TIPS ON PRESENTING YOUR TECHNICAL WORK ORALLY

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www.chemeprof.com

"SPEAKING" GENERIC ADVICE

- http://business.financialpost.com/business-insider/7-excellent-ways-to-start-a-presentation-and-capture-your-audiences-attention

- Sorry… no

"GLIB" STATEMENT

- Tell them what you will tell them
- Tell them (clearly and succinctly)
- Tell them what you told them

SOME ASIDE

- Corrosion and West End Lead players
- Bach and Newton…

OUTLINE

- Define (to yourself) your message very clearly
- Organize your presentation to tell this message
- Slide format can be a matter of taste (+/- complexity), but make sure you can tell the "story" from them and that the reader is not unnecessarily distracted.
- Graphs need to be readable and convey the desired message
- Minimize tables of numbers (or don't use at all)
- Practice your presentation
- Engage the audience

DEFINE YOUR MESSAGE

- Why is the talk being given?
  - Informational vs. tutorial vs. persuasion(al)…
- Always consider the audience
  - Message needs to be adapted to meet the expectations and capabilities of the audience
- Pick 2-4 main points that you wish to transmit

ORGANIZE PRESENTATION TO TRANSMIT THIS MESSAGE

James N. Tilton DuPont, UD

- If informational (not tutorial)
  - Emphasize **what** you did not how you did it
- Time is always prescribed or limited
  - no matter what, I could not teach you something new and hard in 12 minutes.
    - I could tell you what I did however.
- Stay on your main points to be efficient

TALK ORGANIZATION

- Introduction/background
- Theoretical and experimental methods
- Results
- Discussion of Results
- Conclusion

SLIDE FORMAT

- You should have some discretion but…
  - Some fonts are easier to read than others
  - Some fonts are easier to read than others
  - Some fonts are easier to read than others
  - Some fonts are easier to read than others
  - Some fonts are easier to read than others
  - Some fonts are easier to read than others

SLIDE FORMAT

- Slides can be just text or a mix
- A mix may save time, but you have to be able to tell the story

Experiments and Analysis of Carbon Dioxide Capture Using a Model Ionic Liquid

Mark J. McCready, Edward J. Maginn, William F. Schneider and Joan F. Brennecke
University of Notre Dame

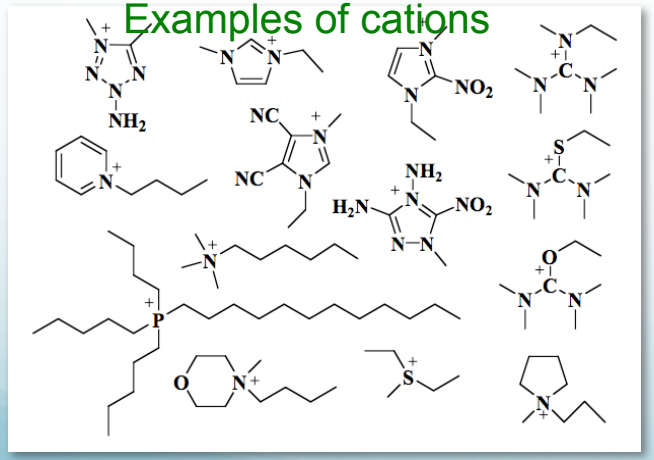
Process tradeoffs

- The primary tradeoffs for the process involve value of heat of reaction
  - Increase: higher IL capacity at lower temperature in absorber, lower IL holdup
  - Decrease: Lower heat of regeneration (desorber), less need for sensible heat exchange
  - Given some limits on temperatures, an intermediate value could give greatest "delta- concentration"

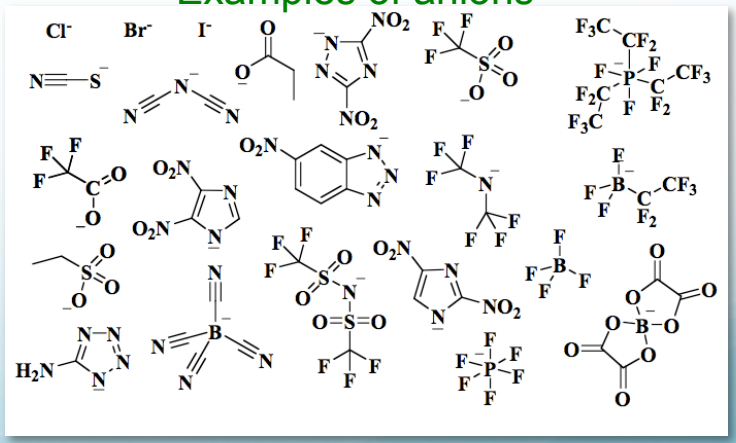
Ionic Liquids and Their Potential as CO_2 Sorbents

