

617e: Ammonia Absorbents for Fast Cycling



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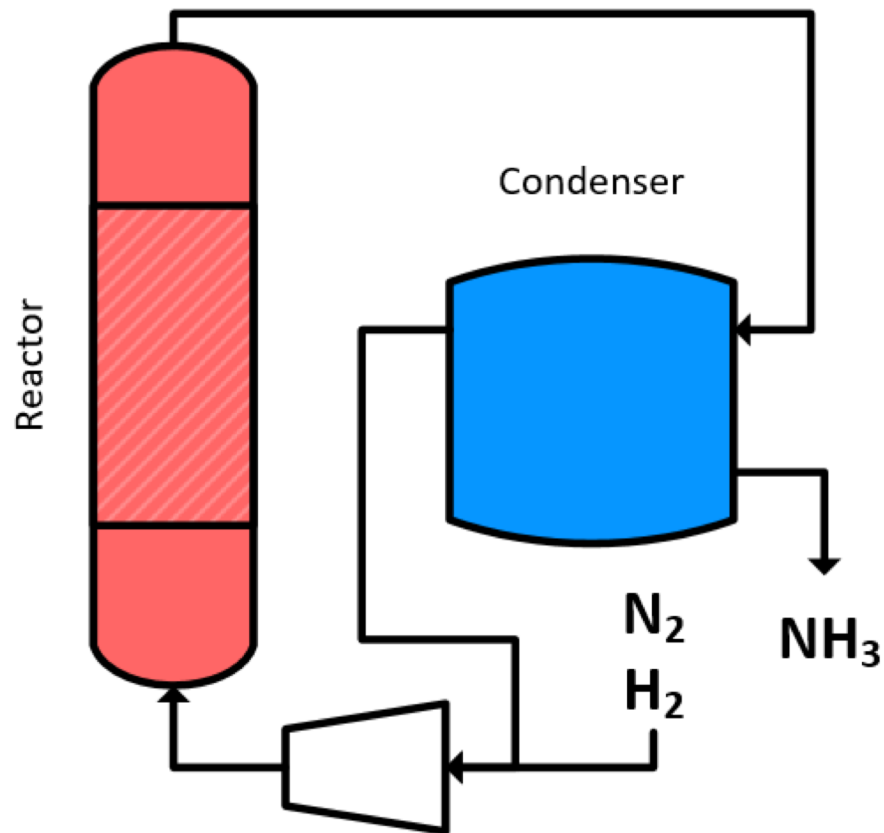
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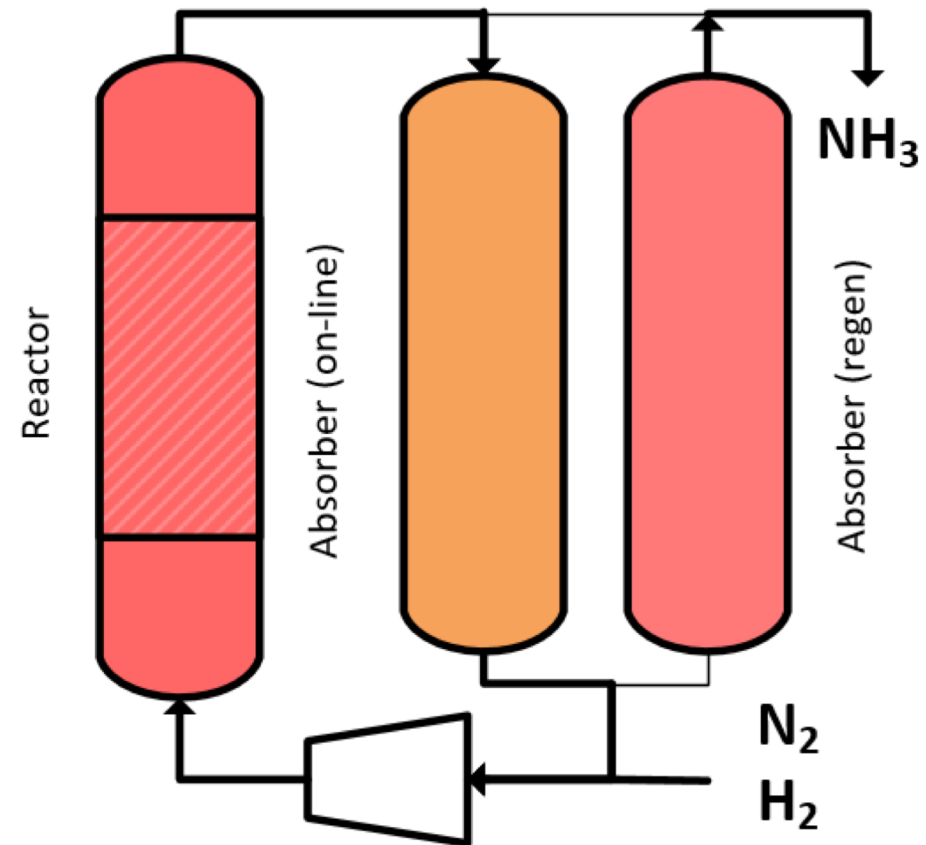
Minnesota Corn Growers Association

