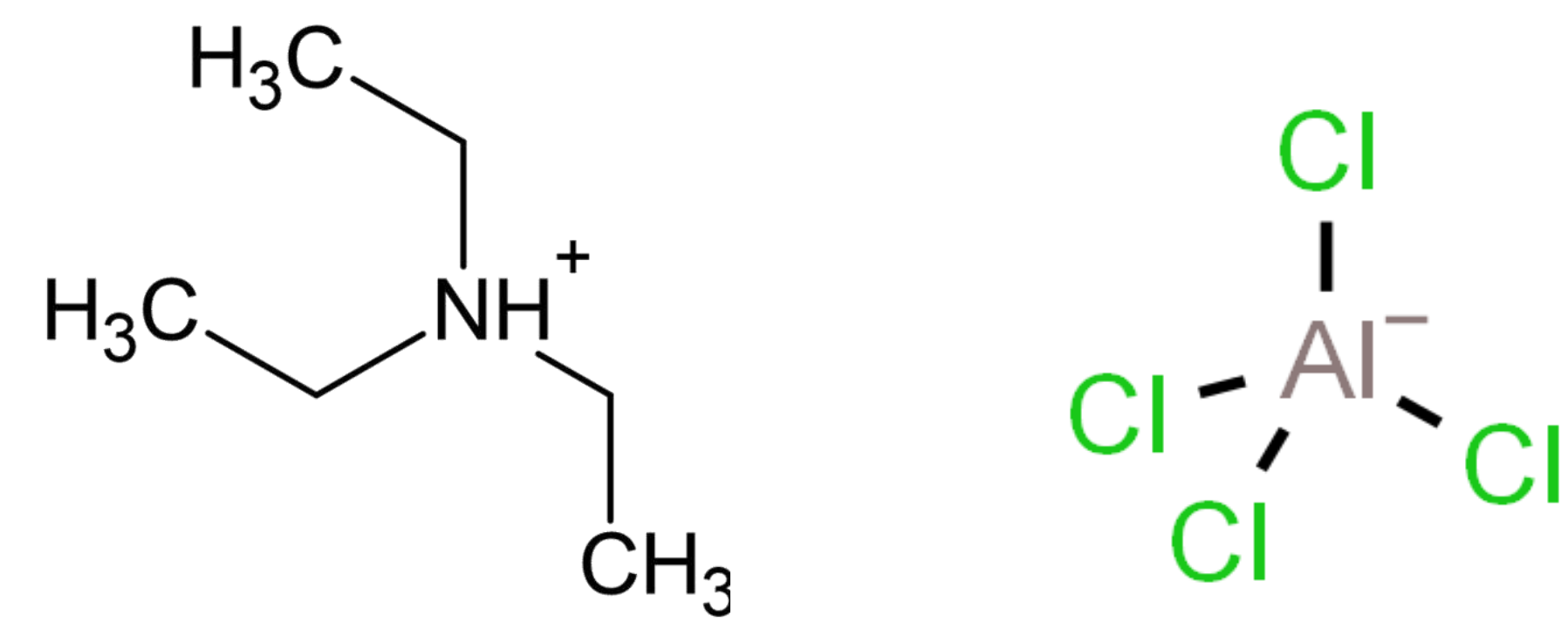


Ionic Liquid Catalyst

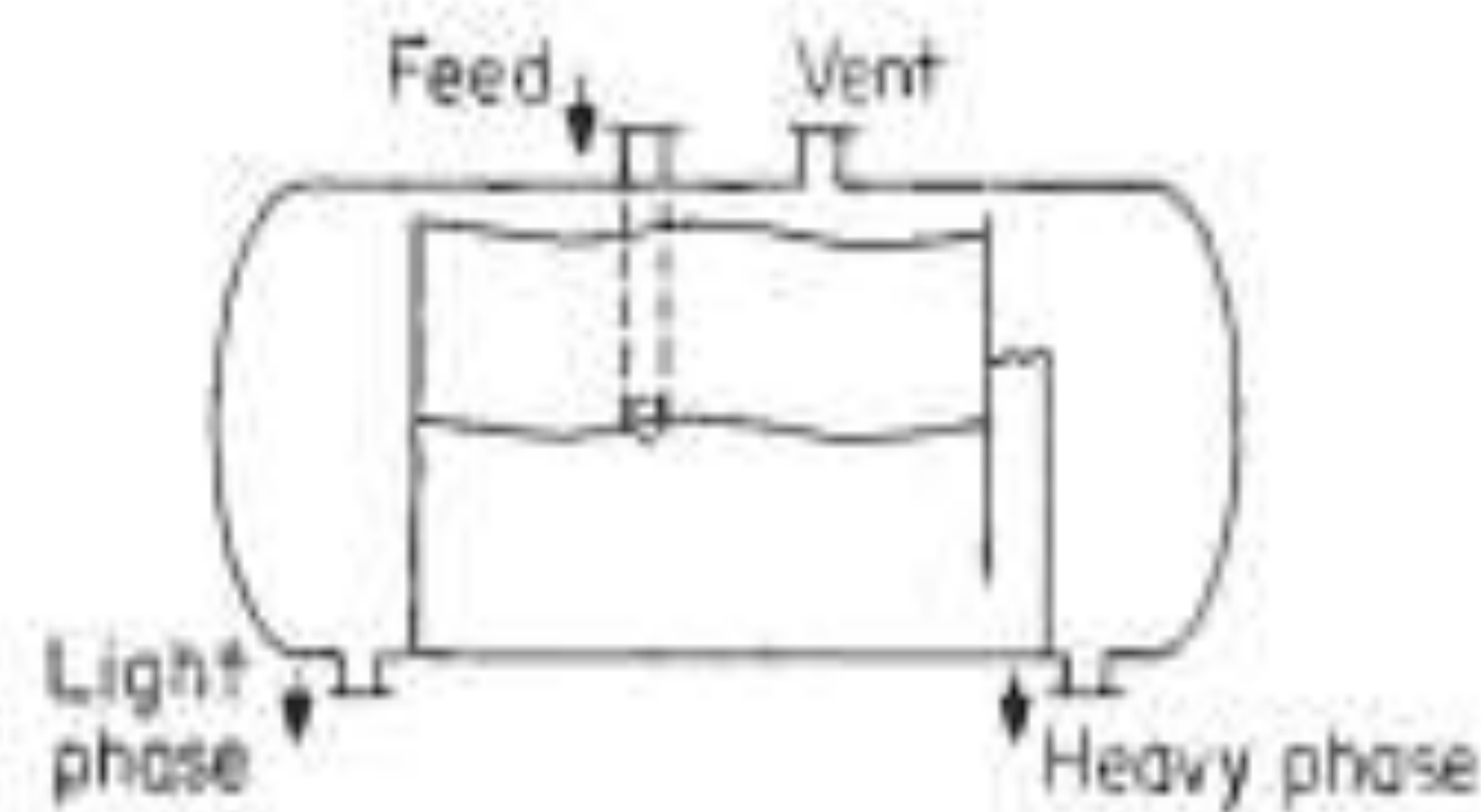


- Combination of $AlCl_3$ and Trimethylamine HCl (TMHC) forms an ionic compound which is in a liquid form at room temperature
- This ionic liquid will serve as the catalyst in our reaction

Benefits of Ionic Liquid Catalyst

- Much higher rate of conversion in the reaction
 - Lab testing suggests as high as 99% conversion vs. on 57% for $AlCl_3$ used on its own
- Easier separation process
 - Ionic Liquid is immiscible with reactants and products, so the product and ionic liquid catalyst stream can be simply separated via decantation of the two liquid phases (see below)