- Pure salts that are liquid around ambient temperature
  - Not simple salts like alkali halides
- Many favorable properties
  - Nonvolatile
  - Anhydrous (or variably hydrous)
  - High thermal stability
  - Huge chemical diversity
  - High intrinsic CO_2 solubility and selectivity

Examples of cations



Examples of anions



Measuring reaction rates of CO_2/IL systems

Theory:

$$D_{CO2}\frac{\partial^2 C_{CO2}}{\partial x^2} = \frac{\partial C_{CO2}}{\partial t} + r(x,t)$$

$$C_{CO2} = 0 \text{ at } x > 0, t = 0$$
$$C_{CO2} = C^*_{CO2} \text{ at } x = 0, t > 0$$
$$C_{CO2} = 0 \text{ at } x = \infty, t > 0$$

Assumption: Change in IL concentration is negligible hence treated as a constant. This implies that CO_2 flux is very small so that IL is not depleted at the surface and reaction product diffuses away from the surface relatively fast.

Pseudo-first order reaction

$$r = k \cdot C_{CO2}$$

$$\bar{R} = kla \cdot C^*_{CO2} \cdot E$$

$$J = \sqrt{k \cdot D_{CO2}} \cdot C^*_{CO2}$$

where $1 < E << E^{\infty}$

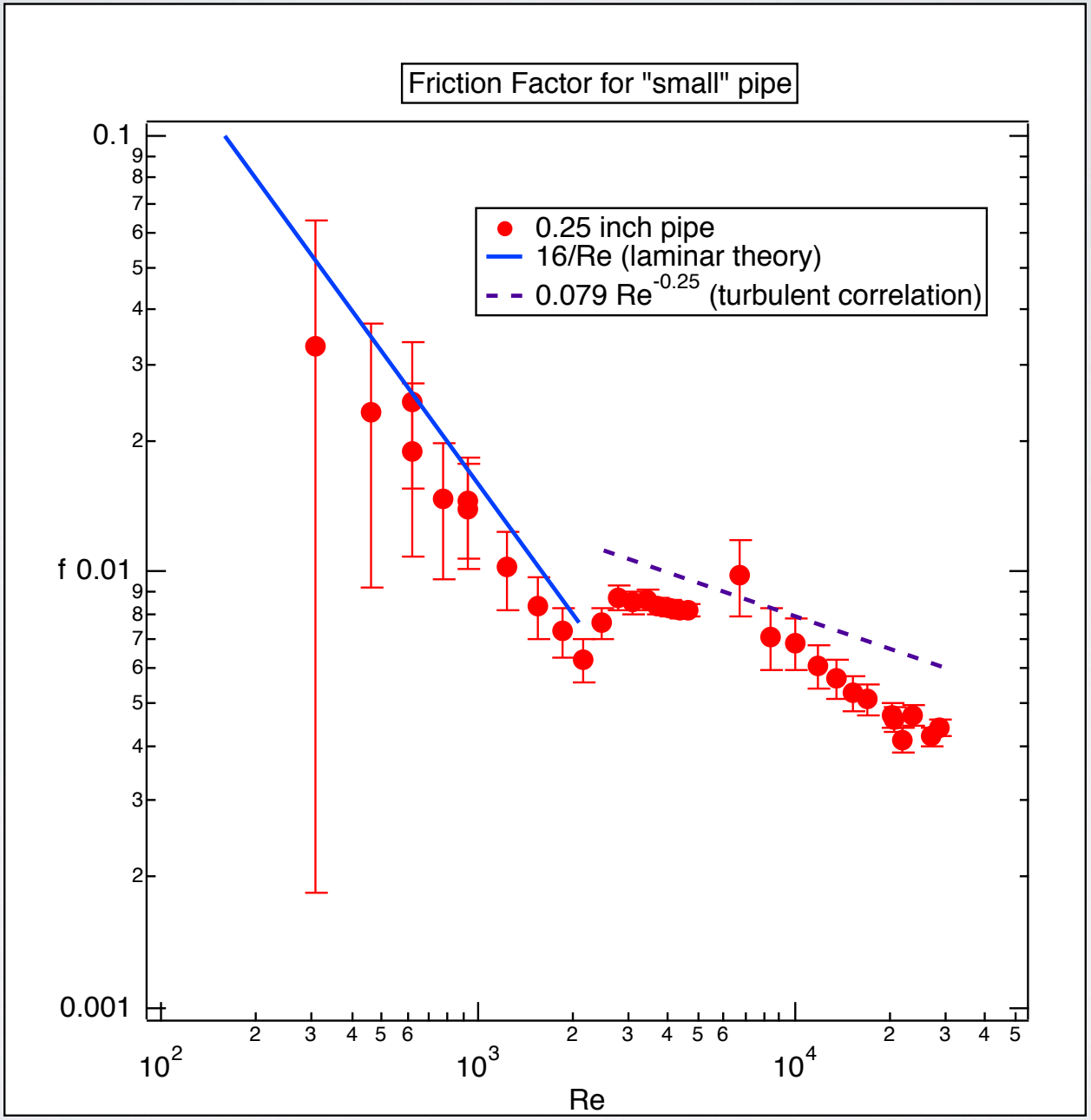
$$E = Ha = \sqrt{\frac{k \cdot D_{CO2}}{kl^2}}$$

