



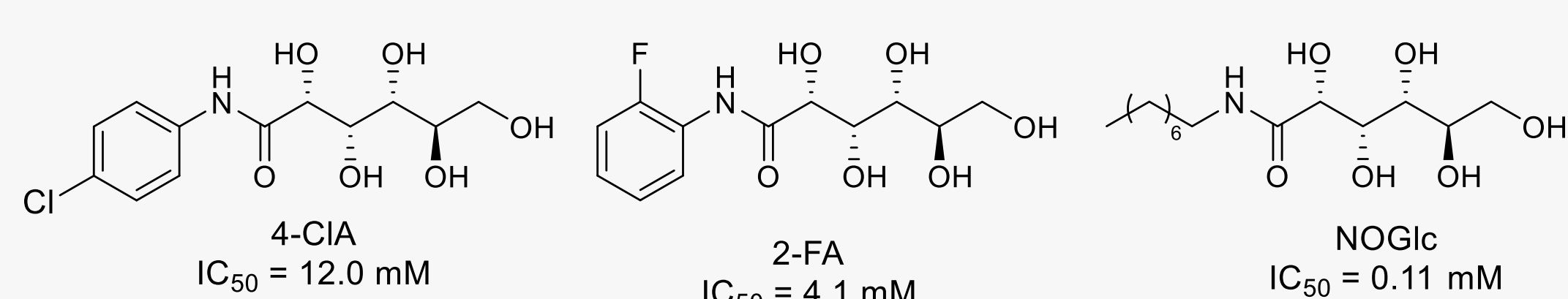
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# Novel Sulfated Alditol Derivatives as Ice Recrystallization Inhibitors

**Murray Legnain, Thomas Charlton and Dr. Robert Ben\***  
University Of Ottawa, Department Of Chemistry and Biomolecular Science

## Introduction

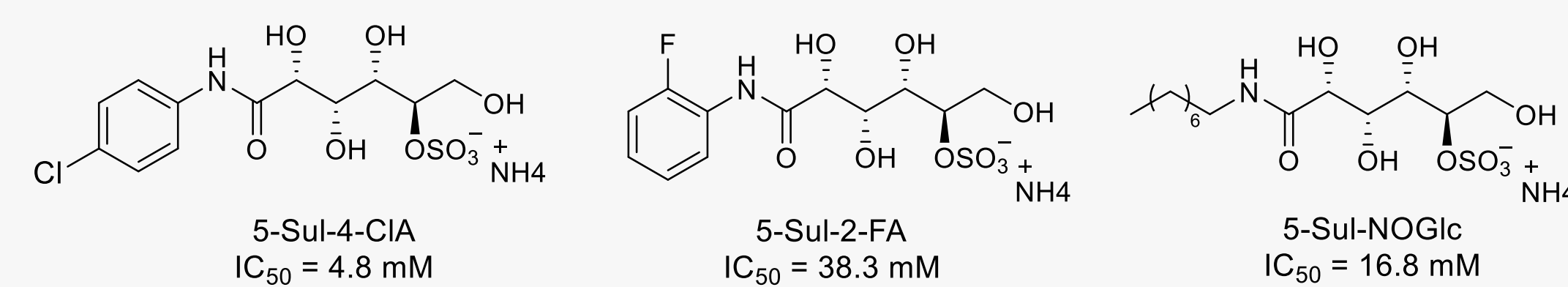
- Ice recrystallization (IR) is the formation of large ice crystals from smaller one which causes damage to the cells due to rupturing or shearing during the freezing and thawing of solutions<sup>1</sup>
- Cryoprotectants exhibiting Ice Recrystallization inhibition (IRI) can help during the freezing or thawing by preventing this, which reduces cryoinjury and enhances post-thaw cell viability<sup>1</sup>
- This is of great importance because recent cell-based therapeutics have emerged as a critical aspect of modern healthcare in regenerative medicine
- Previously Synthesized aldonamides from our lab have shown to be potent inhibitors of ice recrystallization but are very insoluble in aqueous media<sup>2</sup>



- This study aims at synthesizing sulfated alditol derivatives and assessing them for their solubility and IRI activity

## Sulfated Alditols

- Previously synthesized sulfated alditol derivatives have been shown to have similar activity and increasing solubility to non-sulfated alditol derivatives