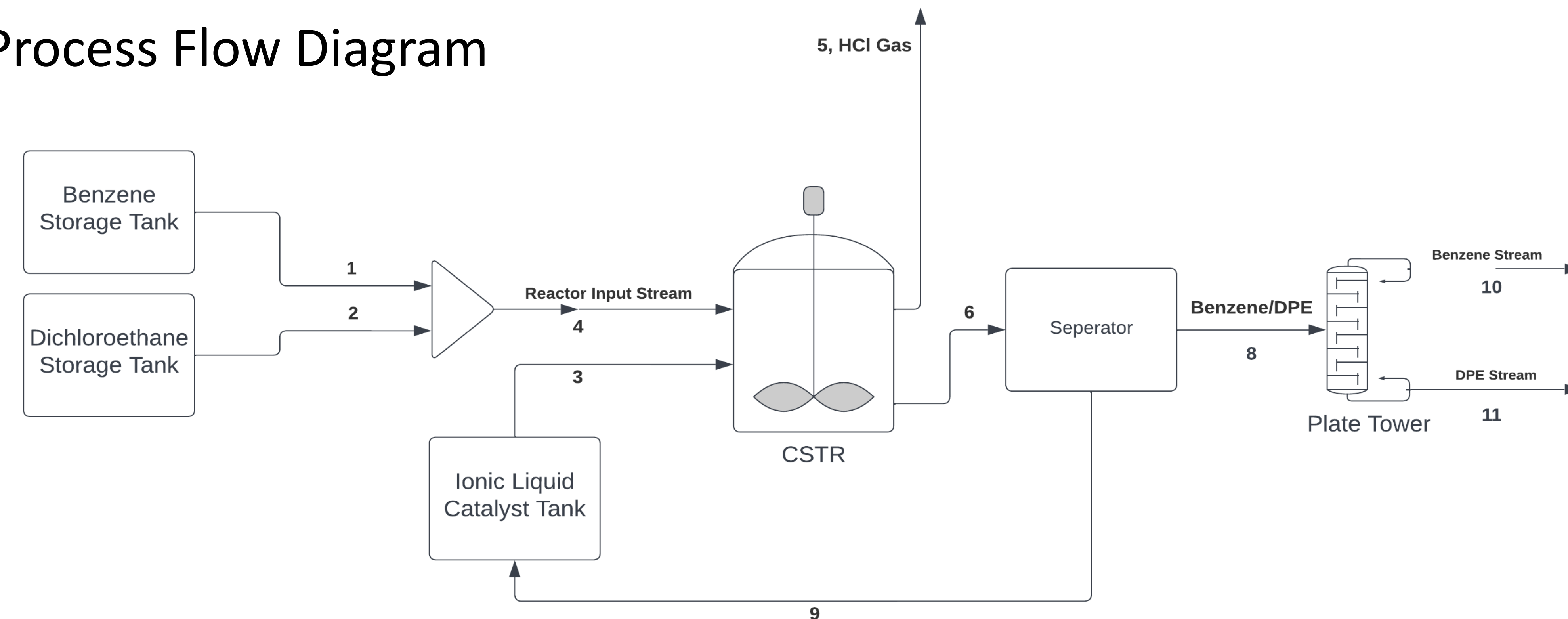
Gravity Decanter



DIPHENYLETHANE PRODUCTION UTILIZING AN IONIC LIQUID CATALYTIC PROCESS

Shawntae Harris, Jake Van Horn, Abdulrahman Almasabi, Rashed Almansoori
 Acknowledgements: Kevin Caple, Ratih Lusianti, Nick AuYeung, Patrick Geohegan