$$E^{\infty} = \sqrt{\frac{D_{CO2,L}}{D_{IL,L}}} + \sqrt{\frac{D_{IL,TG}}{D_{CO2,L}}}\frac{C_{IL}}{v \cdot C^*_{CO2}}$$

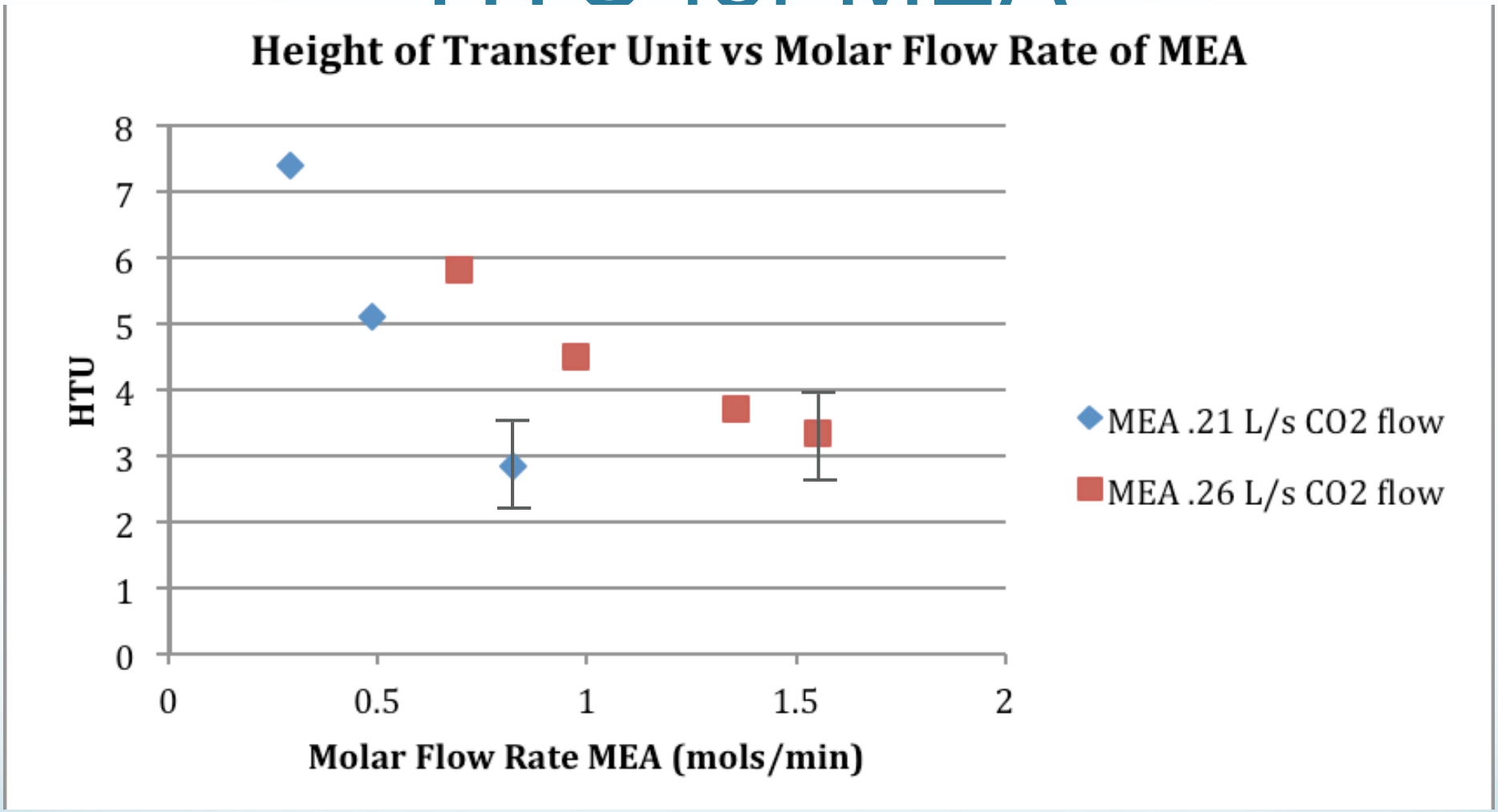
