# Synthesis of Novel PMMA Monomers with Carbohydrate Functionality

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## Introduction

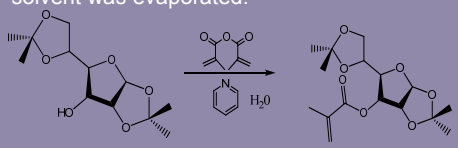
Polymethylmethacrylate (PMMA) is a mostly biologically inert material that has many application as a biomaterial . The ability to functionalize PMMA with carbohydrates easily and at a low cost is of great interest because of their possible commercial applications. It has been shown previously that synthesis of PMMA monomers with carbohydrate functionalities is possible, but most procedures are costly and time consuming. Here is shown a facile and inexpensive procedure for the synthesis of two PMMA monomers with carbohydrate functionalities.

Potential uses for carbohydrate containing polymers:
-Drug delivery system
-Contact lens material
-Bio-implants
-Tissue engineering
-Dental technologies

## Monomer Synthesis

### Reactive monomer of 1,2:5,6-di-O-isopropylidene-α-D-glucofuranose

1,2:5,6-di-O-isopropylidene-α-D-glucofuranose was dissolved in pyridine and mixed with 4-methoxyphenol (inhibitor to prevent polymerization). After 30 minutes of stirring under atmospheric conditions methacrylic anhydride was added. Reaction was run for 3 hours, quenched with water, and left to stir for an additional 24-48 hours. Mixture was then extracted with pet ether, solvent was evaporated and the product re-dissolved in chloroform and an acid/base extraction performed. The final product was obtained in low yield (about 14%) with several impurities including pyridine after solvent was evaporated.



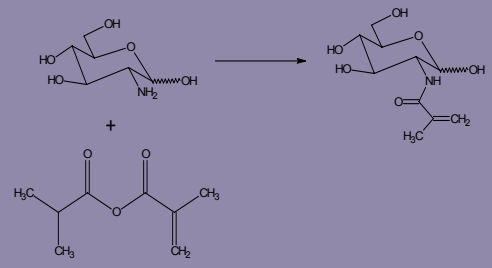
Reactive monomer of 1,2:5,6-di-O-isopropylidene-α-D-glucofuranose

Ion exchange resins for reactive monomer of 2-amino-2-deoxyglucose synthesis

Set up for reactive monomer of **1,2:5,6-di-O-isopropylidene-α-D-glucofuranose synthesis**

### Reactive monomer of 2-amino-2-deoxyglucose

Quaternary ammonium anion exchange resin was washed with water and concentrated $NaCO_3$. The resin was added to 2-amino-2-deoxy glucose and methacrylic anhydride in water and stirred for 24 hours. The mixture was filtered, then run through anion exchange resin and subsequently run through a cation exchange column. The product was lyophilized which gave a yellow powdery solid, in good yield (about 50%)



Reactive monomer of 2-amino-2-deoxyglucose

## Future work

The reactivity ratios, and how these monomers become polymers, whether block (AAABBBAAA), alternating (ABABAB) or random (ABBAABA) is of interest because it will have a large impact on the physical properties and uses for these compound. Future investigation in this area will work to characterize these polymers.

Additionally, less expensive and easier ways to synthesize the monomers are currently being investigated.

## Literature

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