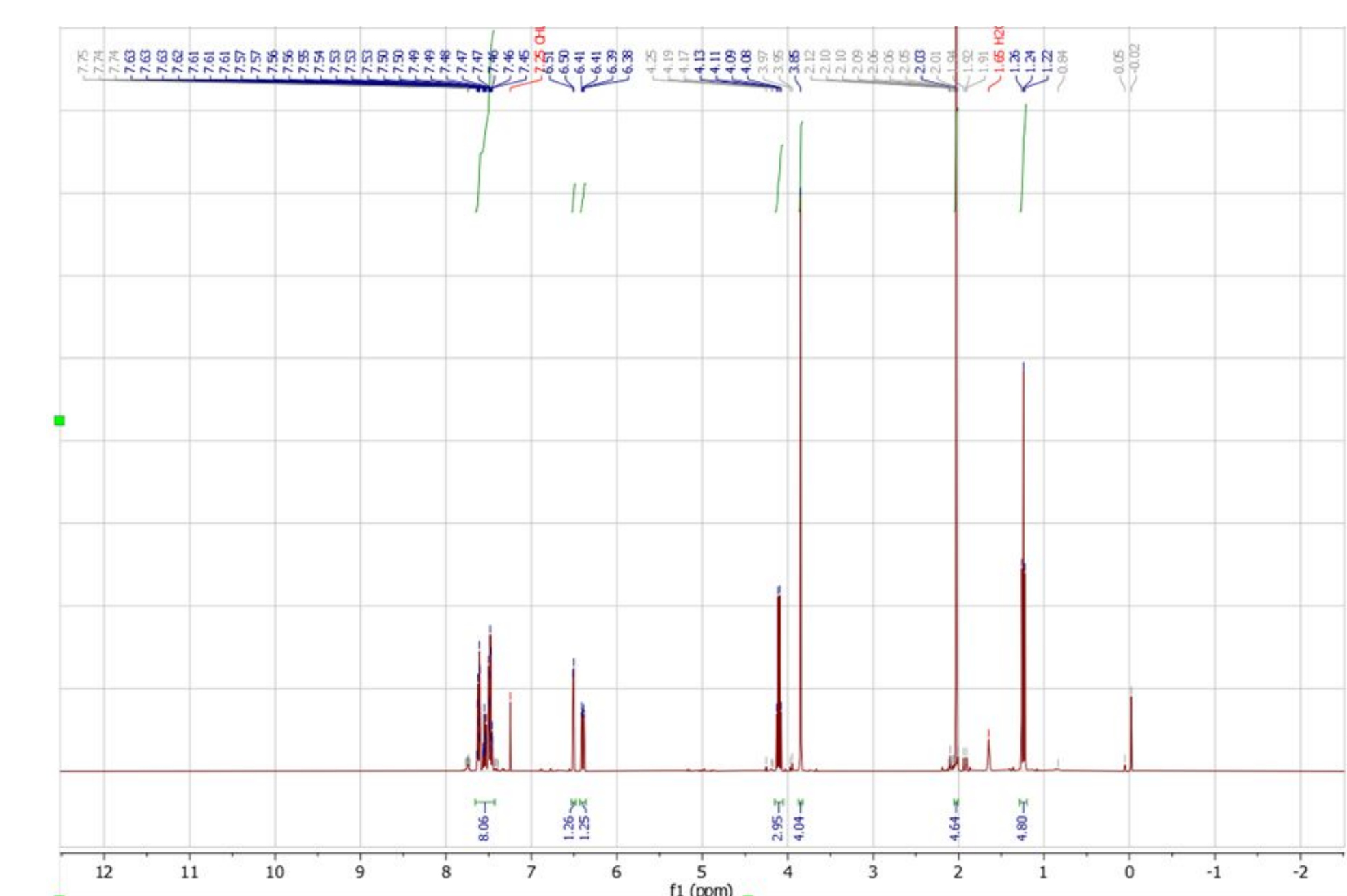
## Future Work

- The next steps of this project is to go back and try and successfully react glucose with the benzophenone. Moving forward the glycosidation should be attempted with other monosaccharides as well as tweaking the reaction mechanism in order to increase the yield from the reaction.

## Data

The reactions to the left was monitored via TLC, with TLC also used to determine the collected fractions after purification by Column Chromatography. NMR was used to determine if recovered product was successfully coupled. TLC was ran in 3:7 ethyl acetate in hexanes  
Lane 1 = Product, 2 = both, 3 = Starting Material

The NMR data for the reaction with 2-hydroxy-4-methoxybenzophenone and Galactose is shown below



## Conclusions

- Thus far, the reaction has not been successful for Glucose and low yield for Galactose. This was determined using NMR specifically looking for 3 peaks between 100-120 ppm.
- $K_2CO_3$  appears to not provide a basic enough environment for the successful coupling of Benzophenone and the desired saccharide. It was concluded that KOH does allow the reaction to proceed