Say What?

Questions, Answers and Rules for an Industrial Career

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Executive External Strategy and Communications Fellow

ACS Local
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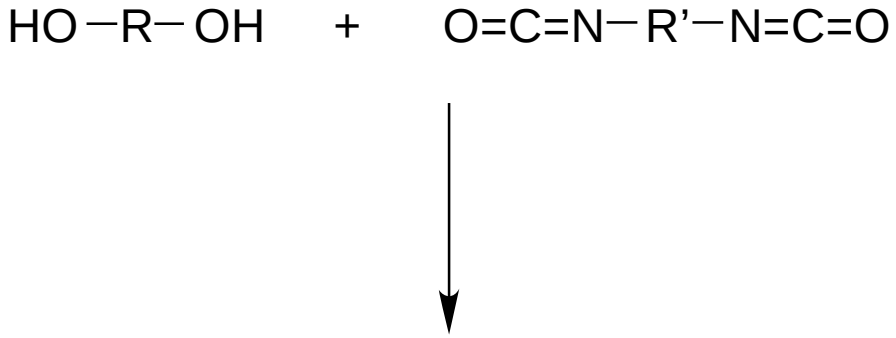
A C S
FELLOW

“That seems wrong...

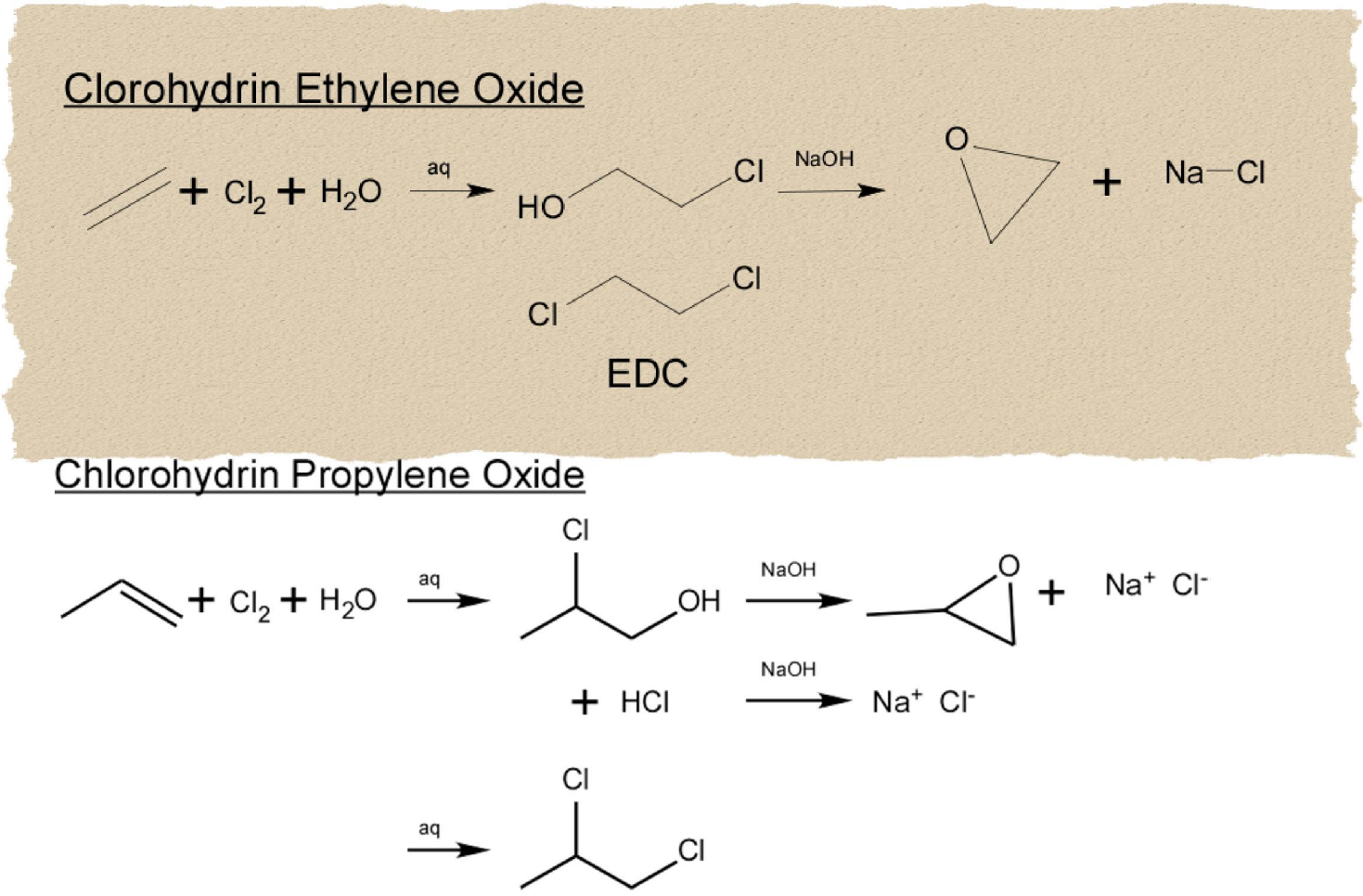
I’ll take care of it.”

Diol ***Diisocyanate***

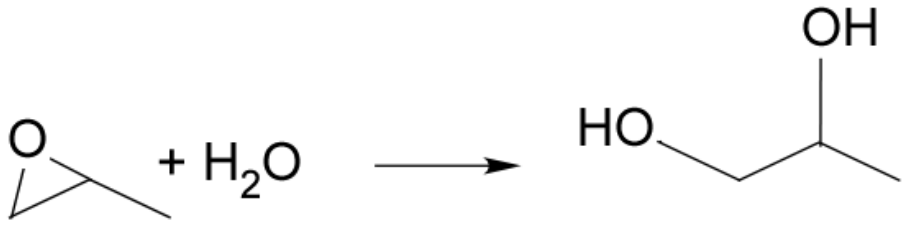


Polyurethane

Chlorohydrin Chemistry

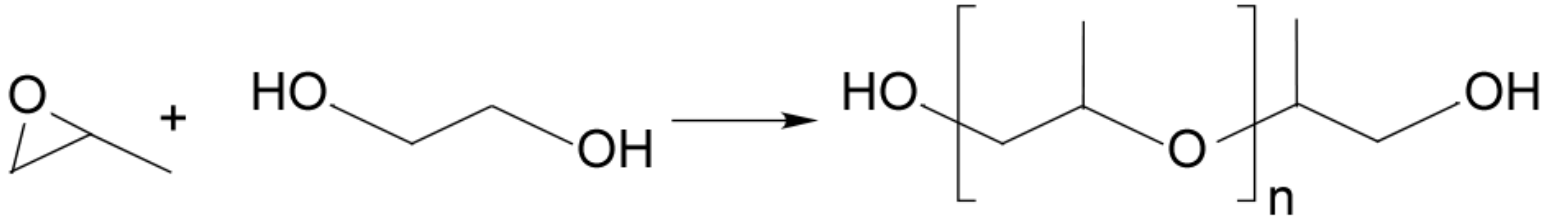


Propylene Glycol/ Polyethers - *Urethanes*



propylene oxide

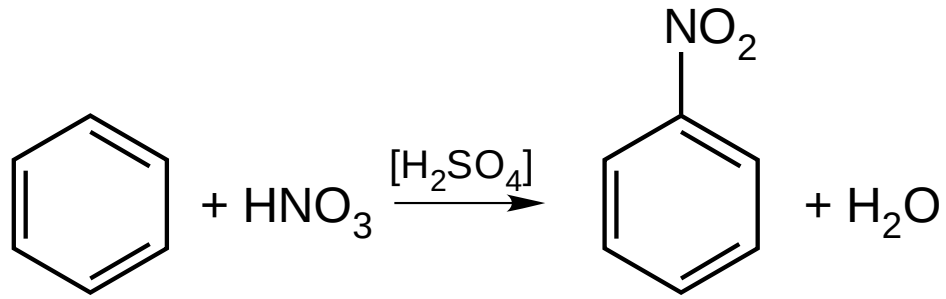
propylene glycol

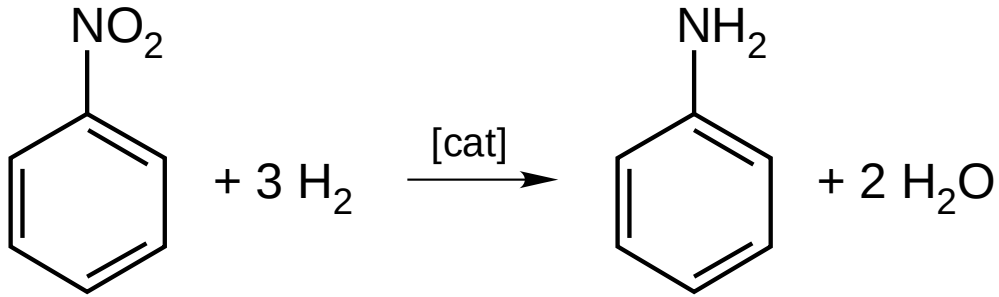


polyetherpolyol

Urethanes – *Aniline Production*

$$NH_3 + 2\ O_2 \longrightarrow HNO_3 + H_2O$$

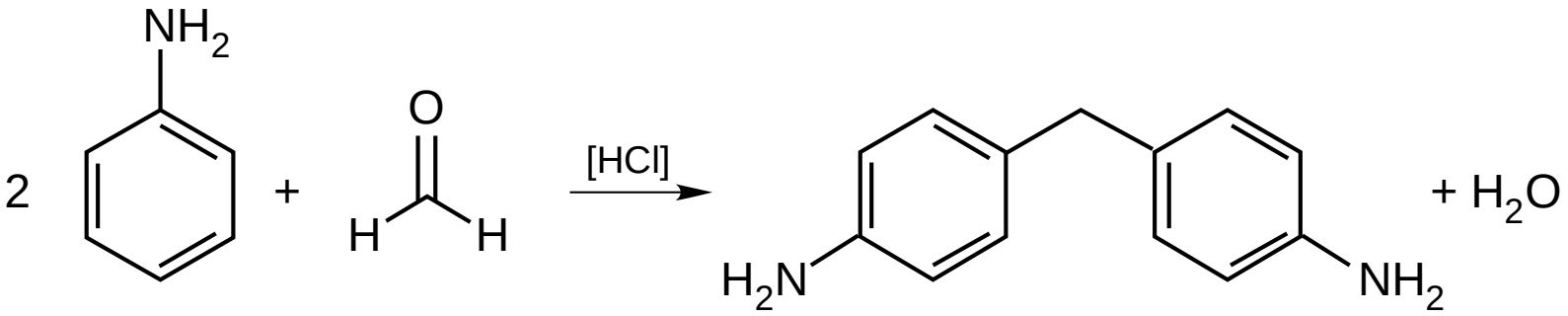




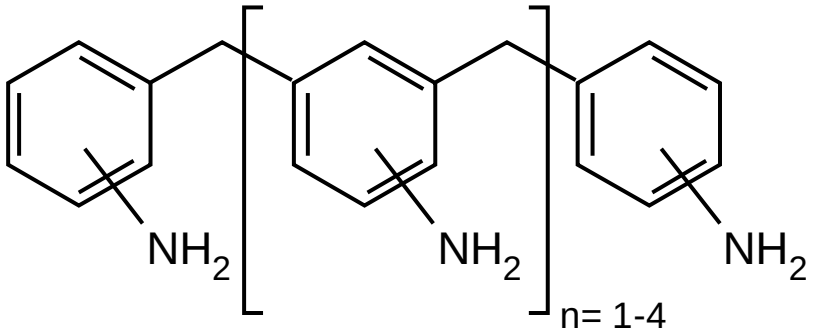
Two steps: liquid phase nitration of benzene with nitric acid to nitrobenzene in sulfuric acid. Water is formed and the H2SO4 must be dried before reuse.

