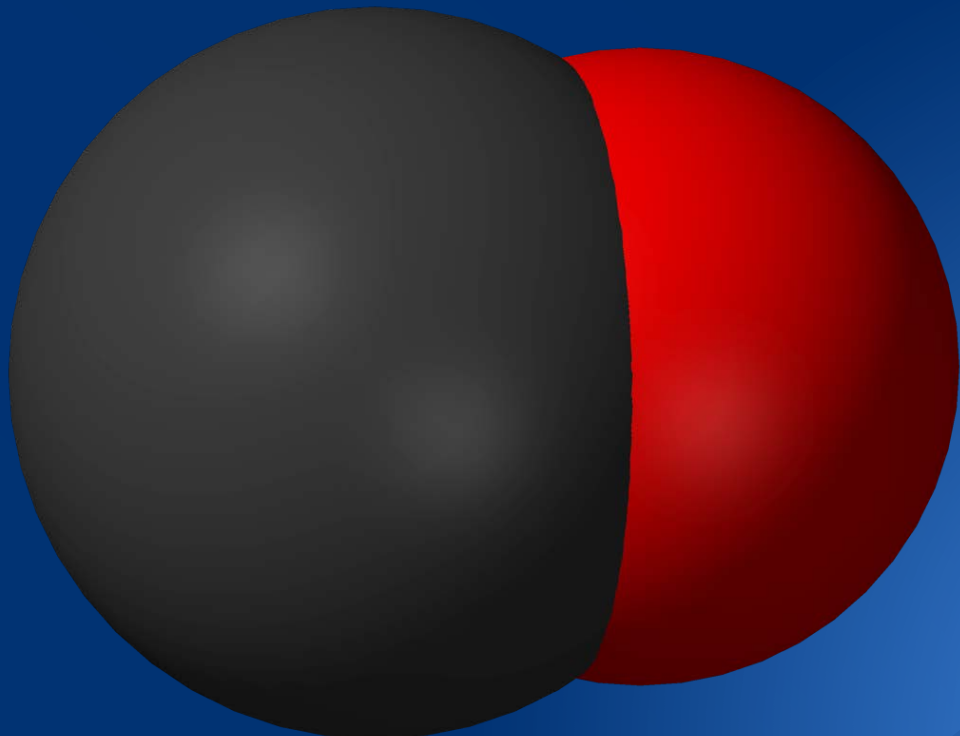


Green Chemicals From CO: The Killer Solution!

Sonny
"Always Late"
Hajare

Yasha :P



MATT!!!!

Overview

- Where CO comes from
- Chemicals from CO
 - Acetic Acid
 - Polyurethane
 - Methanol
 - Formic Acid
- Conclusion