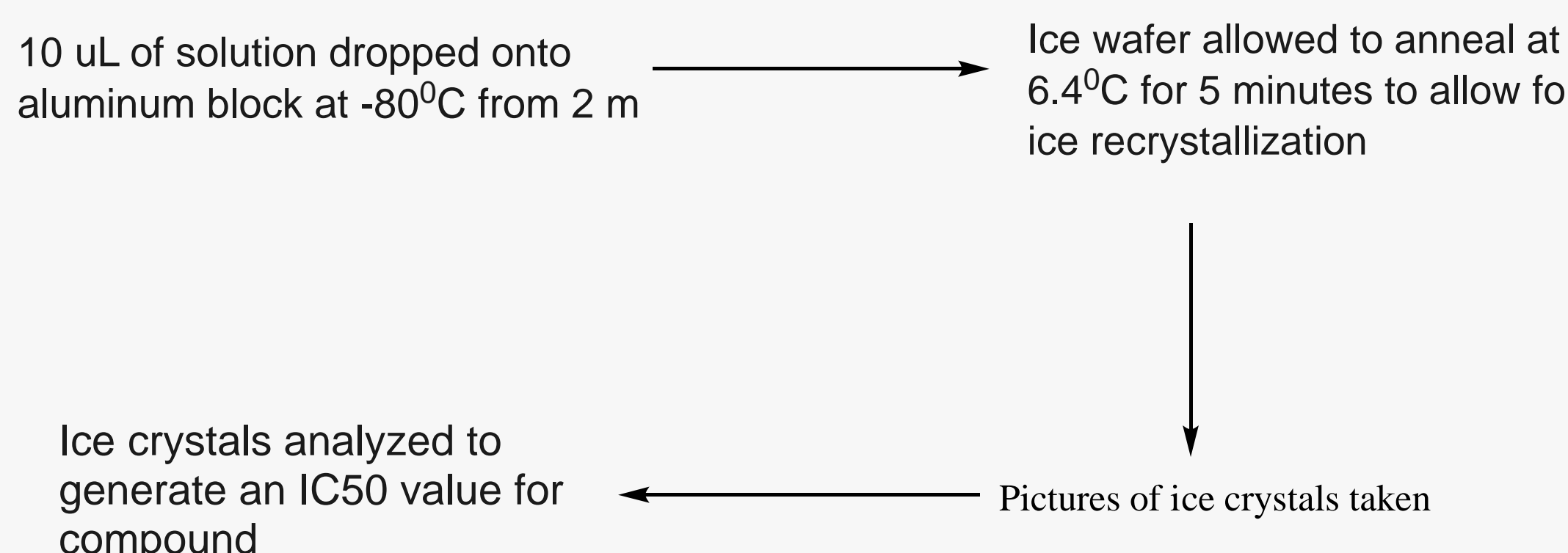


Compound	Solubility (mM)	Compound	Solubility (mM)
4-ClIA	20	5-Sul-4-ClIA	>100
2-FA	10	5-Sul-2-FA	>100
NoGlc	0.5	5-Sul-NoGlc	>100

Table 1.0: Solubility data or previously synthesized alditol derivatives.