Nitrobenzene is hydrogenated to aniline in the gas-phase in a fixed bed reactor with a catalyst of Pd/Pt/Fe.

MDA

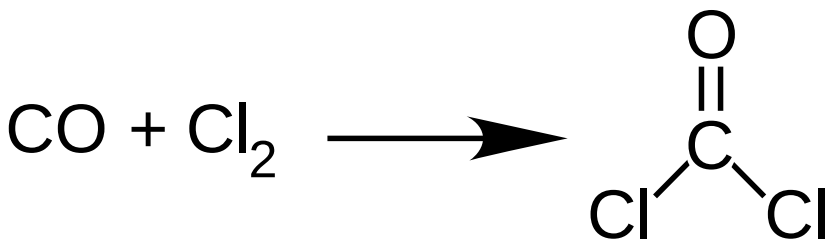


formaldehyde *methylenedianiline*

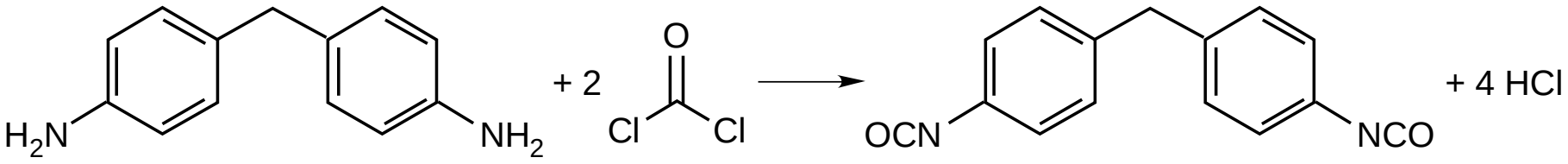


polymeric MDA (PMDA)

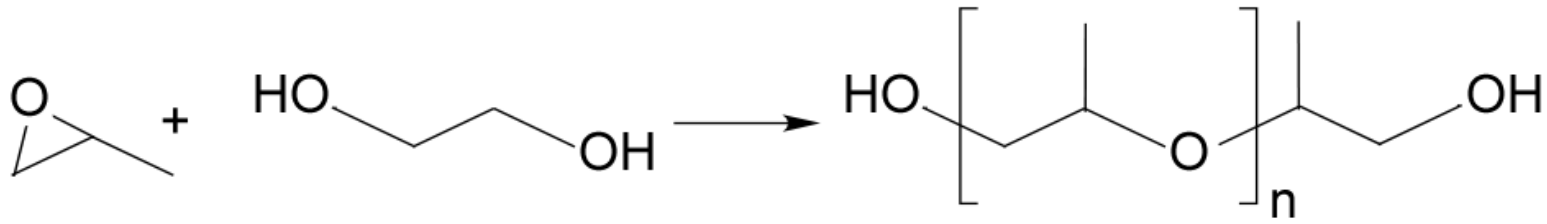
Phosgene – *Key Urethane Intermediate*



Isocyanates – *MDI/TDI*

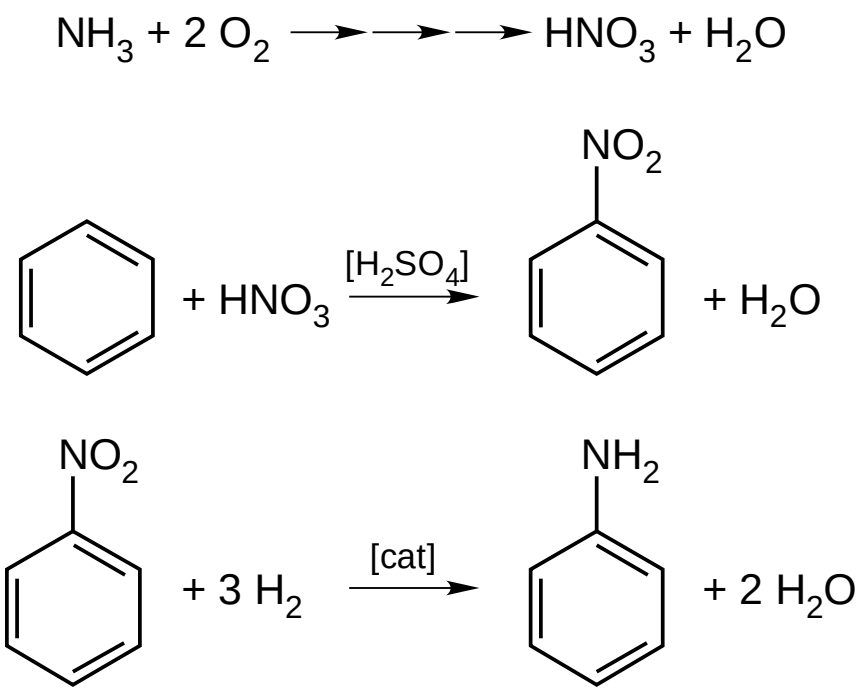


diphenylmethane diisocyanate



polyetherpolyol

Urethanes – *Aniline Production*



Catalyst: Pt / Pd / Rh
Reaction Temperature: 820°C
Reaction Pressure: 12 bar
By-products: NOx

Adiabatic Process
Reaction Temperature: 95 - 134°C
Reaction Pressure: 4.4 bar abs.
By-products: Nitrophenols, Dinitrobenzenes

Adiabatic Process
Catalyst: Pt / Pd / Fe
Reactor Temperature: 120 - 220°C
Reactor Pressure: 18 bar abs.
By-Products: Schiff Base, Cyclohexanone, Phenol, Cyclohexylamine, tars etc.

“I wonder if...

I have an idea.”

United States Patent [19]

Li

[11] **4,300,005**

[45] **Nov. 10, 1981**

[54] **PREPARATION OF VINYL CHLORIDE**

[75] Inventor: **Tao P. Li**, Chesterfield, Mo.

[73] Assignee: **Monsanto Co.**, St. Louis, Mo.

[21] Appl. No.: **856,889**

[22] Filed: **Dec. 2, 1977**

[51] **Int. Cl.**[3] **C07C 1**

[52] **U.S. Cl.** **570/**

[58] **Field of Search** ..... 260/656 R, 65
570/

[56] **References Cited**

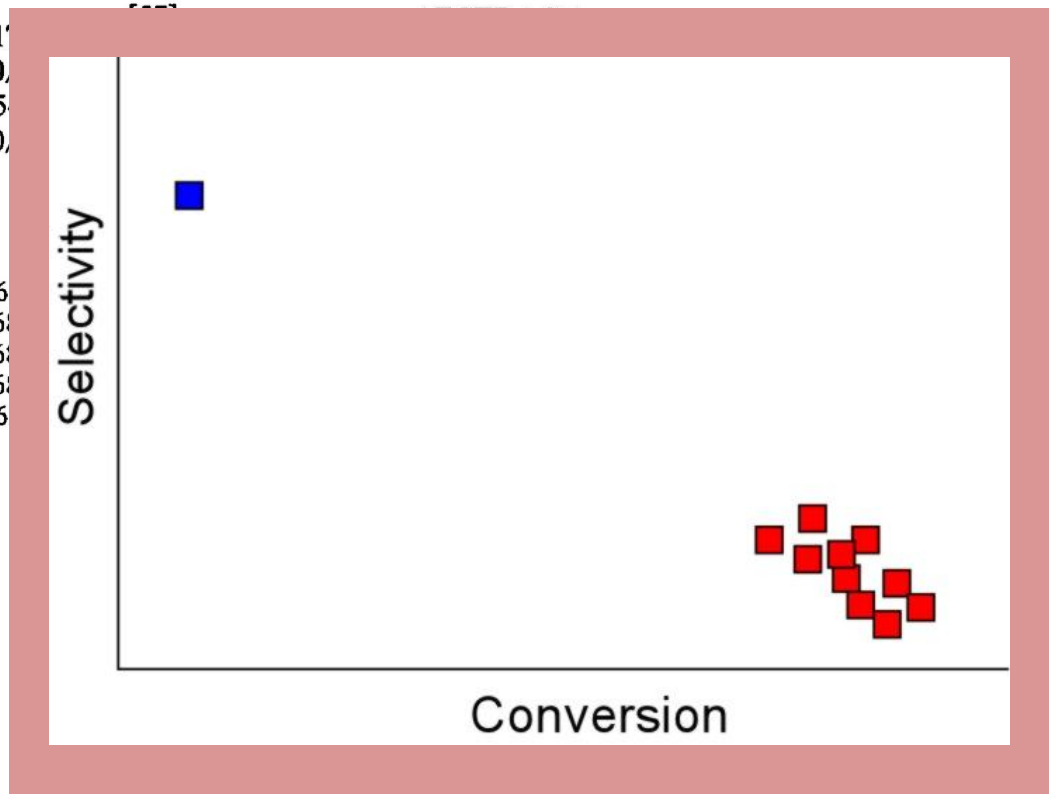
U.S. PATENT DOCUMENTS

3,217,064	11/1965	McGreevy et al.	260/6
3,308,184	3/1967	Bajars	260/6
3,308,198	3/1967	Bajars	260/6
3,359,343	12/1967	Bajars	260/6
3,427,359	2/1969	Rectenwald et al.	260/6
4,042,639	8/1977	Gordon et al.	260/656 R

