



# Solvent development in Cesar

**Eirik Falck da Silva**

**European Research Conference on CCS Research, Development and  
Demonstration  
11 February 2008**



# Solvents

Cesar 1

Cesar 2

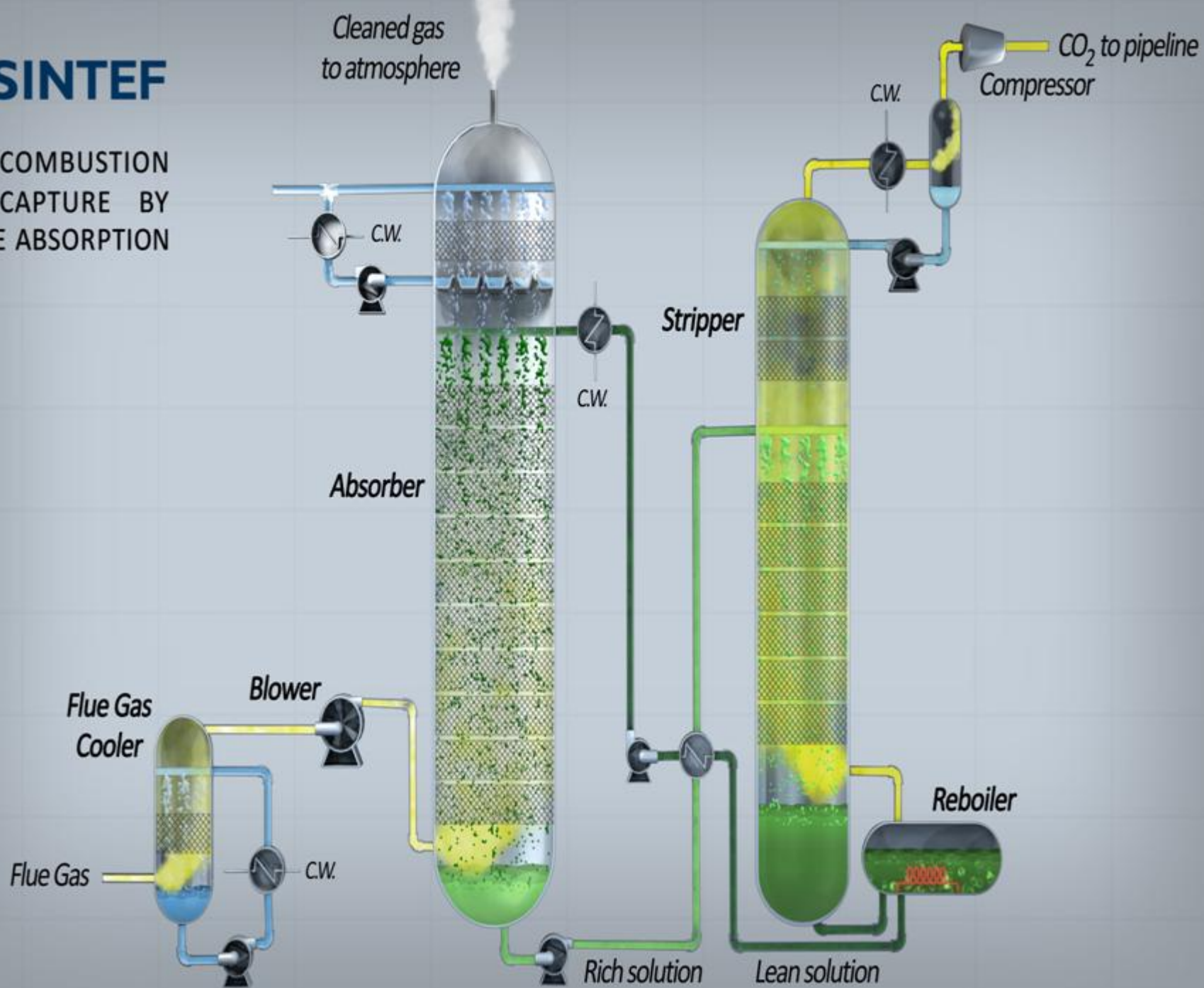
Cesar 3

Cesar 4

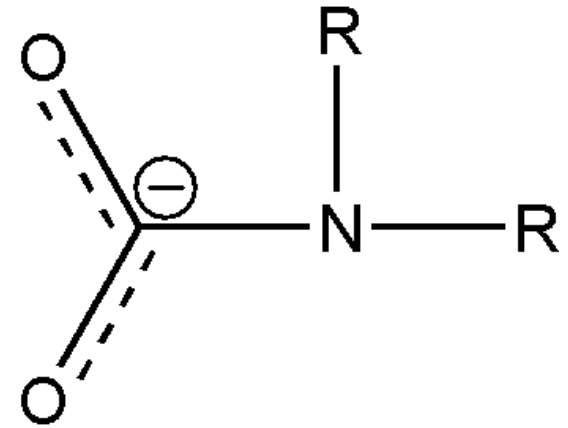
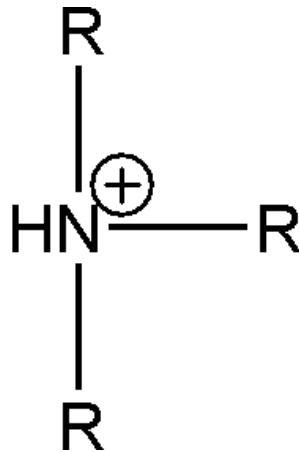
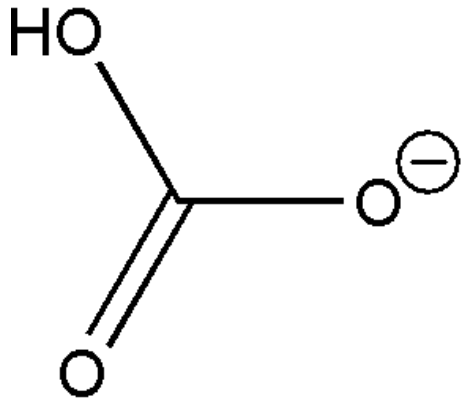
Cesar 5