- Some sulfated alditols show increased IRI activity

## Methods



## Methods (Cont.)

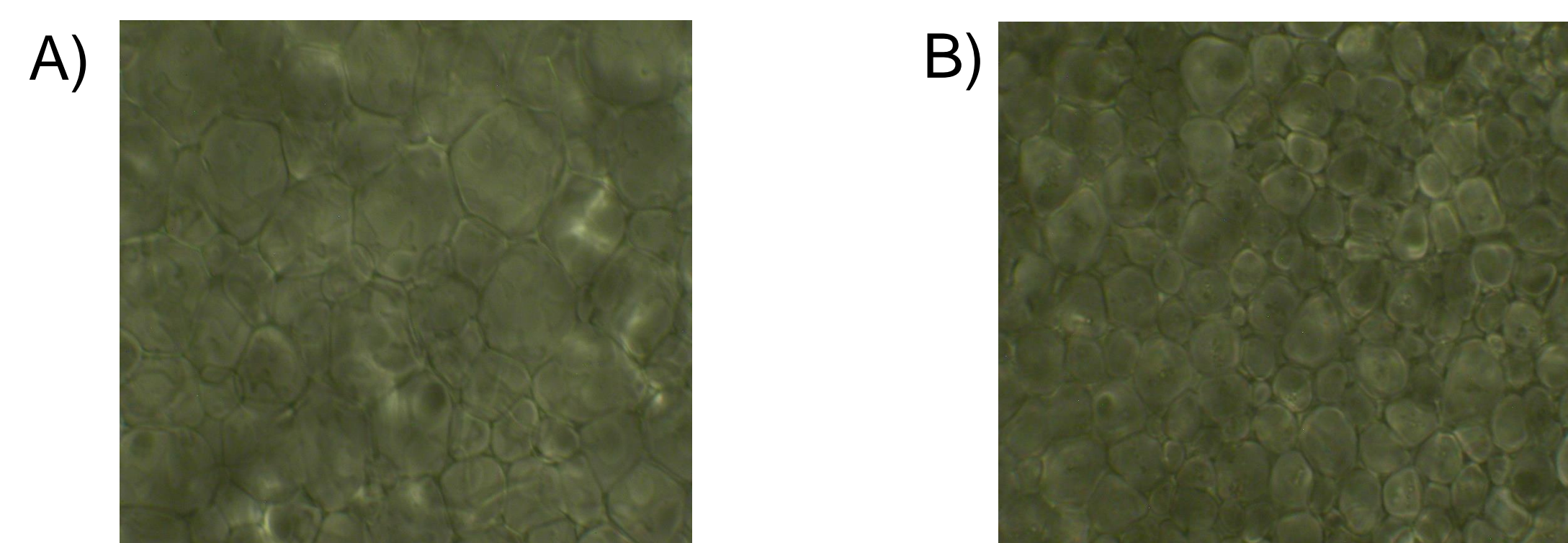
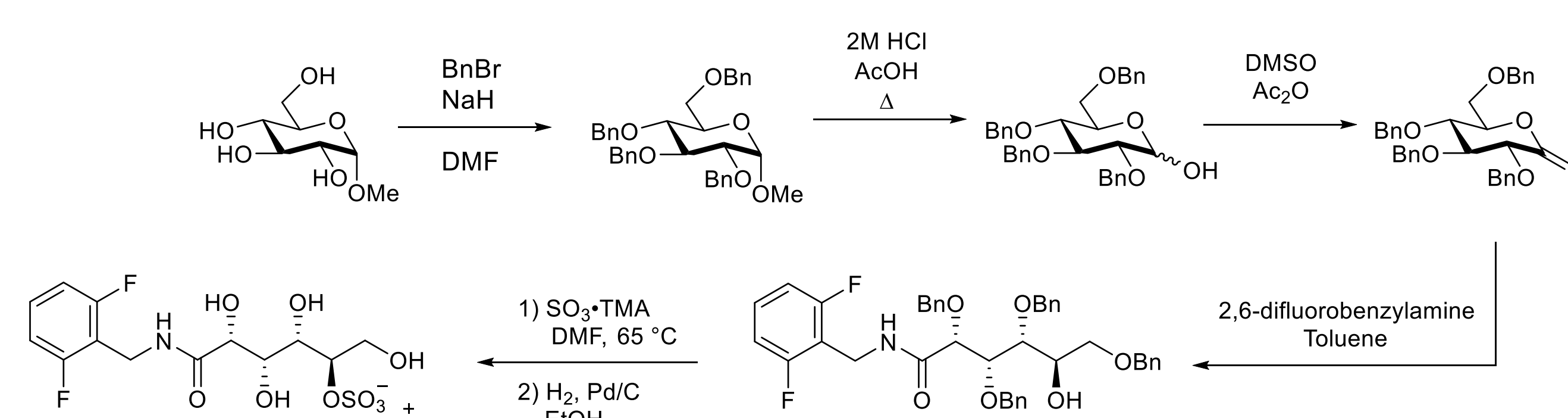