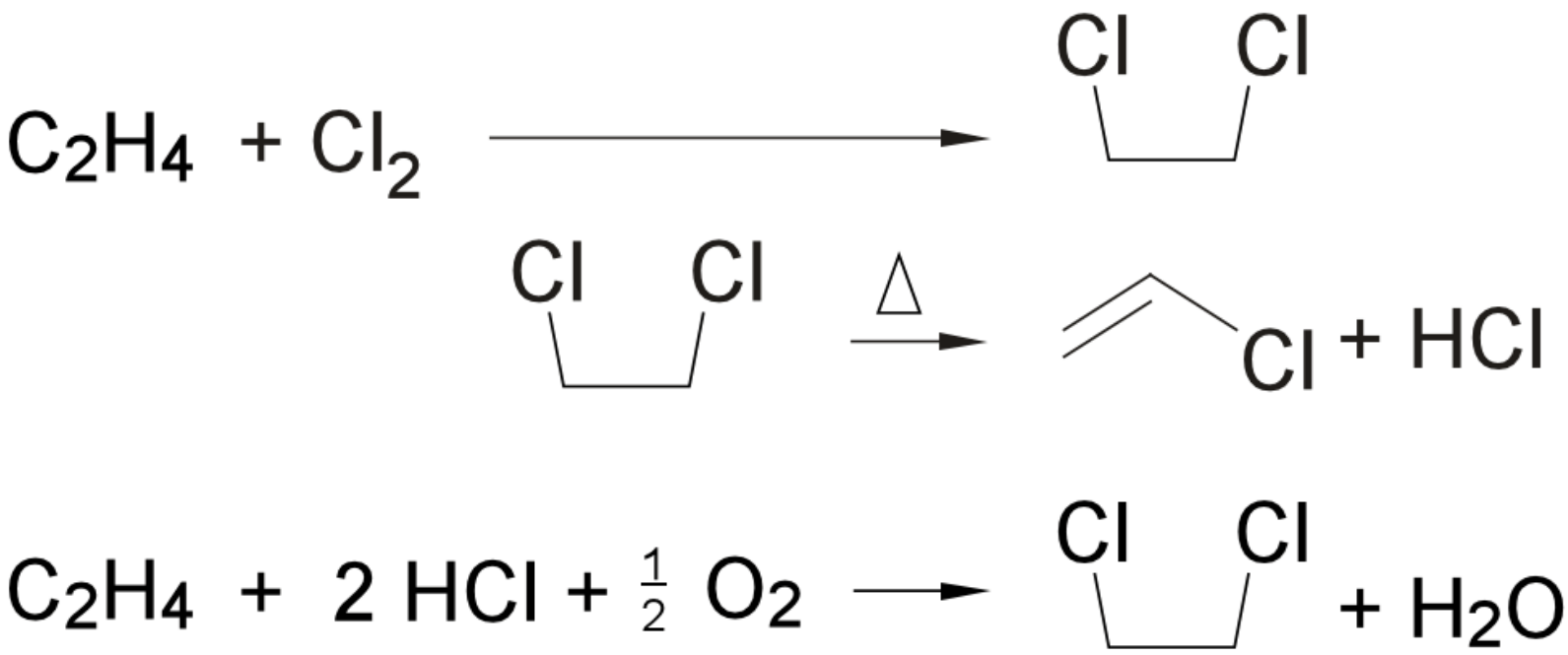
FOREIGN PATENT DOCUMENTS

1039369	8/1966	United Kingdom	260/656 R

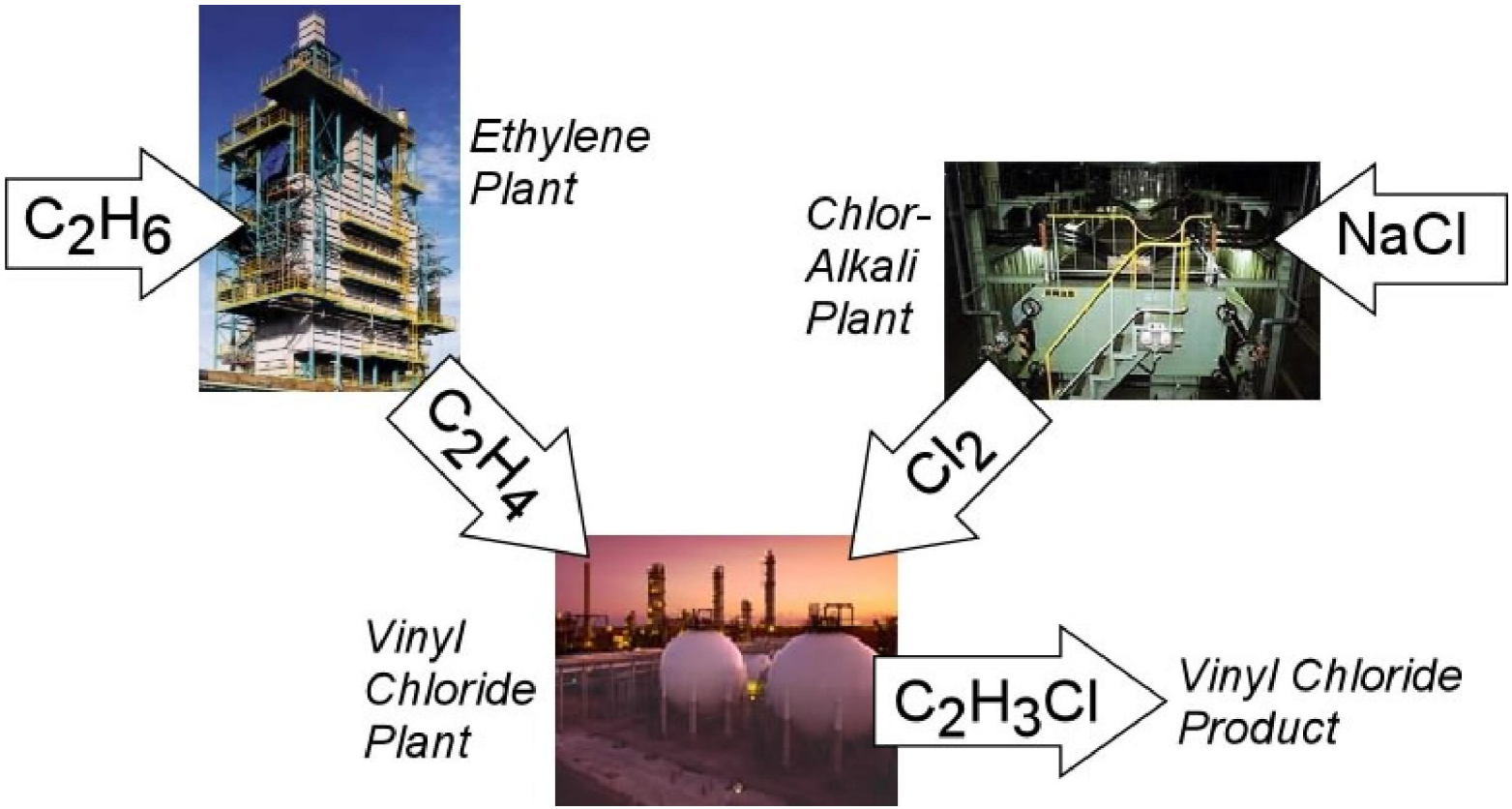
Primary Examiner—Delbert E. Gantz
Assistant Examiner—Joseph A. Boska



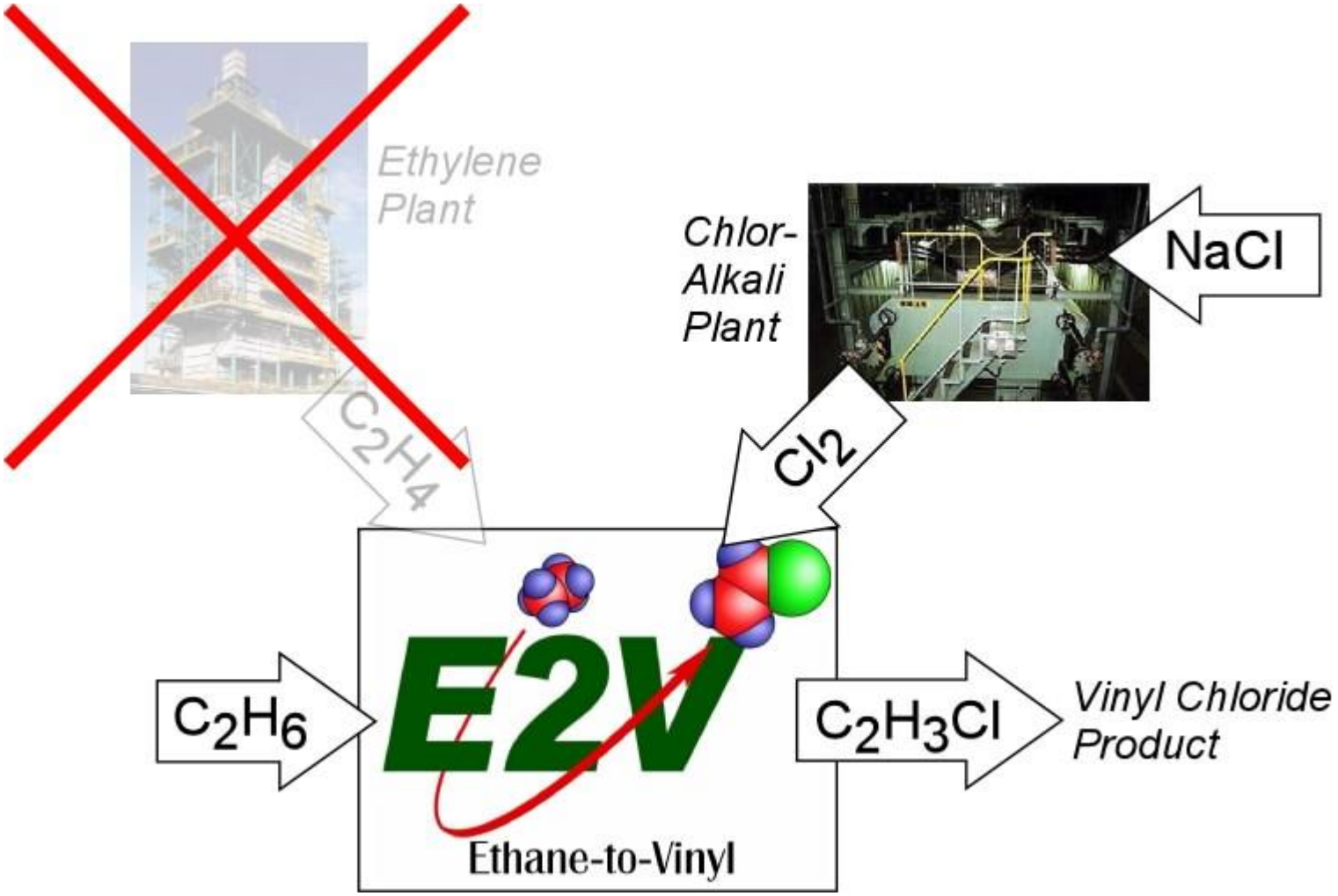
Balanced Vinyl



Vinyl Chloride



E2V


Ethylene
Plant
Chlor-
Alkali
Plant
NaCl
C2H4
Cl2
C2H6
E2V
C2H3Cl
Vinyl Chloride
Product
Ethane-to-Vinyl

United States Patent [19]

Li

4,300,005

[45] **N 10, 1981**

[54] **PREPARATION OF VINYL C**

[75] Inventor: **Tao P. Li,**

[73] Assig: ouis, Mo.