GRAPHS AND FIGURES

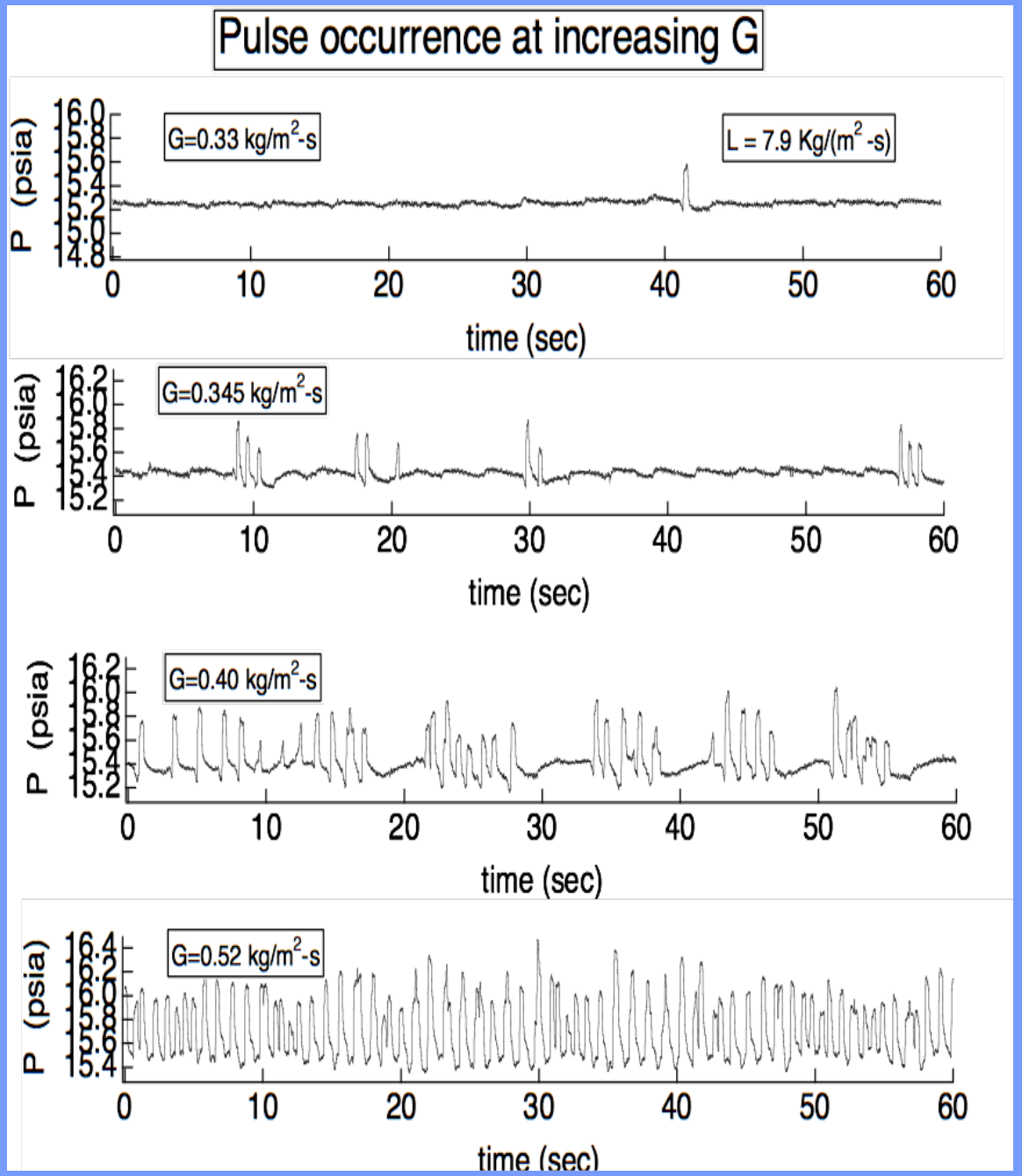
- Graphs need to be readable and tell what you need them to do
- Figures need to be as simple as possible