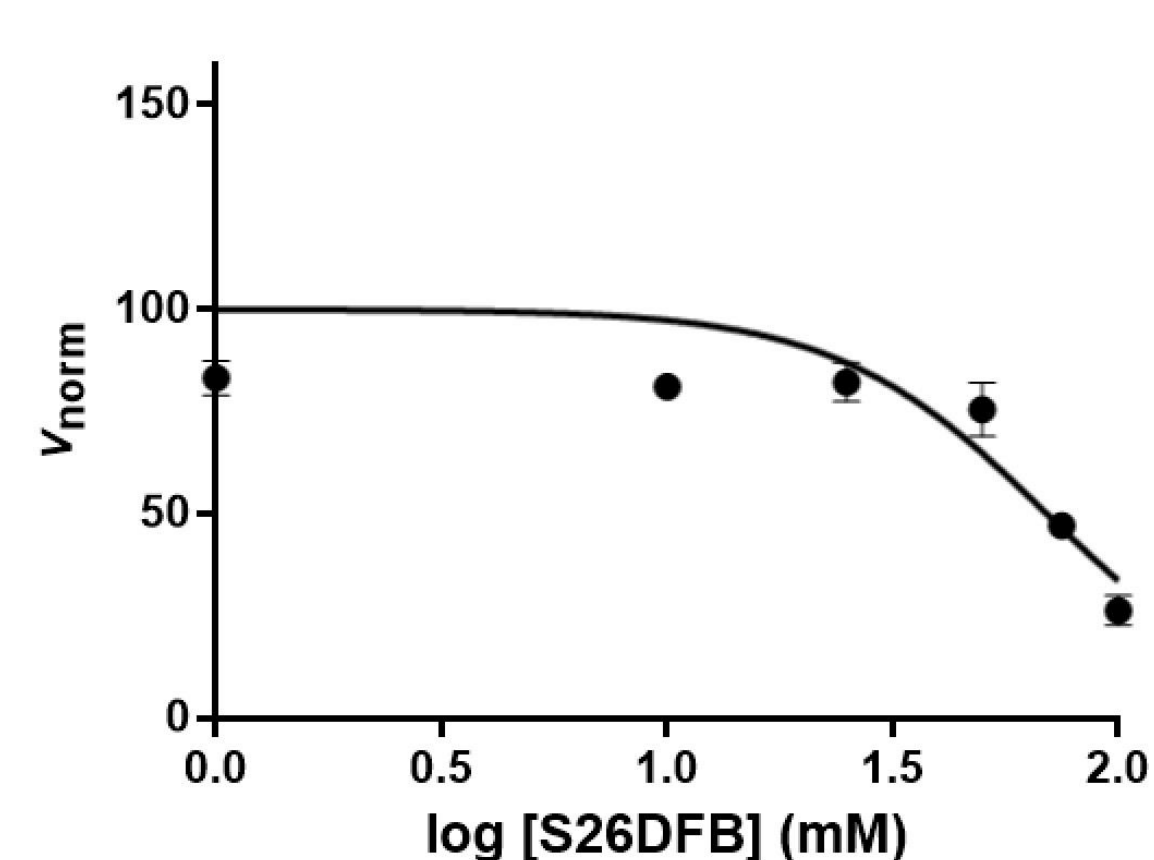
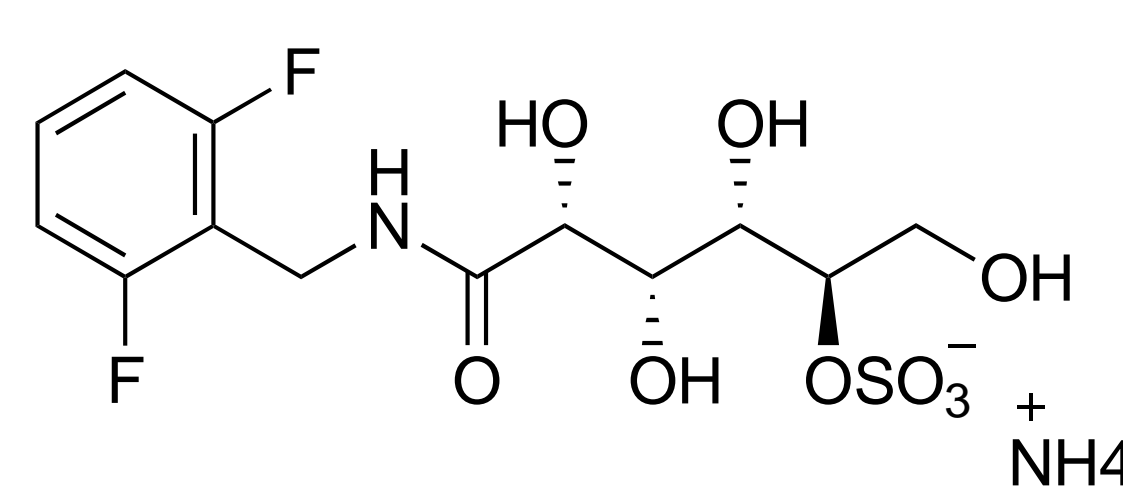
Figure 1.0: Splat-cooling assay: A) Positive Control for ice recrystallization (PBS) B) with S26DFB (100 mM).