Two Sustainable NH_3 Processes

(a) Condensation



(b) Absorption

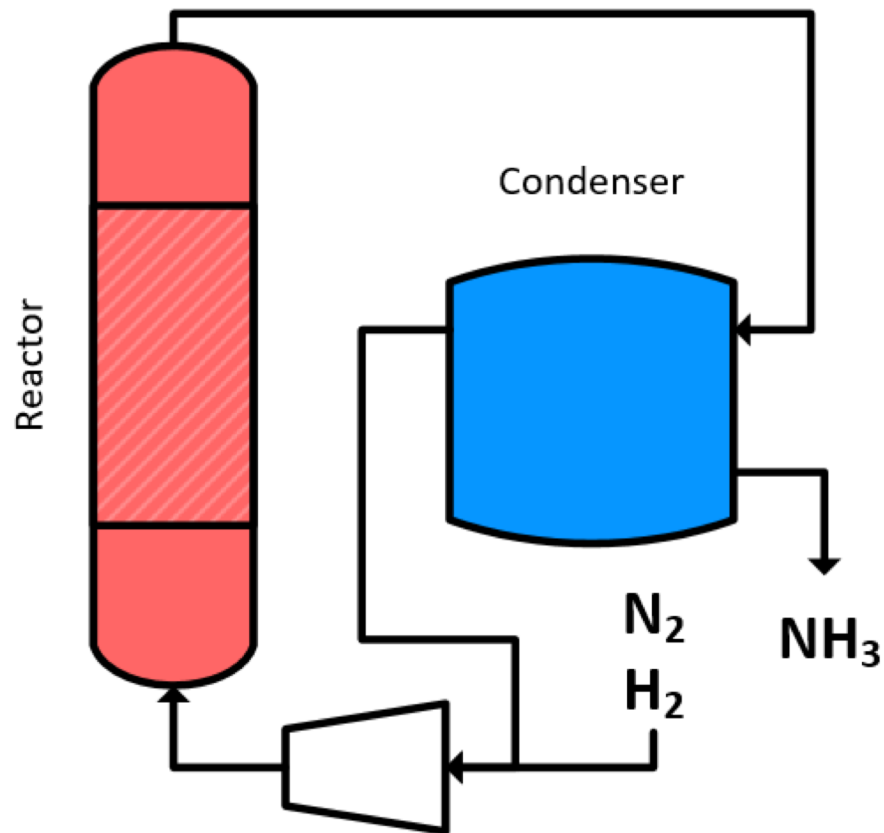


Sustainable NH₃ Costs 2X Conventional