PIPE FLOW DATA



HTU for MEA

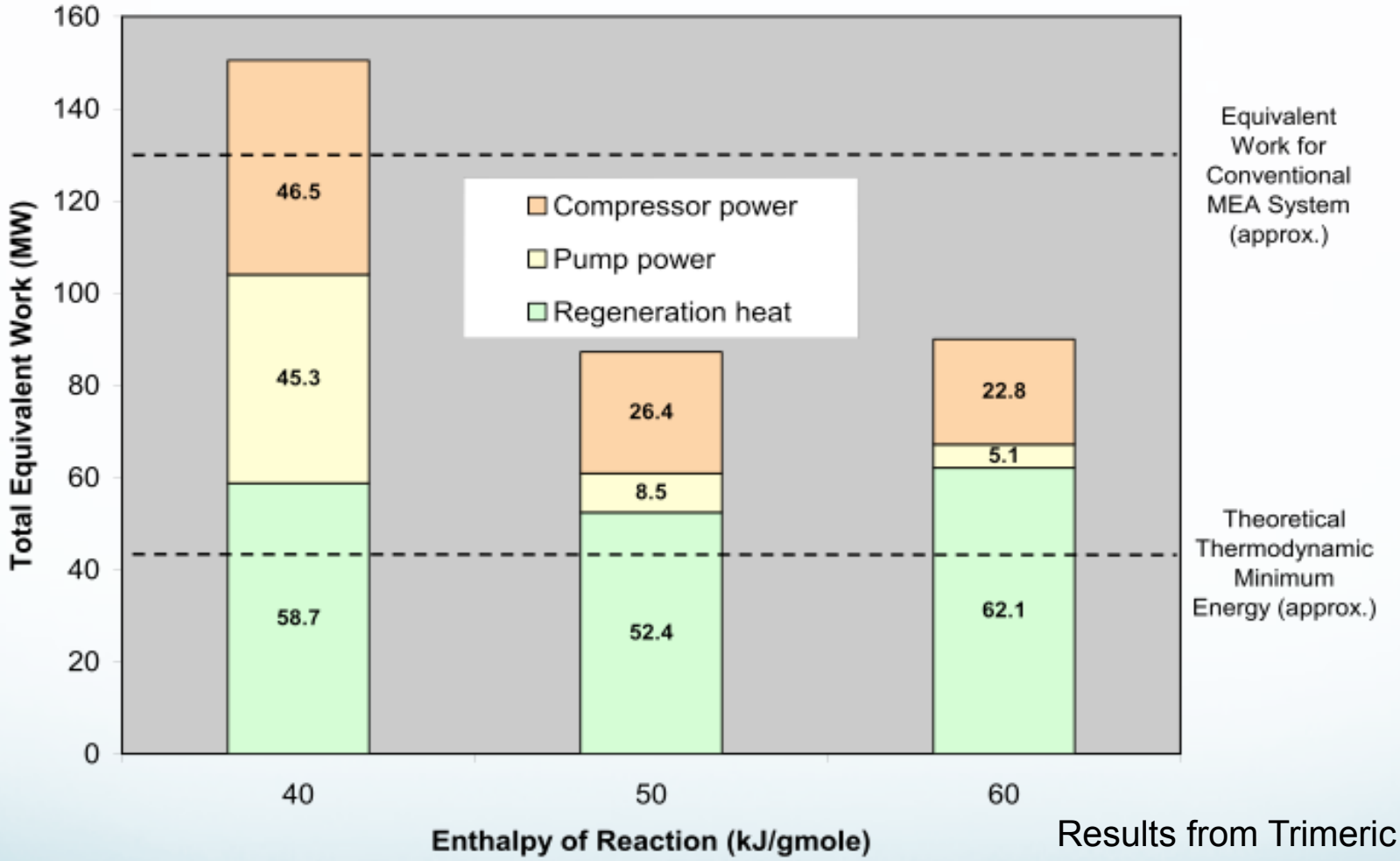

Height of Transfer Unit vs Molar Flow Rate of MEA
HTU
8
7
6
5
4
3
2
1
0
0
0.5
1
1.5
2
Molar Flow Rate MEA (mols/min)
MEA .21 L/s CO2 flow
MEA .26 L/s CO2 flow