## Synthesis of S26DFB



## Results

### A) S26DFB



### B) 26DFB

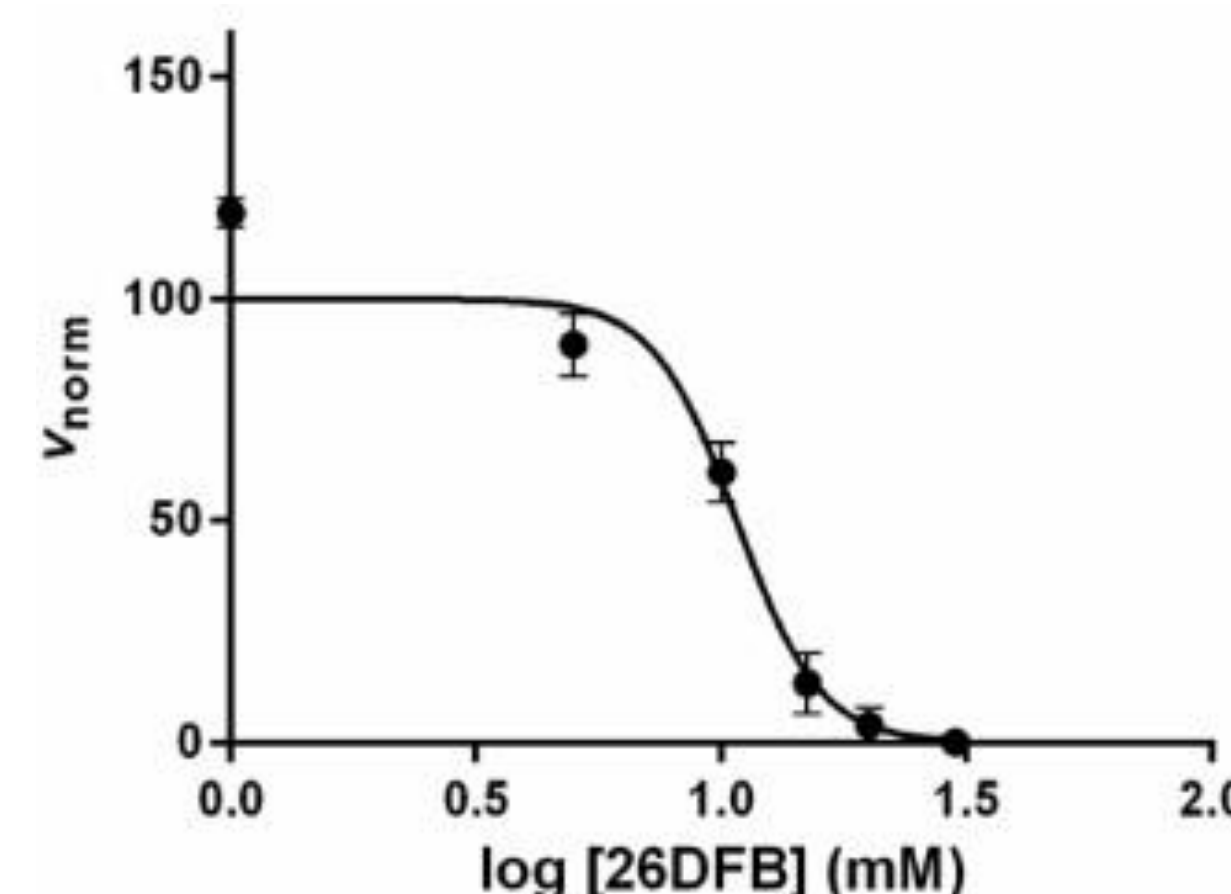
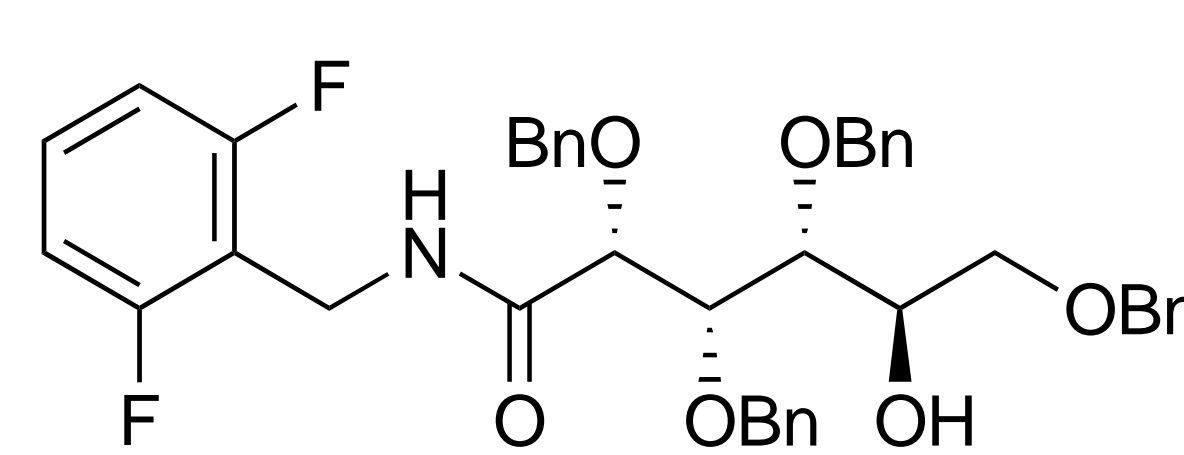