[21] p. 56.889

[22] **Dec. 2, 1977**

[51] **Int. Cl.**[3] C07C

[52] **U.S** 570

[58] **Fi** rch ..... 2 R, 654 A; 570/2

[56] **fe nces Cited**

U. NT DOCUMENTS

3,217,064	11/1	Greevy et al.	260/656 R
3,308,184	3/1	ajars	260/680
3,308,198	3/196	rs	26
3,359,343	12/1967	Ba rs	
3,427,359	2/1969	Rectenwald et	56
4,042,639	8/1977	Gordon et al.	260/6 6 R

GN PATENT DO UMENT

1039 8 1966 United Kingdo 2 R

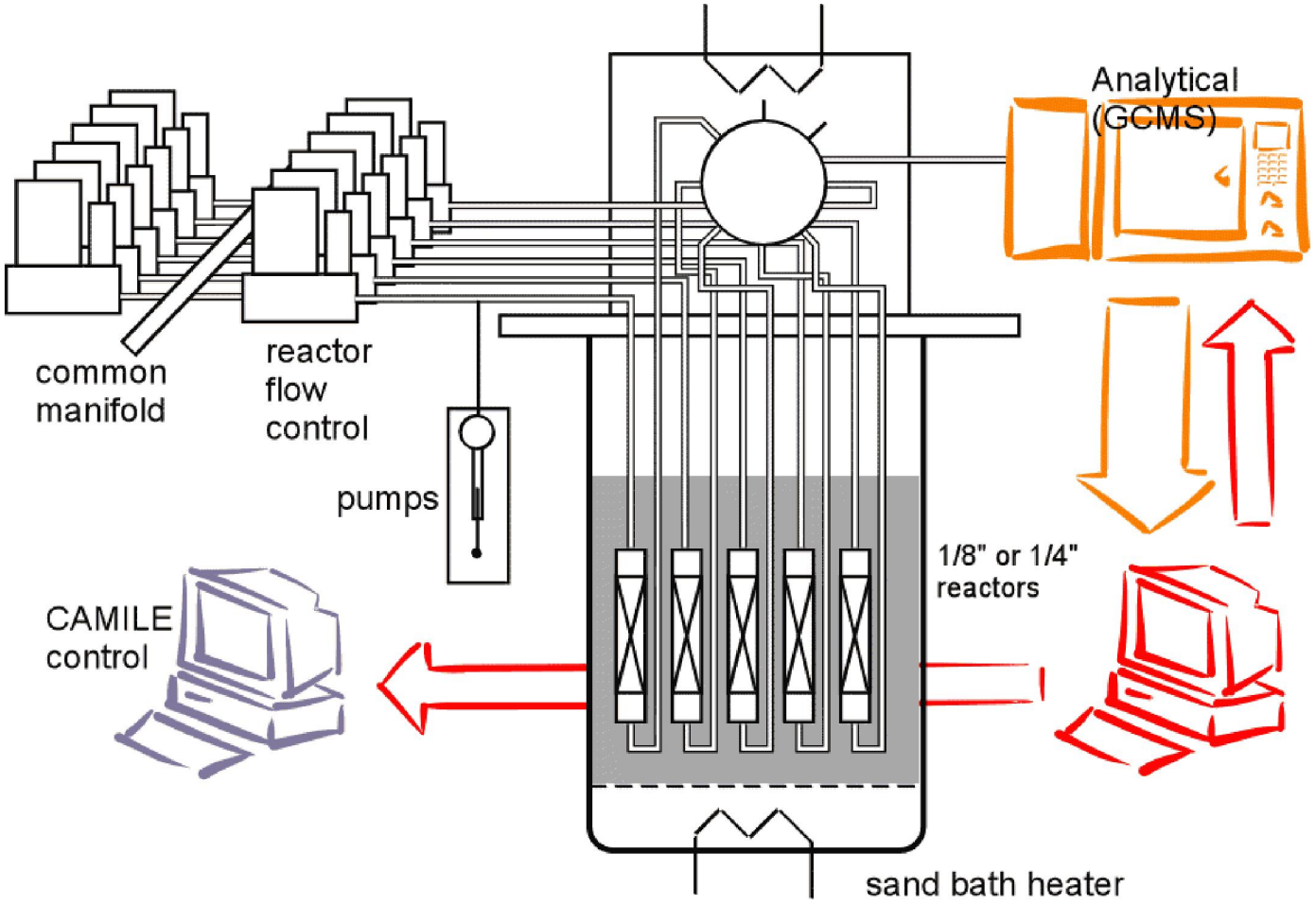
Primary Ex r—Delbert E. Ga

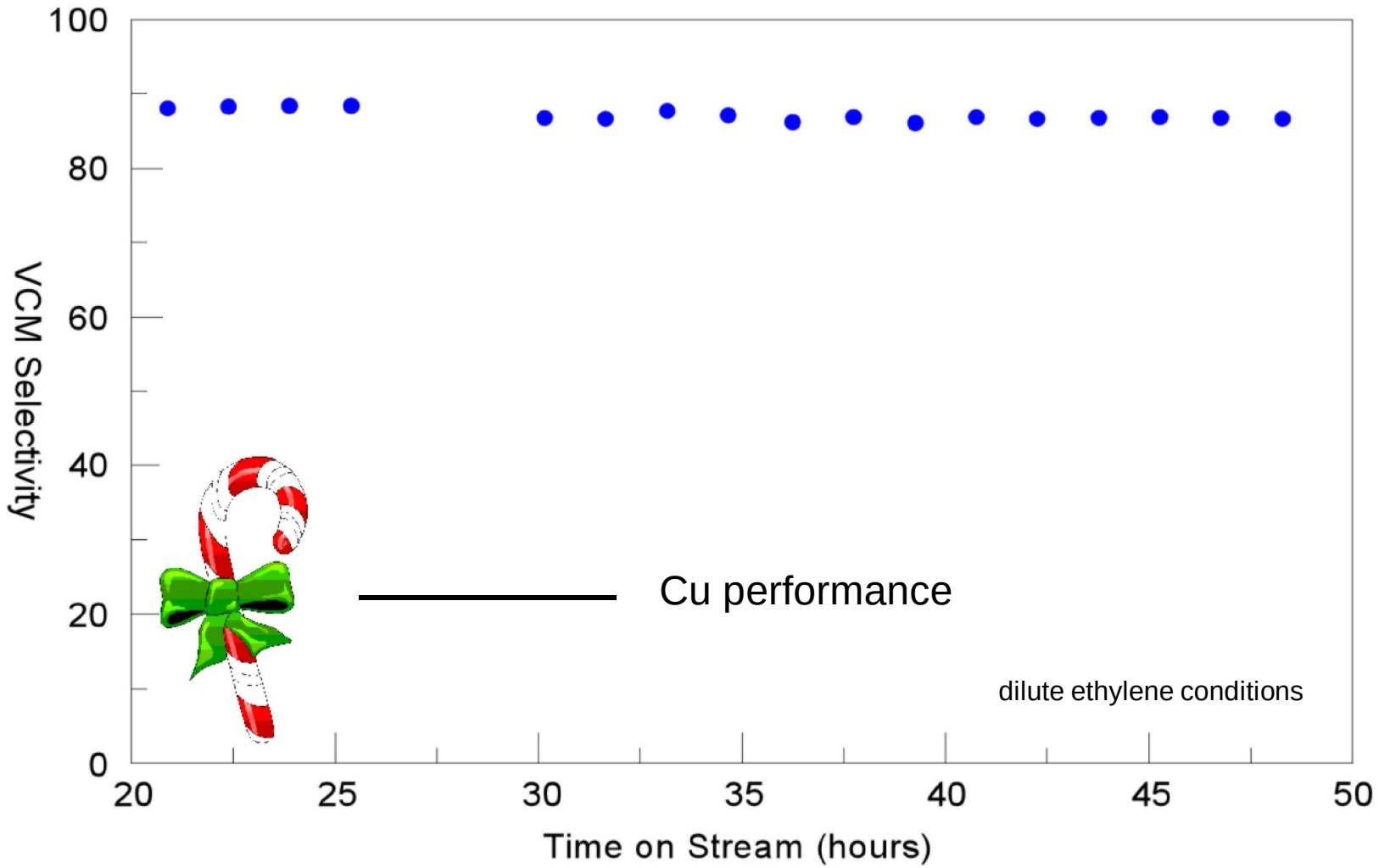
Assistant Exa. —Joseph A. Bos

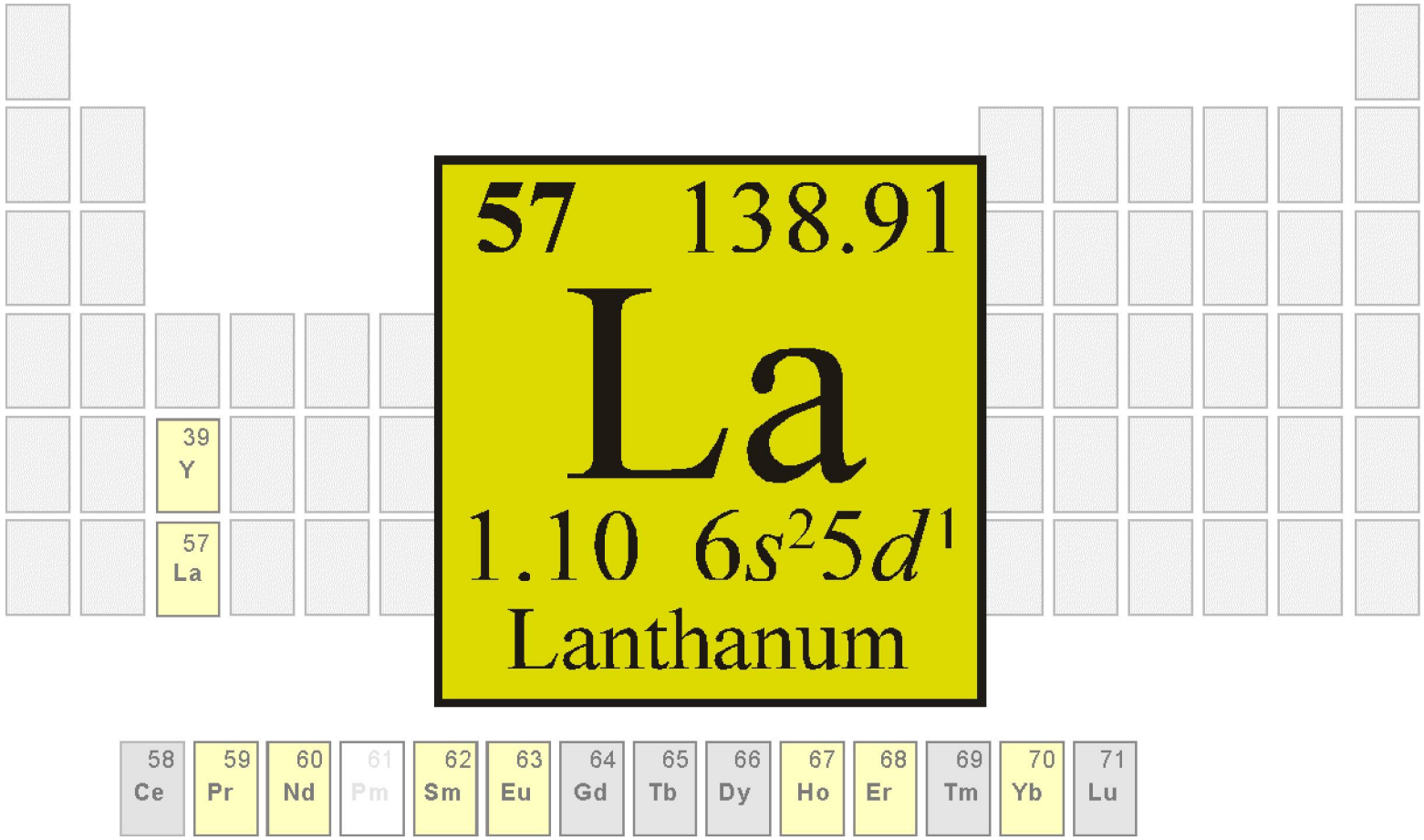
[57] **ABSTRACT**

Monohalogena efins are selectively prepa high yields fro s having 2 to 4 ca by the reaction of hydrocarb halide and a source of o from about 400° to abo with catalyst comprising alkali metal phosphate deposited on phat y potas phosphate, deposited on port. Typically, vinyl chloride is pre- e step from ethane.