Mass transfer increases by a factor of 3-4 in a pulse

mjm@nd.edu http://www.nd.edu/~mjm chemeprof.com

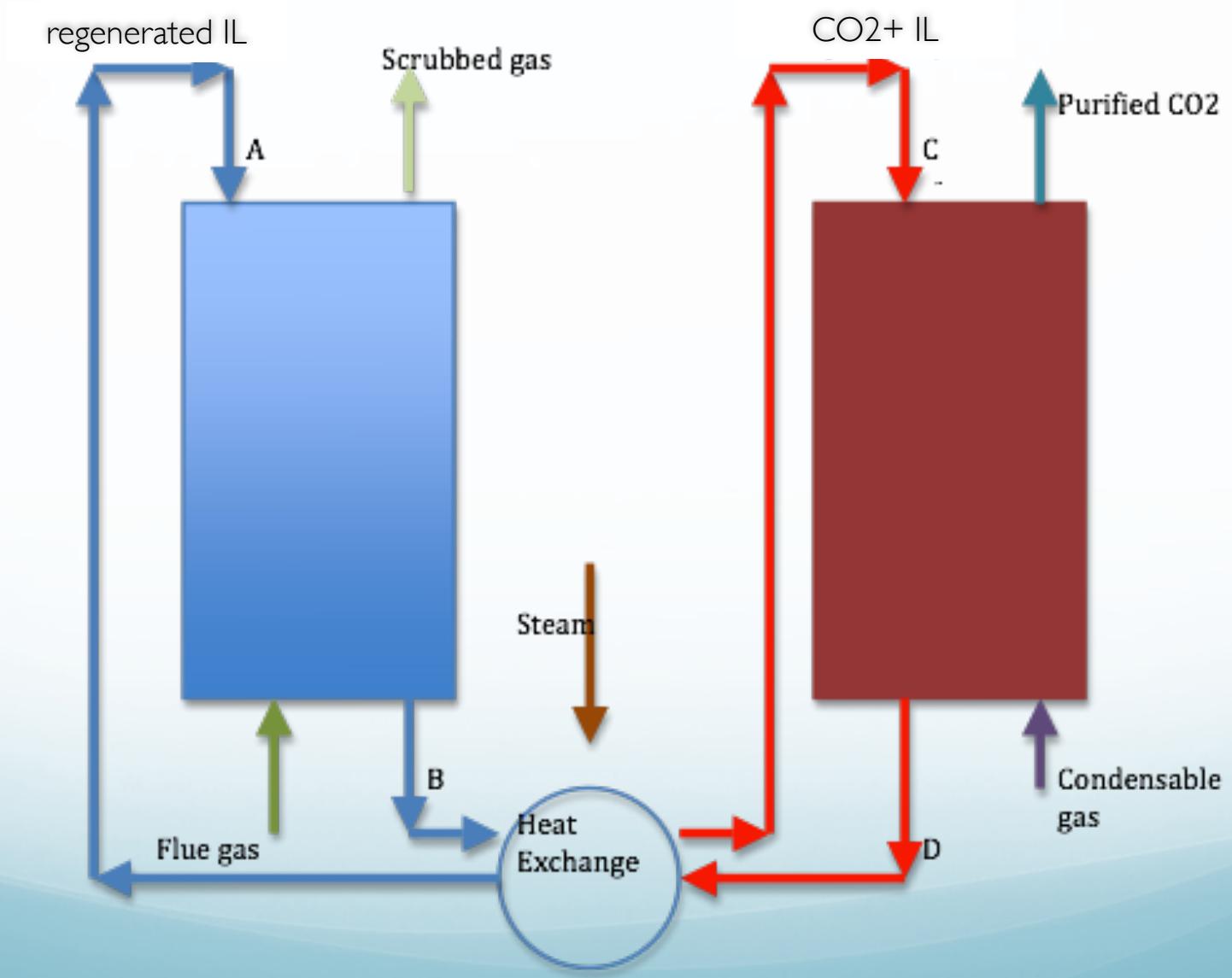
Optimal binding energy from process modeling



Results from Trimeric Corp.

Can ILs be designed with optimal CO_2 reaction enthalpy?

Ionic Liquid Process schematic



Absorber/Desorber for CO2 removal

- We have run continuous steady-state operation of absorber and regenerator.