Figure 2.0: Dose response curve for A) S26DFB B) 26DFB.

Compound	IC <sub>50</sub>	Solubility
S26DFB	69.5 mM	>100 mM
26DFB	10.8 mM	55 mM

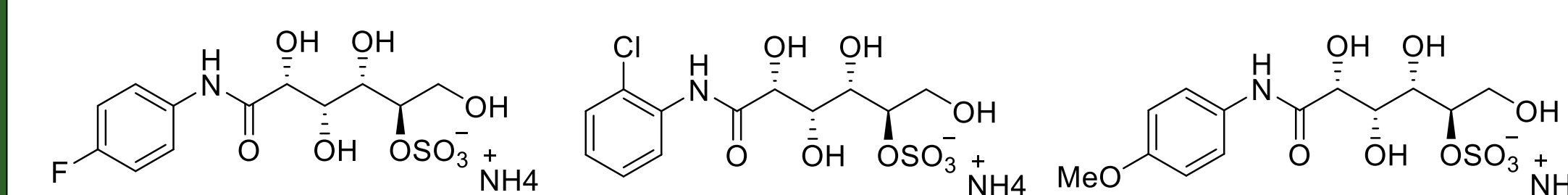
Table 2.0:  $IC_{50}$  and solubility data.

## Conclusions

- S26DFB displayed an  $IC_{50}$  value of 69.5 mM, meaning it is not a good inhibitor of IR
- The non-sulfated 26DFB has an  $IC_{50}$  value of 10.8 mM which is drastically lower than the sulfated derivative
- S26DFB did show a drastic increase in solubility relative to its non-sulfated parent compound, which follows the solubility trend of the other sulfated derivatives
- More derivatives should be synthesized and assessed for their IRI activity

## Future Work

- Higher concentrations of solutions would need to be tested to generate a more accurate  $IC_{50}$  Value
- Testing of sulfated derivatives of other alditols which show IRI activity in hopes of increased IRI activity



## References

- Ben, R. "Ice recrystallization inhibitors as cryoprotectants." N.p., 27 Mar. 2012. Web. 09 Mar. 2017.
- Capicciotti, C.J.; Ben, R.N. *et al.* Chem. Sci., **2012**, 3, 1408.
- Briard, J. G.; *et al.* Nature Sci. Reports. **2016**, 6, 23619.

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