10 Claims, No Drawings

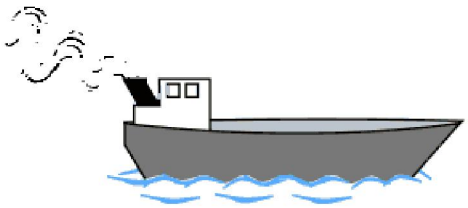

Analytical
(GCMS)
common
manifold
reactor
flow
control
pumps
CAMILE
control
1/8" or 1/4"
reactors
sand bath heater


100
80
60
40
20
0
VCM Selectivity
20
25
30
35
40
45
50
Time on Stream (hours)
Cu performance
dilute ethylene conditions


57 138.91
La
1.10 6s25d1
Lanthanum
39
Y
57
La
58
Ce
59
Pr
60
Nd
61
Pm
62
Sm
63
Eu
64
Gd
65
Tb
66
Dy
67
Ho
68
Er
69
Tm
70
Yb
71
Lu

“Yes.”

make methanol

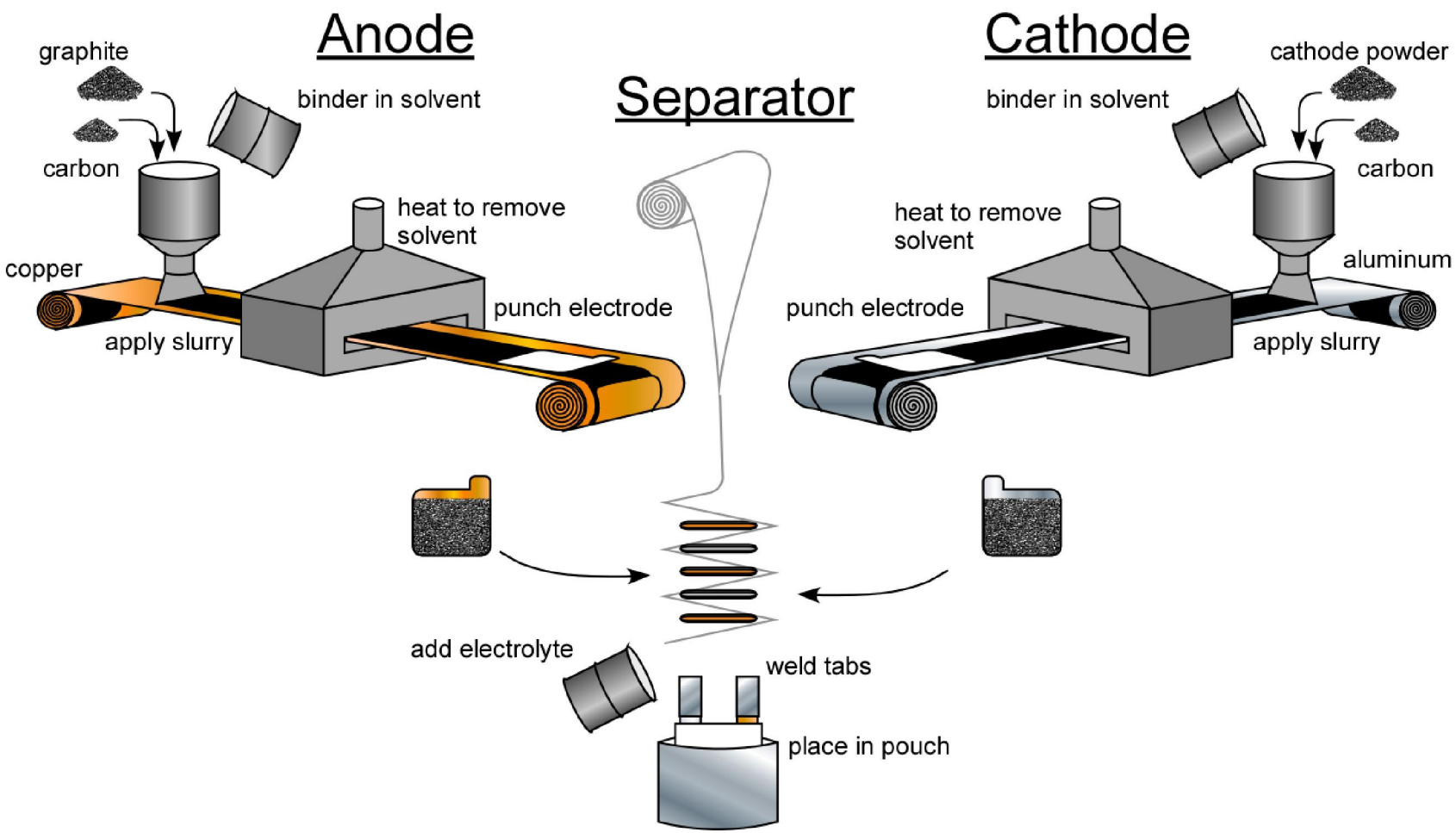


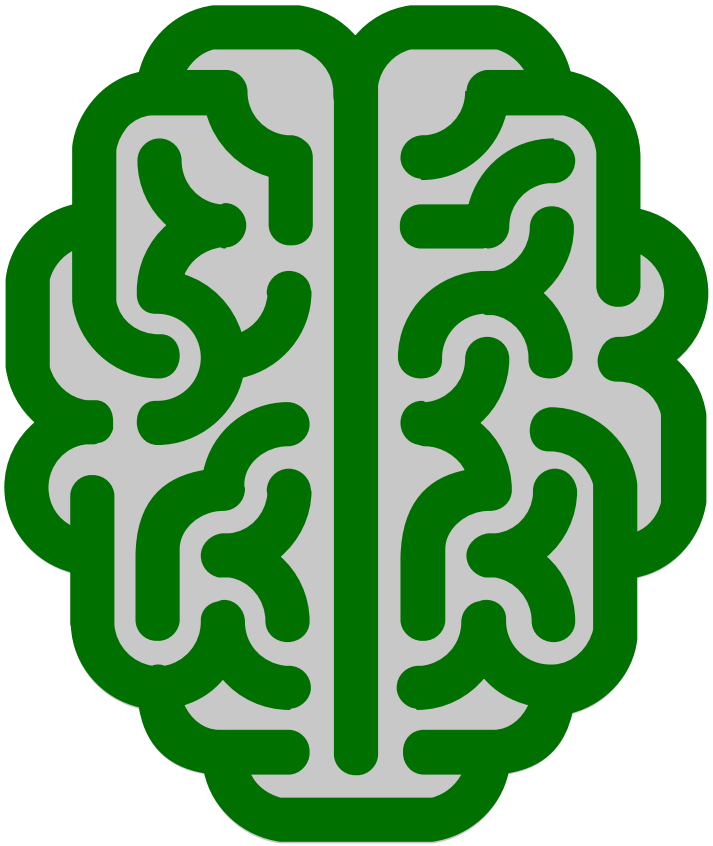
ship methanol

make olefins

The Dow Methane Challenge

“I don’t know, but I am sure I can learn”

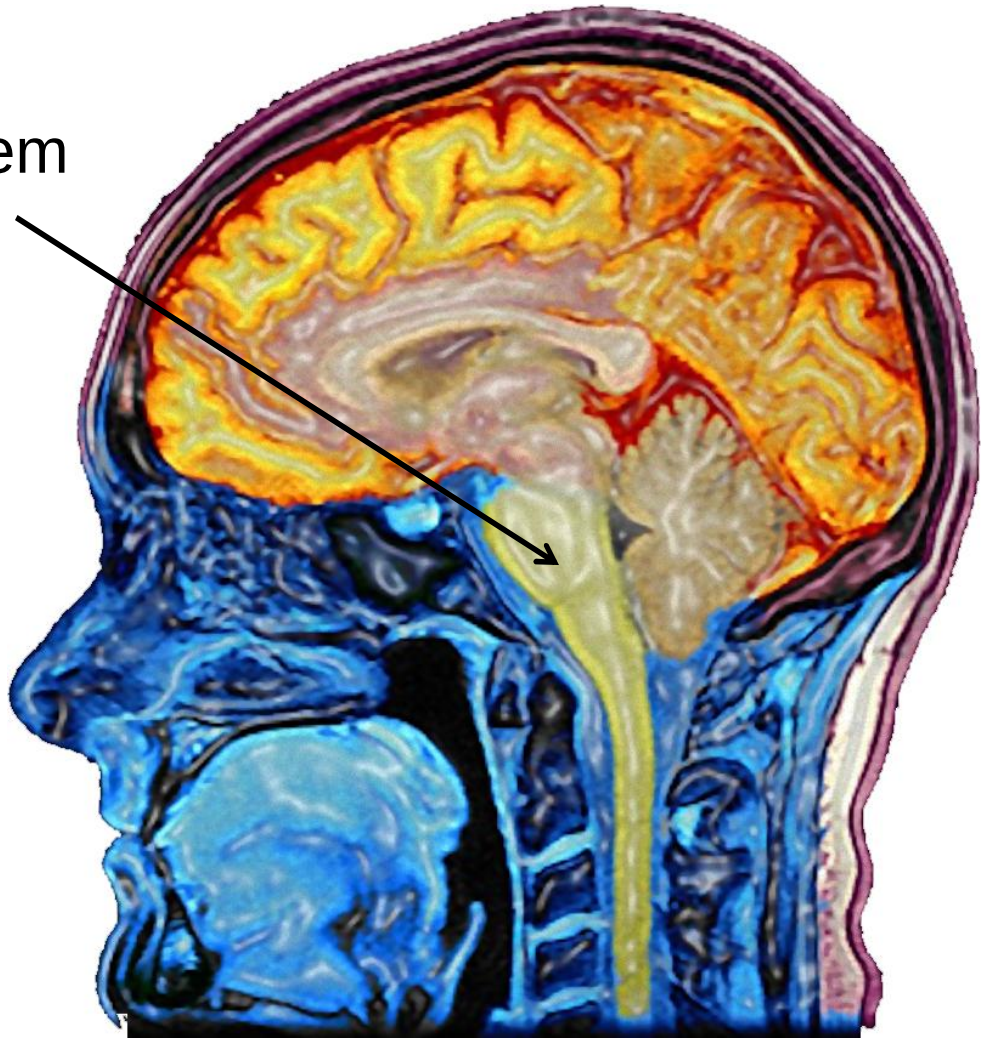

Anode
graphite
binder in solvent
carbon
heat to remove solvent
copper
punch electrode
apply slurry
Separator
Cathode
cathode powder
binder in solvent
carbon
heat to remove solvent
aluminum
punch electrode
apply slurry
add electrolyte
weld tabs
place in pouch