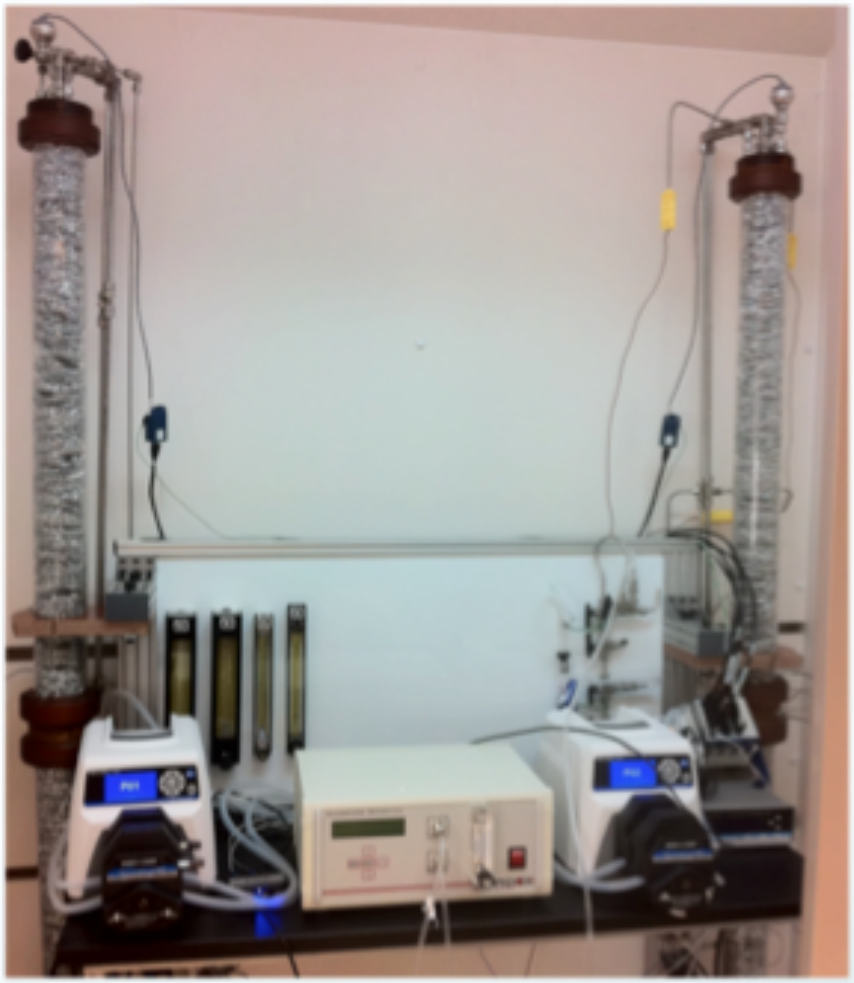
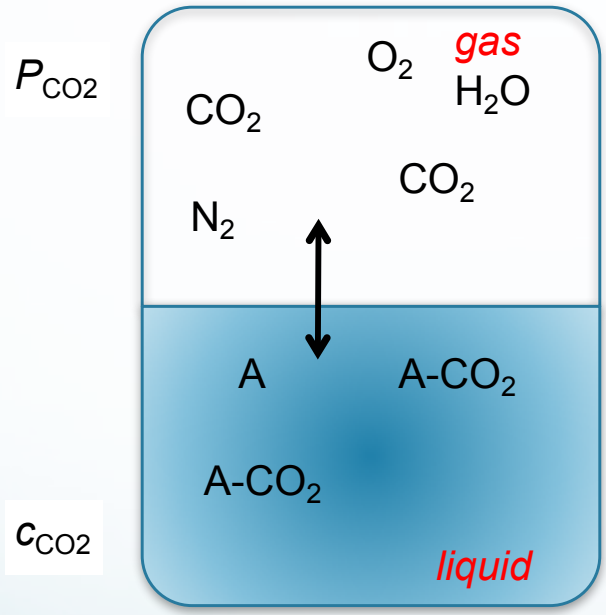


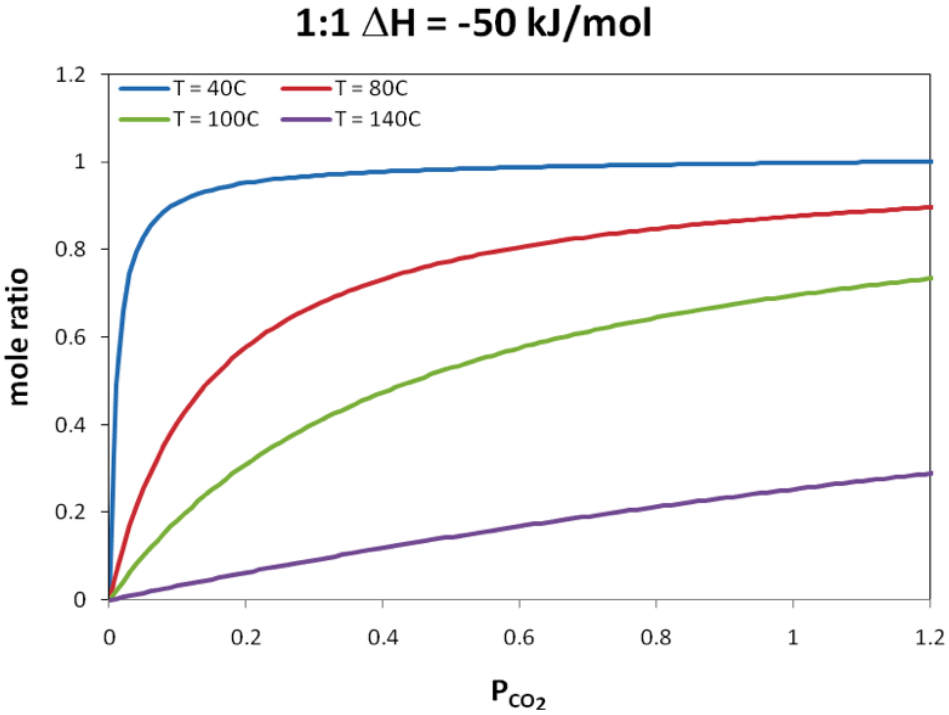
Figure 1: Image of the lab-scale unit constructed for Task 18.