Cesar 6

POST-COMBUSTION  
CO<sub>2</sub> CAPTURE BY  
AMINE ABSORPTION

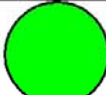

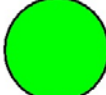

















# Chemical absorption

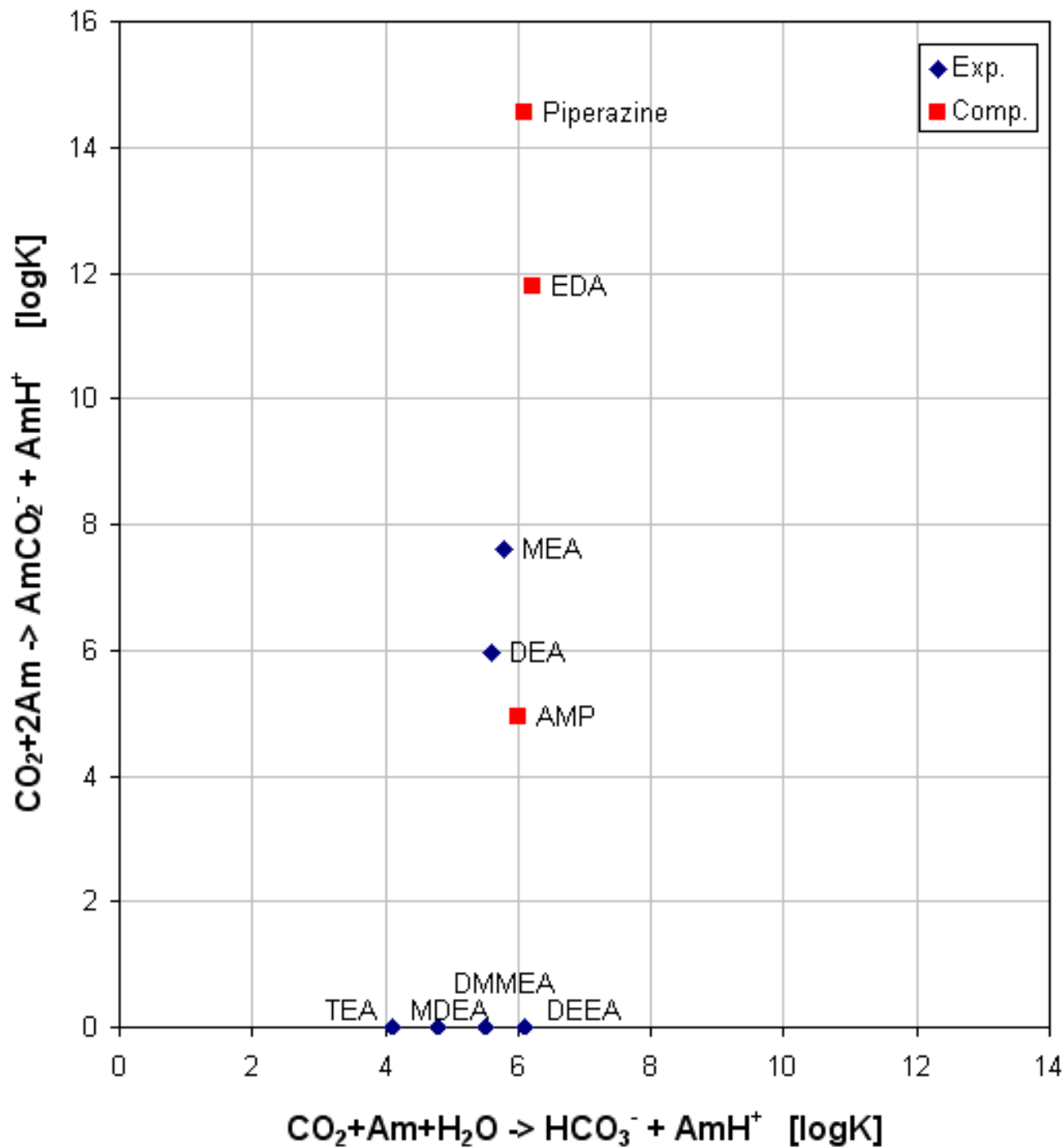


# Solvent components

- 0-order amine ( $\text{NH}_3$ )
- 1-order amines (MEA...)
- 2-order amines (Piperazine..)
- 3-order amines (MDEA..)
  
- 1-order amino acids
- 2-order amino acids
- 3-order amino acids
  
- Carbonates ( $\text{K}_2\text{CO}_3$ ...)

	Importance/ Known property	Potential Show stopper
<b>Equilibrium</b>		
<b>Kinetics</b>		
<b>Toxicity</b>		
<b>Solubility/Vaporization</b>		
<b>Corrosion</b>		
<b>Degradation</b>		
<b>Cyclic capacity</b>		
<b>Viscosity</b>		
<b>Solvent cost</b>		Screening show-stopper
<b>Foaming</b>		
<b>Precipitation</b>		





Experimental  $pK_a$  data:

Perrin, D. D. (1965)

Experimental  $K_c$  data:

Böttinger, Maiwald and Hasse (2008)

Comp. data:

da Silva and Svendsen (2006)

# WP1.1 Solvent selection, characterization and optimization

## GOALS:

- Select and characterize solvents to be tested in the pilot plants
- Solvents that meet our performance specifications
  - Energy
  - Stability
  - Plant size
  - Environmental impact
- Gather available Health, Environment and Security data

# The optimal solvent

- No solvent is perfect in all respects
- The optimal tradeoff between properties is not fully known
- A comparison between solvent systems should be based on processes optimized for each solvent system