Where CO comes from

Partial Oxidation



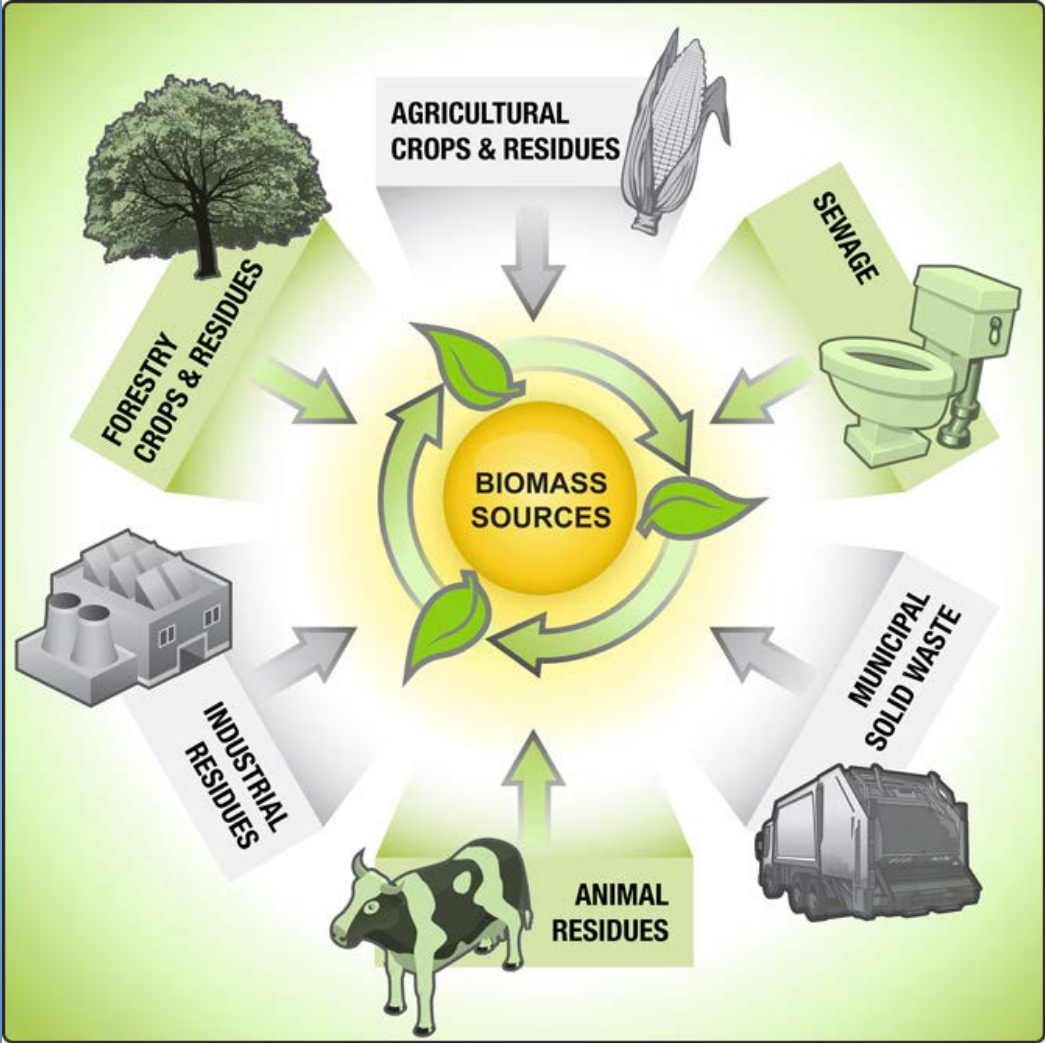
Steam Methane Reforming



Gasification



Feedstocks: Natural Gas, Biomass and Coal



Acetic Acid

- Originally made with phosgene
- Captiva vs Monsanto Processes
- Made from Methanol and CO in the presence of an Iridium or Rhodium catalyst

Acetic Acid Cont.

Monsanto- Rhodium Catalyst

- 30 to 60 atmospheres and 150 to 200 Celsius
- Methyl Iodide created
- Rate due mostly to catalyst and MeI concentrations
- Byproducts include CO₂, H₂, and propionic acid

Acetic Acid Cont.

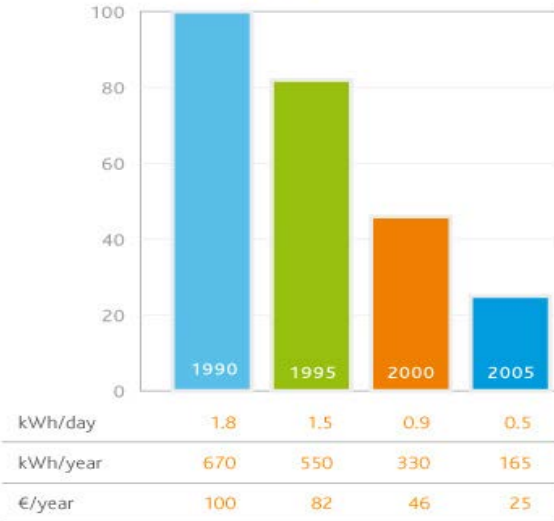
Captiva-Iridium Process

- Iridium is 18 times cheaper than Rhodium
- Promoters such as Zinc Iodide can be added
- Extremely High Purity produced with low organic iodine impurities
- Less dependent on CO partial pressure

Polyurethane

- 80 billion dollar industry by 2020
- Home construction
- Clothing, appliances, boats, car emission, electronics, flooring, medical
- Skating(wheels)!
- Carbon monoxide is used to make phenyl carbonate
- Phenyl Carbonate is reacted with amine to make urethane

Lower energy consumption due to polyurethane use



Source: CECED

Other Chemicals

- Methanol
 - Used in production of other chemicals and can be used to fuel vehicles (monster trucks)



- Formic Acid
 - Antibacterial and preservative



Conclusion

- CO can be used to create greener routes to produce chemicals
 - Acetic Acid
 - Polyurethane
 - Methanol
 - Formic Acid

References

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