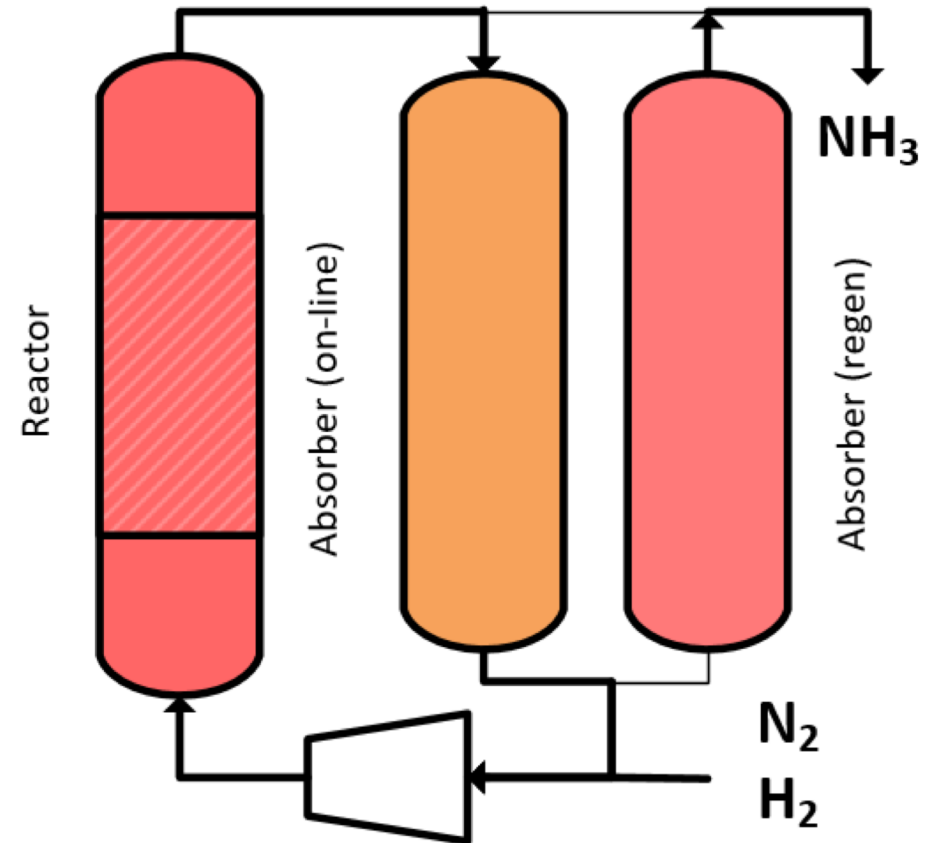


Two Sustainable NH_3 Processes

(a) Condensation



(b) Absorption



Replace Condenser with Absorbent

100g $MgCl_2$ can hold 74 l_{STP} NH_3