ready

Memorable is Good

Brain Stem Level



Memorable is Good

productivity

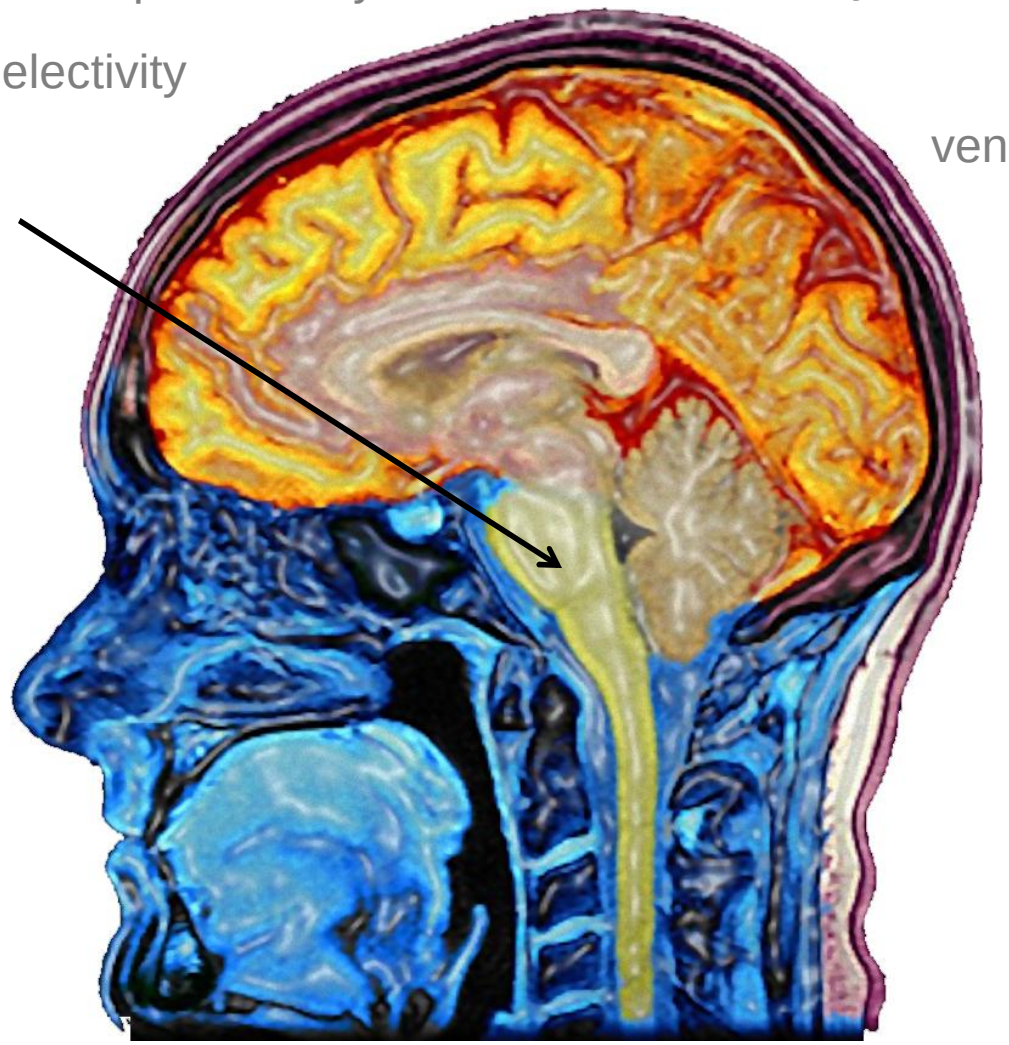
catalyst cost

selectivity

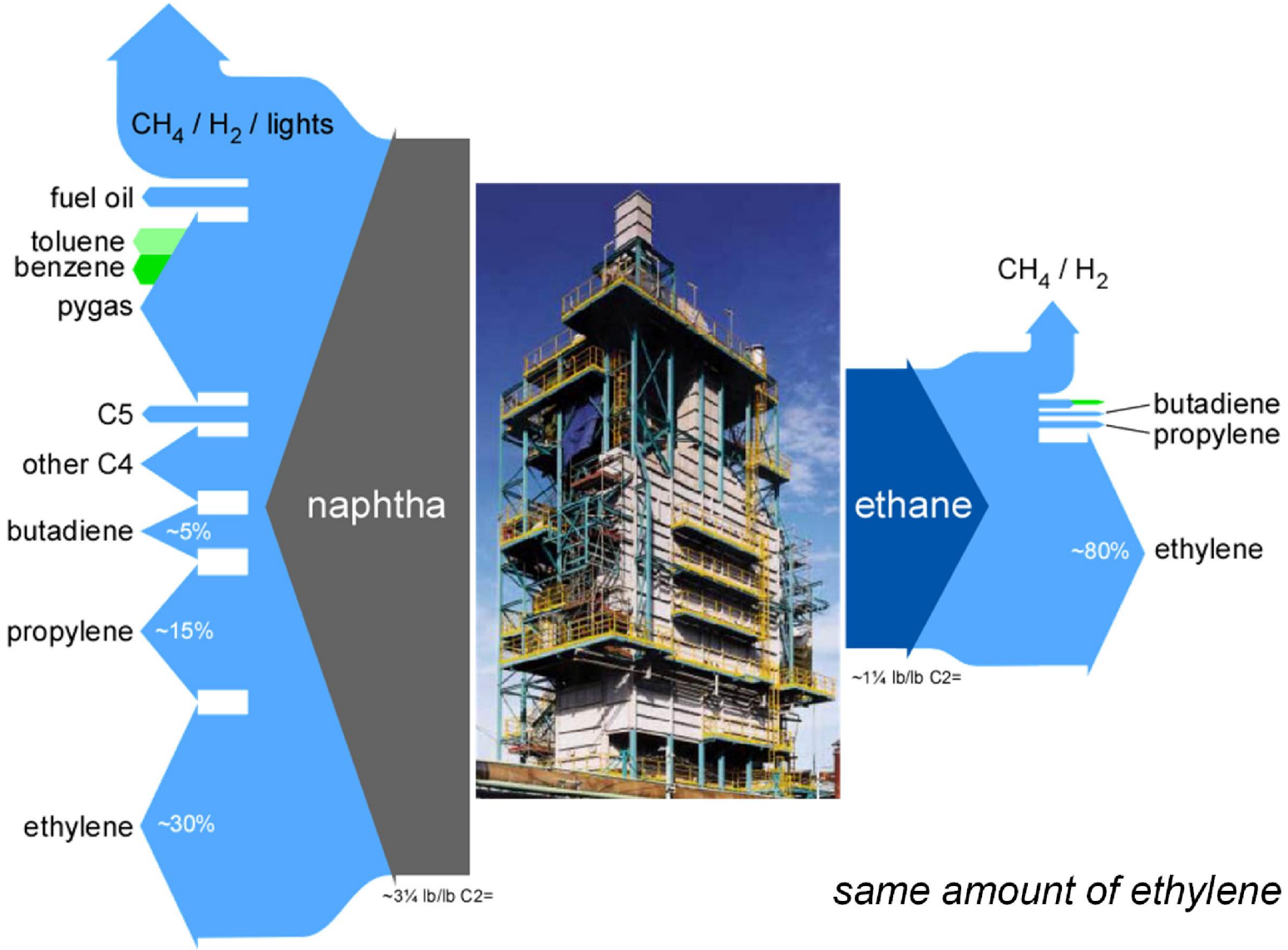
Attrition

vendor selection

recycle

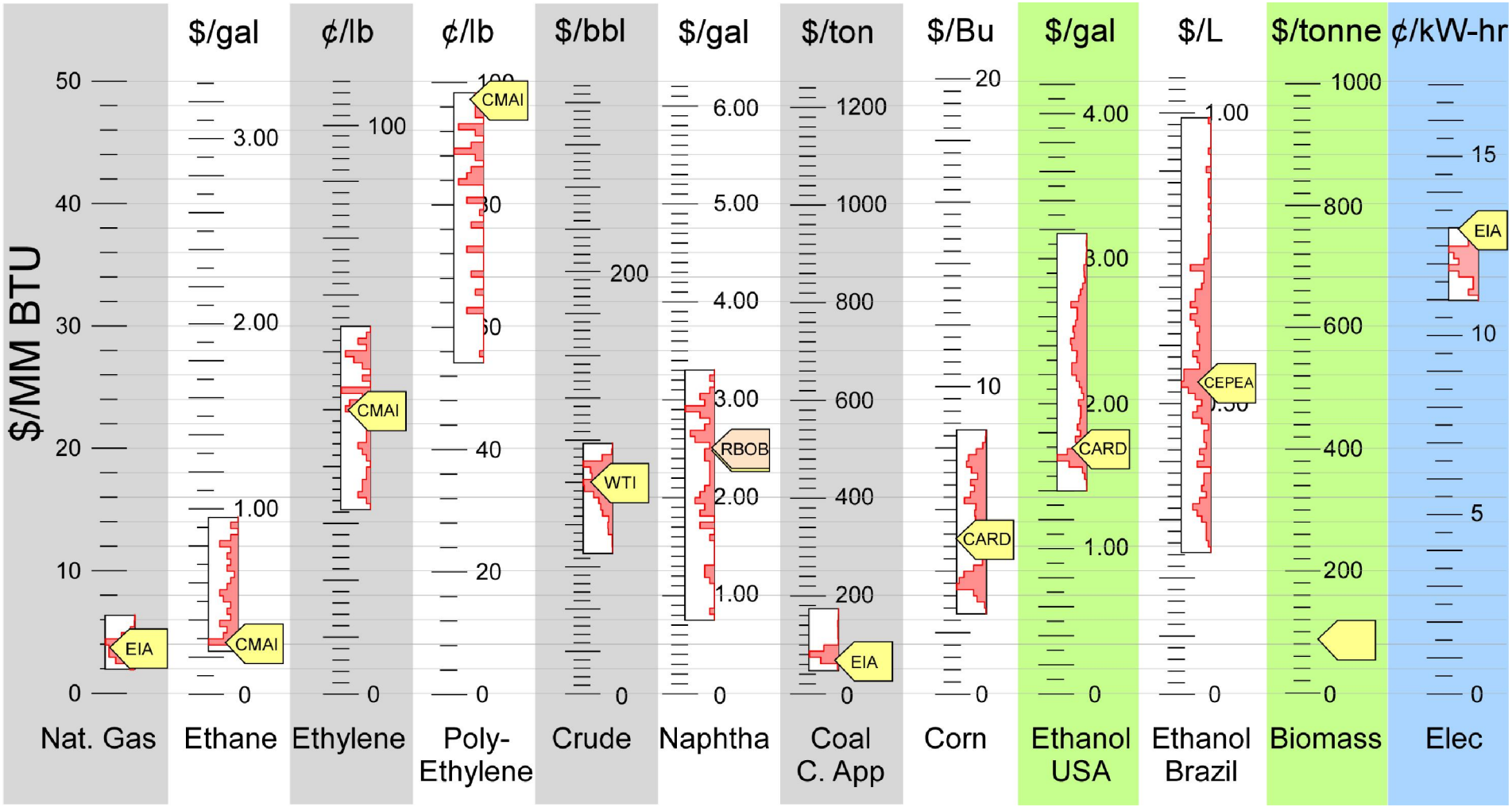


Naphtha vs Ethane Cracking Comparison



same amount of ethylene

Data Rich Slide