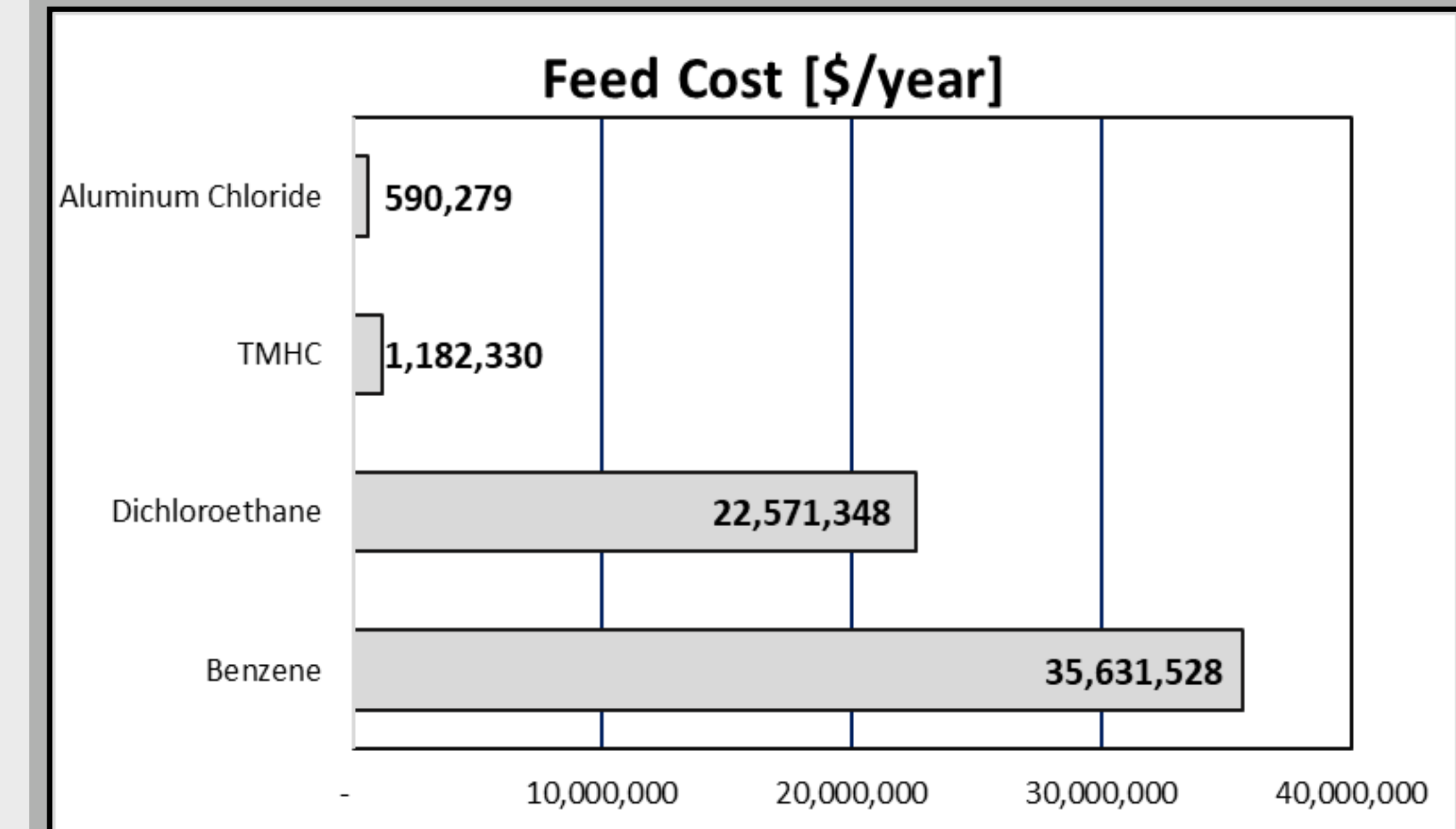
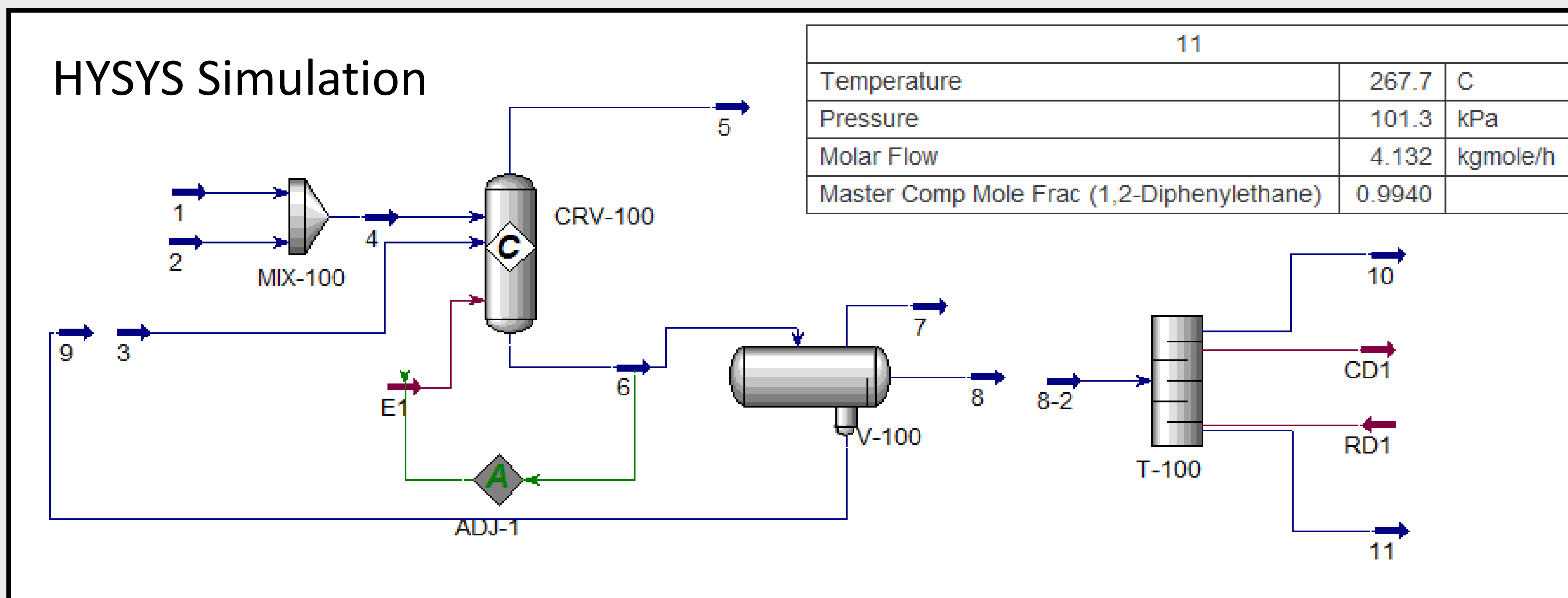
Process Flow Diagram



Process Explanation

The use of our ionic liquid catalyst allows for a minimal process design. Benzene and Dichloroethane are passed into the CSTR along with the fully recycled ionic liquid. The outlet liquid stream is passed to a separator/decanter which is properly sized to allow the ionic liquid and product to separate fully. The heavier ionic liquid is passed directly back into the CSTR. The most crucial element of our process is that the ionic liquid is fully recovered so that it does not need to be replenished. The feeds are then passed to a single distillation tower to achieve the required 99.4% purity DPE stream. The system was further confirmed using a HYSYS simulation. Self calculations were required for the ionic liquid as it was impossible to properly model in HYSYS, but the reaction and distillation were modeled as shown.

HYSYS Simulation



Unit Operation Sizing

- Our unit operations are small
 - This is due to the conversion rate of our reaction. Having a higher conversion means lower flow rates and thus smaller equipment
 - Because our operations are so small, we do not have to spend as much money to purchase them.

Major Equipment Capital Cost [\$]