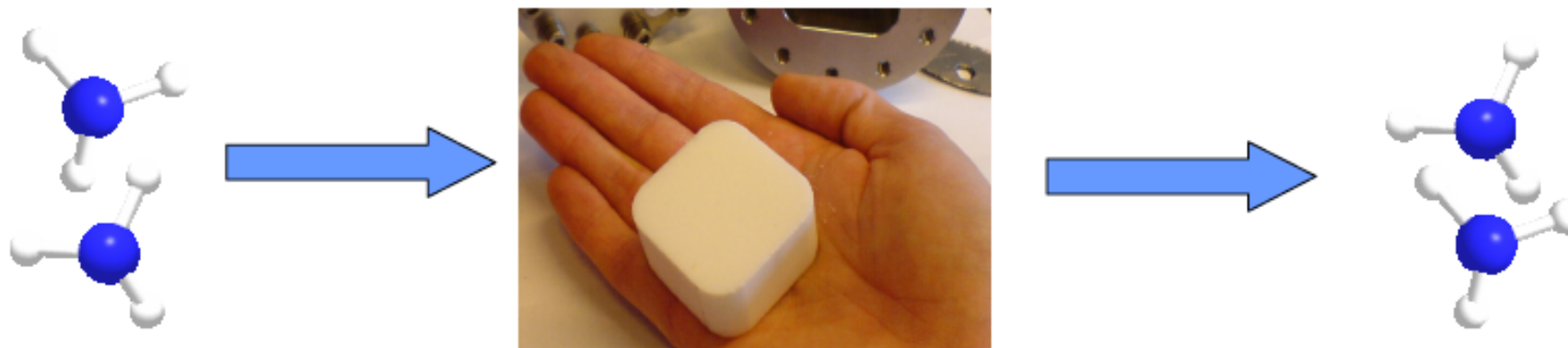
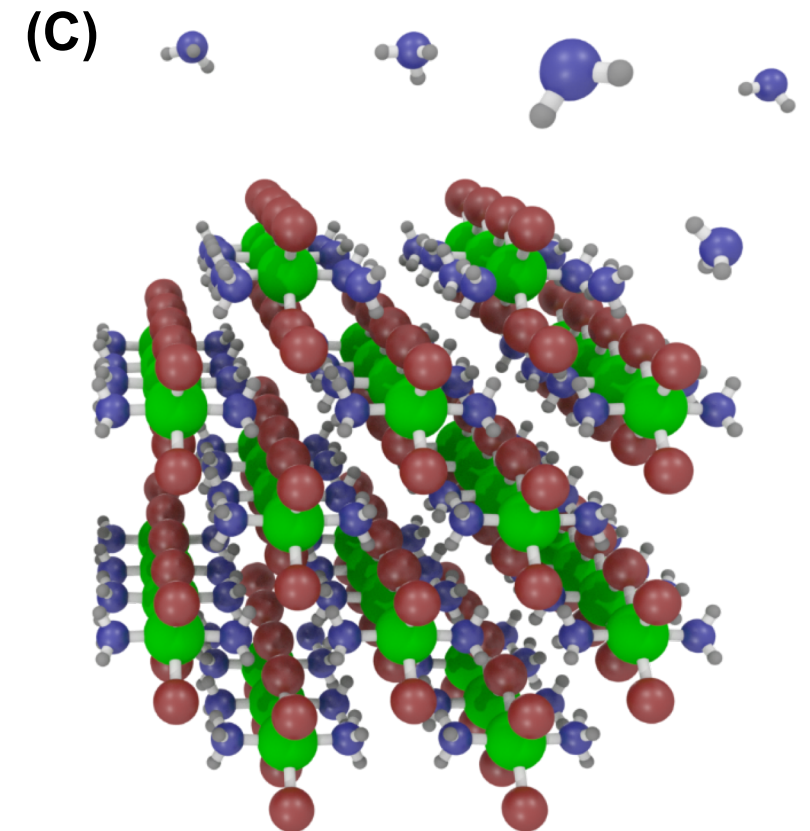
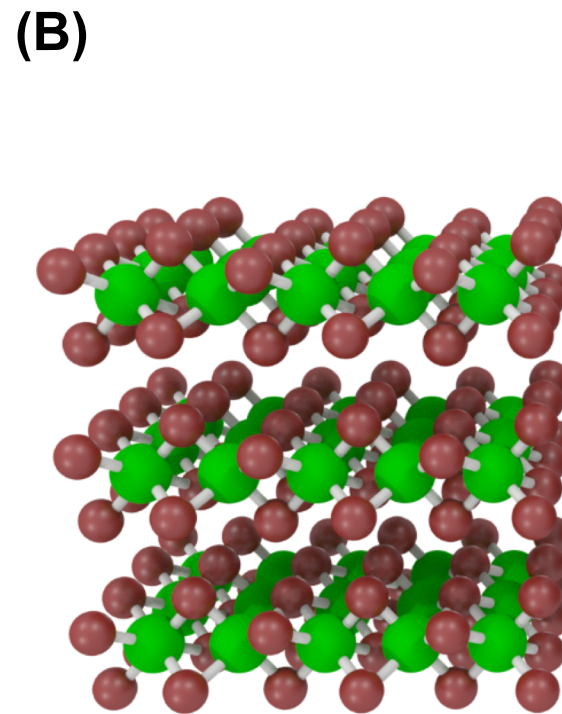
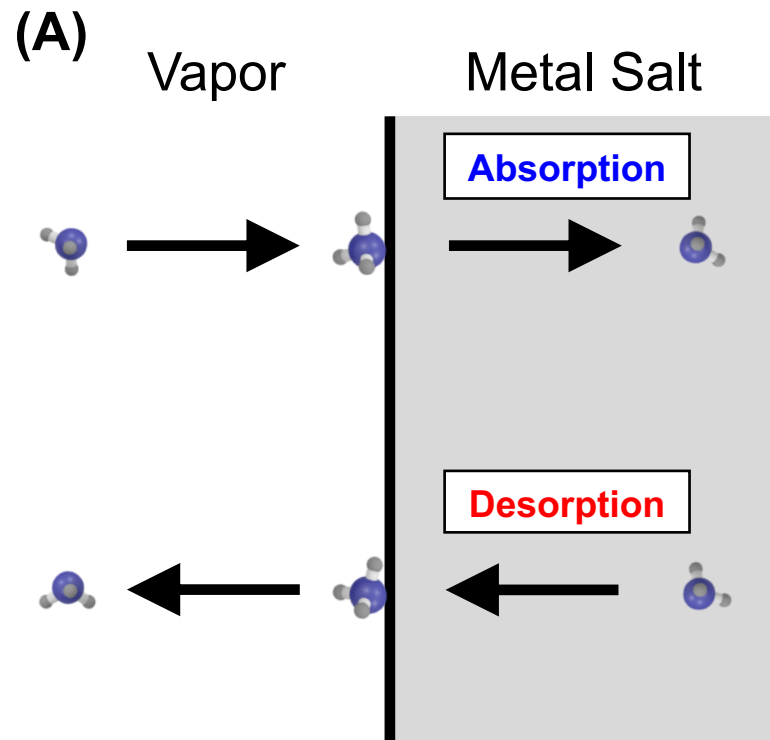