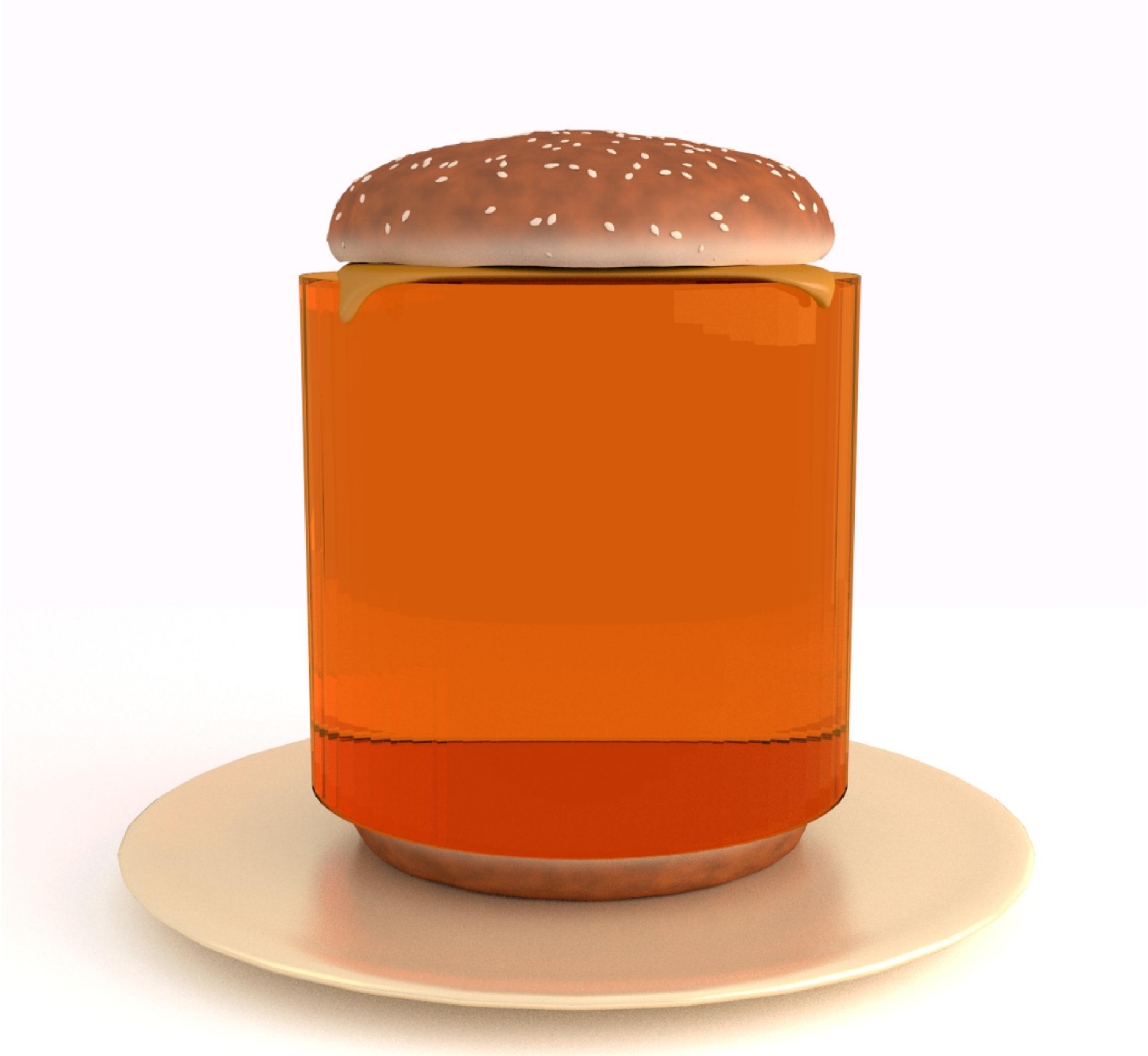
Which is better for the environment?

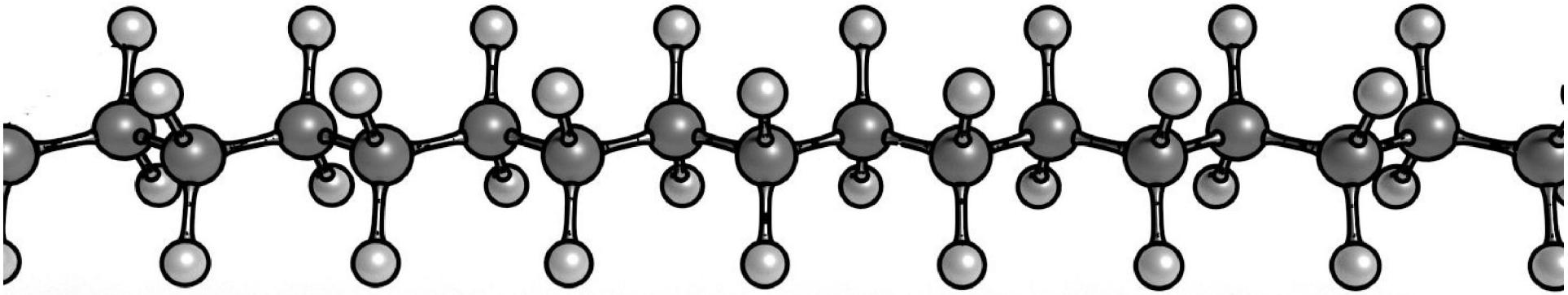
A meat-eater in a Prius

A vegan in a Hummer

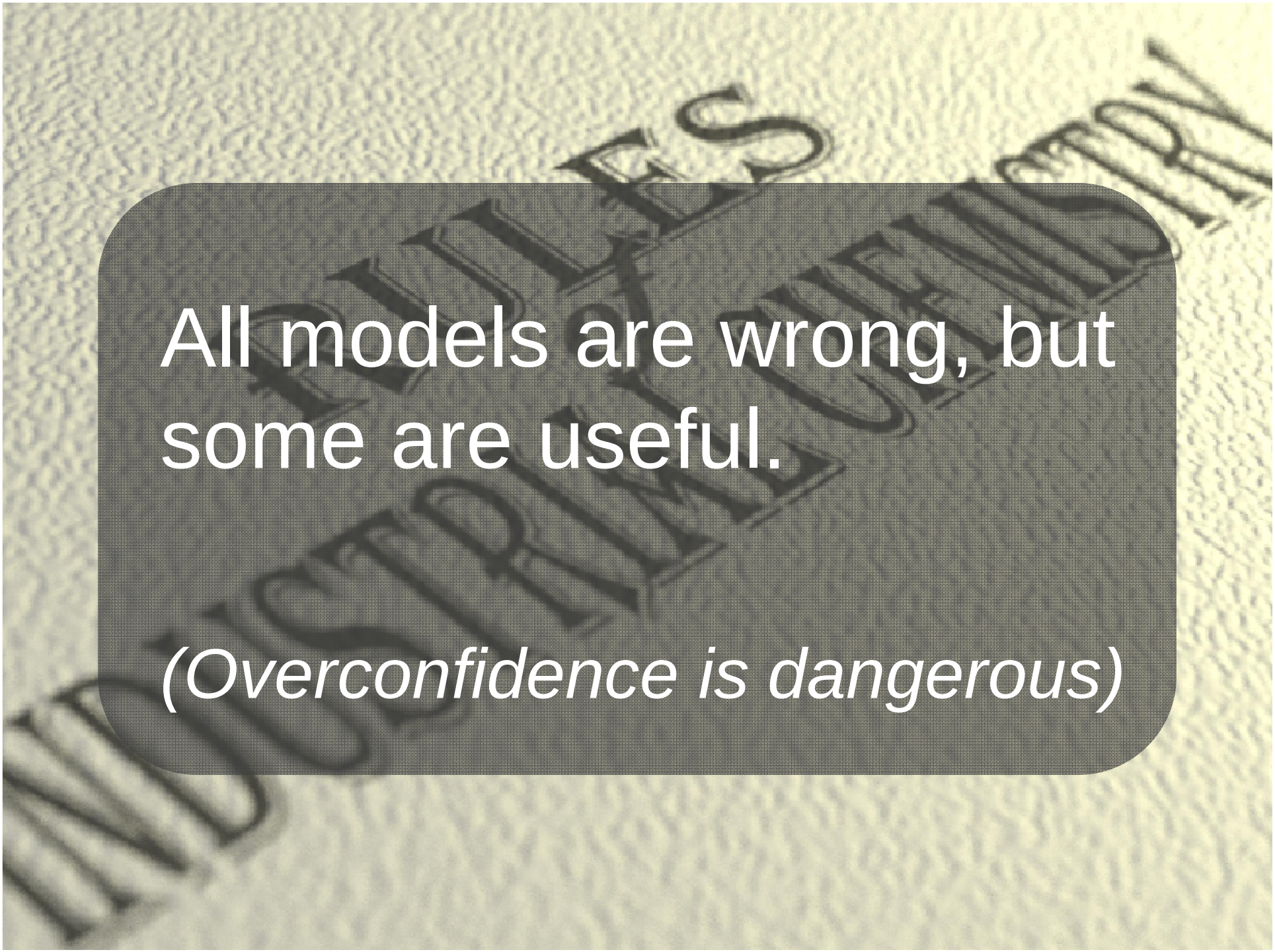

TARE

Embodied Fossil Energy

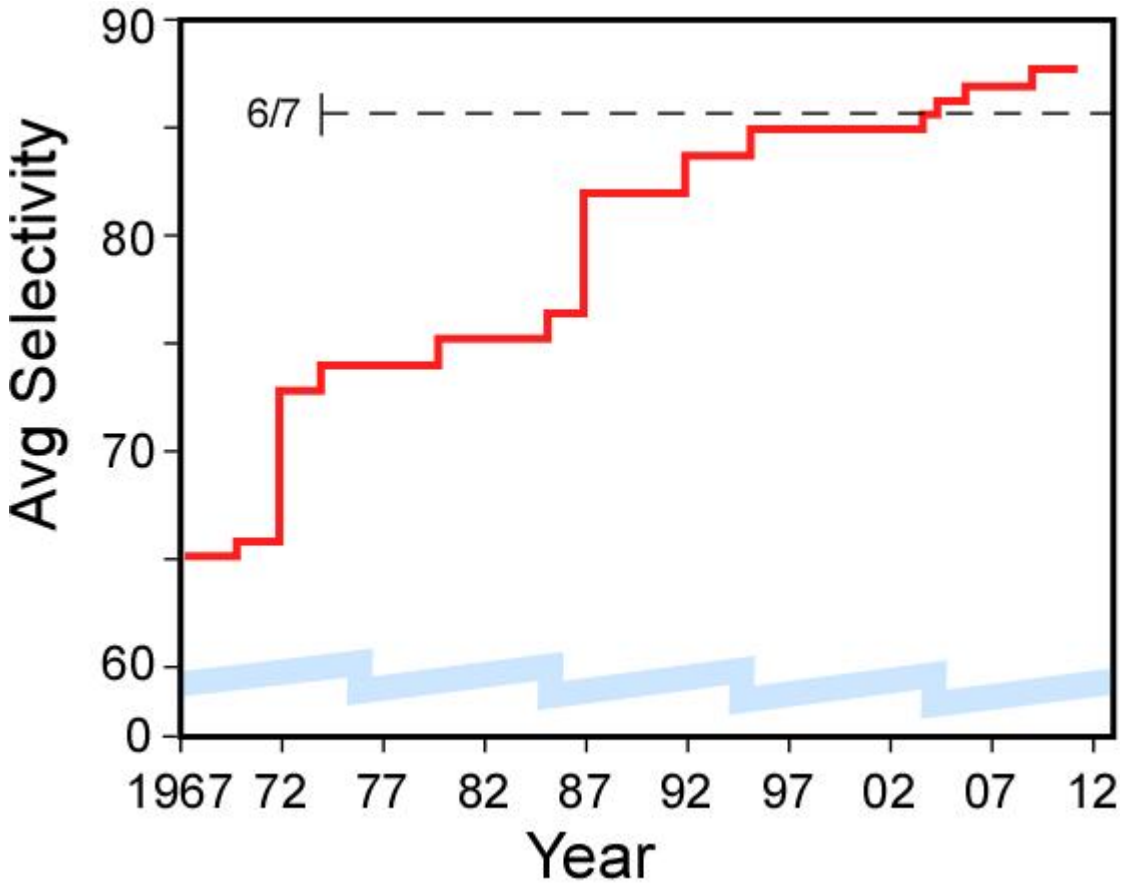




Thermodynamics is more than math, it really governs what can happen.