Absorption isotherms

Langmuir (single site) absorption

$A + CO_2\,(g) \leftrightarrow A \cdot CO_2 \quad K_{eq}(T)$





$$c_{CO_2} = \frac{K P_{CO_2}}{1 + K P_{CO_2}}, K = e^{-\Delta G^\circ(T)/RT}$$

$$\Delta S^\circ(T) \approx -S^\circ_{\mathrm{trans},CO_2}(T)$$

$$\Delta H^\circ(T) \rightarrow \text{bond strength}$$

Analysis (for global instability)

- Averaged momentum equations

$$\frac{\partial \varepsilon_k \bar{\rho}_k}{\partial t} + \nabla \cdot \varepsilon_k \bar{\rho}_k \mathbf{v}_k = 0$$

$$\frac{\partial \varepsilon_k \bar{\rho}_k \mathbf{v}_k}{\partial t} + \nabla \cdot \varepsilon_k \bar{\rho}_k \mathbf{v}_k \mathbf{v}_k = \nabla \cdot \varepsilon_k \left(\bar{\mathbf{T}} + \mathbf{T}_\mathbf{k}^{\mathbf{Re}} \right) + \varepsilon_k \bar{\rho}_k \mathbf{b}_\mathbf{k}$$

- Following the standard simplifications

$$\frac{\partial \varepsilon_k \bar{\rho}_k \mathbf{v}_k}{\partial t} + \nabla \cdot \varepsilon_k \bar{\rho}_k \mathbf{v}_k \mathbf{v}_k = \varepsilon_k \nabla p_k + \boxed{p_k \nabla \varepsilon_k} + F_i + \varepsilon_k \bar{\rho}_k \mathbf{b}_\mathbf{k}$$

New key term

DON'T USE TABLES OF NUMBERS ON SLIDES

76,820	64,007	140,827	0	71,444	69,383
0	0	0	0	0	0
66,219	108,371	174,590	0	57,278	117,312
0	108,770	108,770	0	120,000	(11,230)
0	0	0	18,411	18,411	0
0	90,699	90,699	0	0	90,699
0	0	0	0	0	0
0	107,824	107,824	23,961	0	131,785
0	23,961	0	0	0	0
0	91,018	91,018	0	0	91,018
0	101,375	101,375	0	0	101,375
0	109,180	109,180	0	0	109,180
0	95,301	95,301	0	0	95,301
0	0	0	0	0	0
0	113,026	113,026	0	0	113,026
0	75,173	75,173	0	0	75,173
0	83,210	83,210	0	0	83,210
0	72,701	72,701	0	0	72,701
0	73,130	73,130	0	0	73,130
128,125	0	128,125	0	0	54,237
0	78,634	78,634	0	0	78,634
35,930	0	35,930	0	30,930	5,000

PRACTICE

- Talk through until you are comfortable
- If you can't become comfortable, use notes
- Memorize the first "line" for each slide

ENGAGE THE AUDIENCE

- Unless you are looking into a camera….
- Spend at least 1/2 of the time looking at people in the audience,
  - all the better if you actually make eye contact!
    - but not with only a few people!!
- Hopefully they are engaged and with you this generates some mutual "synergetic energy".
- If they seem lost, perhaps you can step up the energy level a bit to re-engage them

CONCLUSIONS

- Use a title slide
- Define your message clearly
- Organize your presentation to tell this message
- Slides need to be readable and clearly explainable by you
- Practice!
- Engage the audience