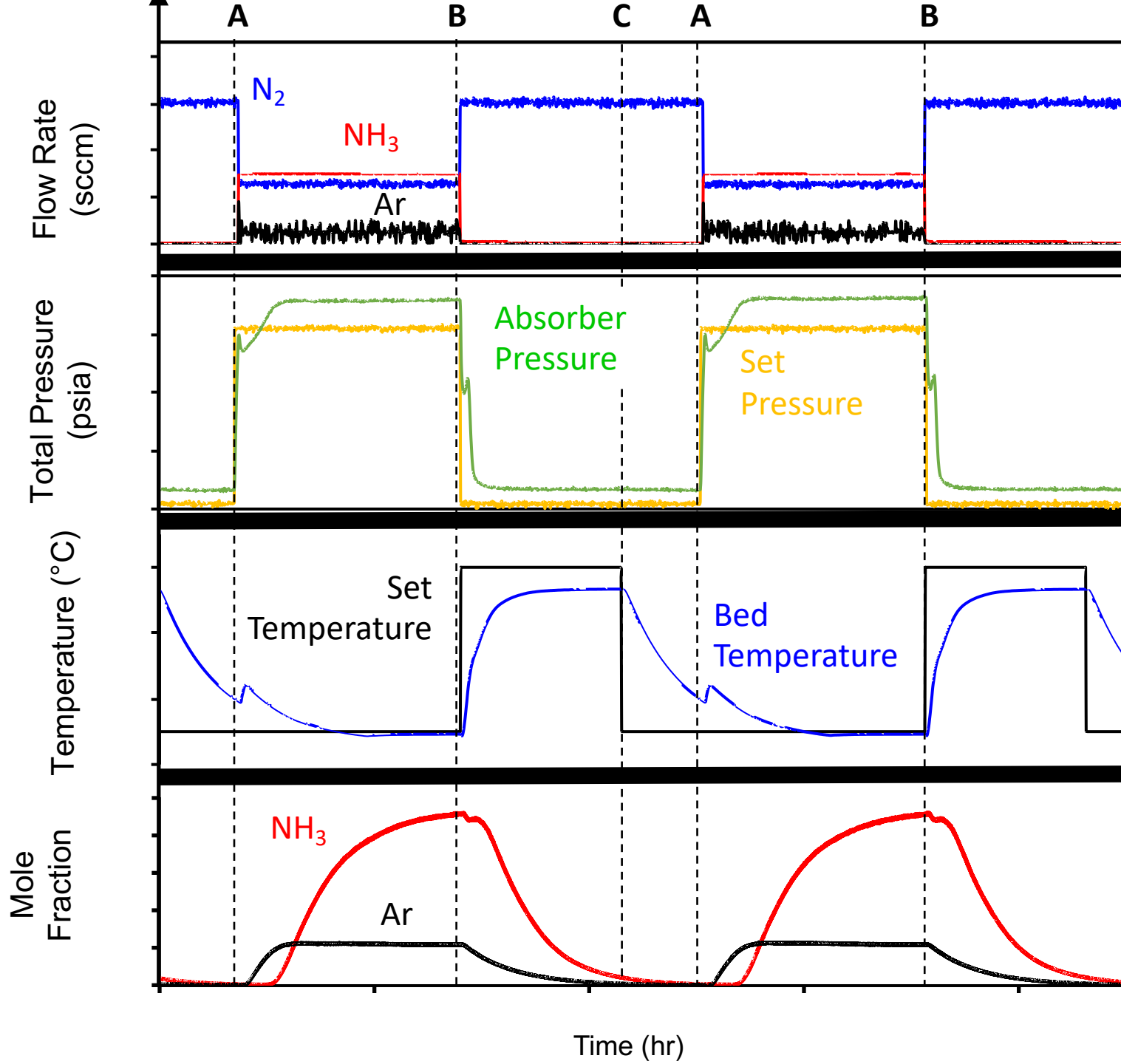
Image ref: <http://www.amminex.com/products/adammine.aspx> (accessed 24 April 2018)

Absorption Depends on Reaction



Prototype with absorbers for 1kg/day
being installed and commissioned





Absorption
Gives Small
Unused Bed
Length

Cyclic steady state conditions

Toward Data and Model for Prototype and for Future Scale-up or Modular Designs

- Optimal cycling at ideal cyclic steady state
 - Perhaps more important – learn from the search
- Process model for non-ideal operation needed
 - Non-steady state (cyclic) such as startup, shutdown, changed setpoint
 - Imperfect heat transfer
 - Very fast differential cycling vs. max capacity cycling