All models are wrong, but some are useful.
(Overconfidence is dangerous)

Ethylene Oxide Catalysis



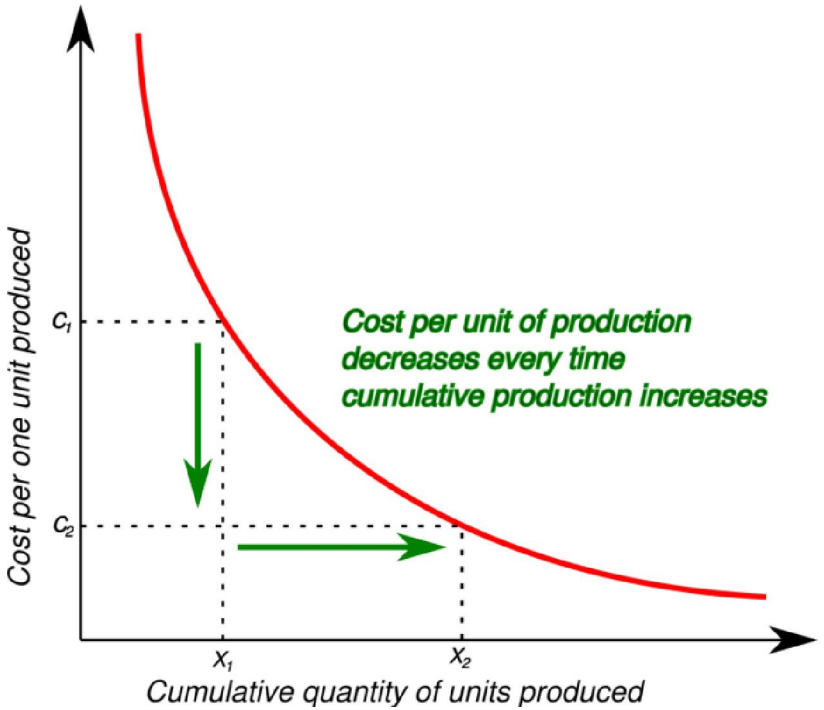
http://www.cricatalyst.com/catalysts/ethylene-oxide.html

Scale *always* wins.

Driving Costs Down

Scale

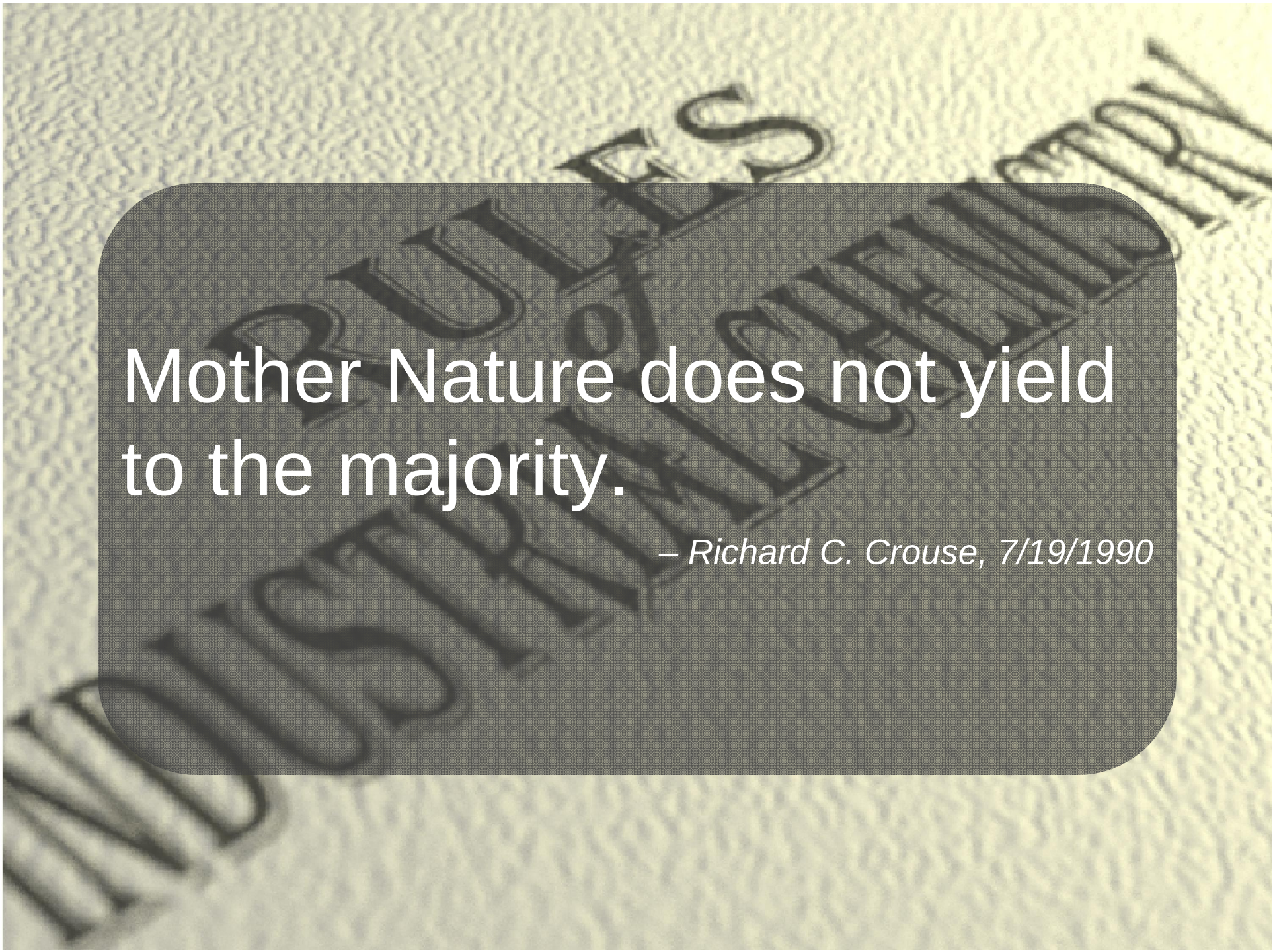
Experience



If you are moving mass around, scale reduces cost faster than experience.

A mixture of valuable chemicals is not the same as a valuable mixture of chemicals.

Cost, speed, quality – pick two


Mother Nature does not yield to the majority.
– Richard C. Crouse, 7/19/1990

Presentations

99.9999% of presentations are to *influence*. Never fall into the trap of thinking your job is only to *inform*.

Presentations

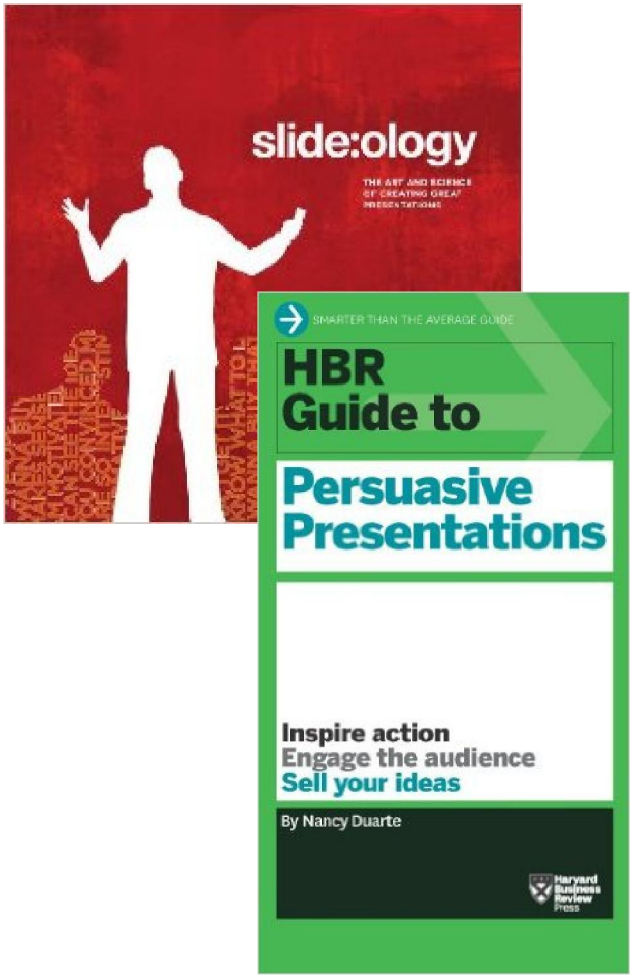
Duarte's Golden Rule

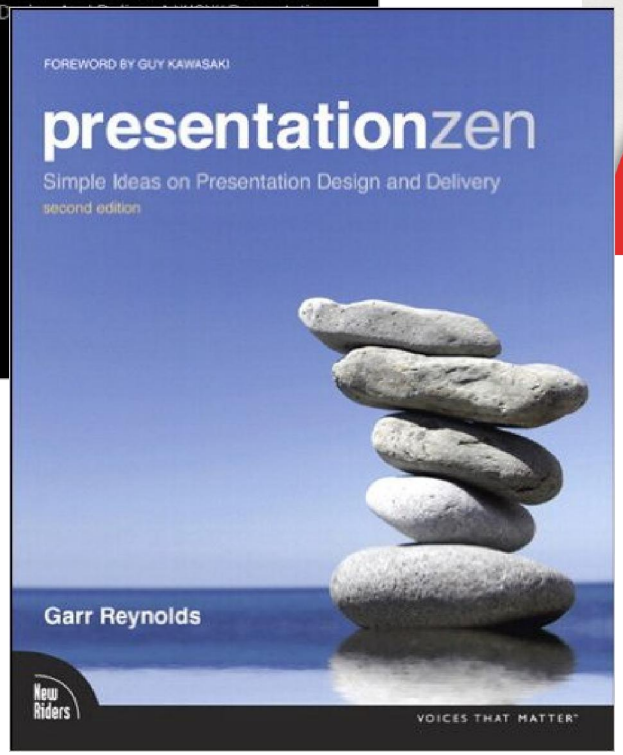
Never give a presentation you wouldn't want to sit through.

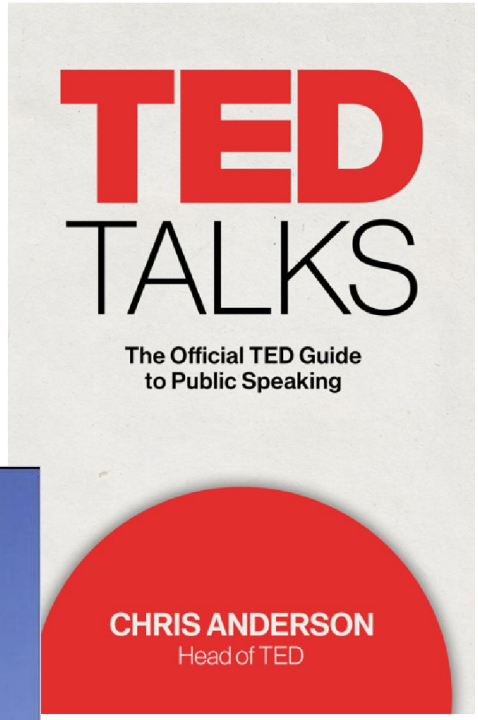
Nancy Duarte in HBR Guide

Favorite References – Display of Information

Favorite References - Presentations







Favorite References - Writing

“When does saying“I don’t know” make you look smart?”

“Whenever it is true.”

When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong.

– Arthur C. Clarke