

# 중국의 바이오매스 급속 열분해

# 1. 서론

# 중국의 오일 부족

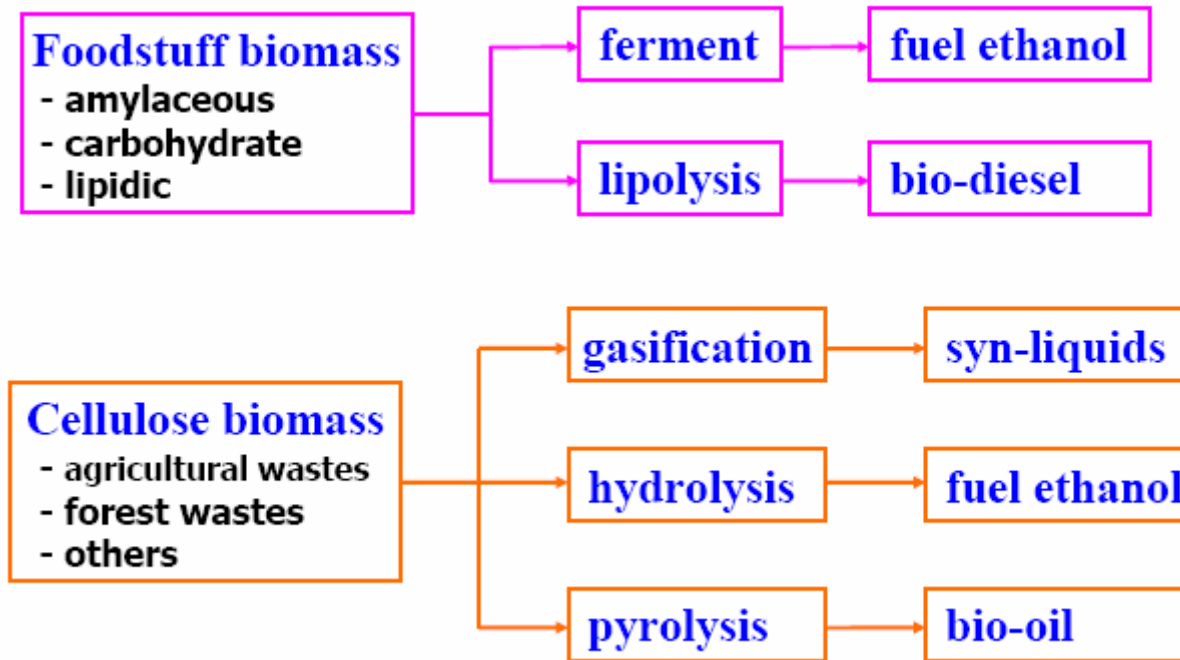
- Due to rapid growth of economy, demand for energy is also rapid growing in China.
- In 2005, 317.67 million tons of oil were consumed and 42.9% of them were imported.
- In 2020, nearly 500 million tons of oil will be consumed and more than 60% need to import.
- Oil shortage gives us opportunity to develop new technologies of alternative fuel.

# 중국의 농업부산물 생산량: 연 간 700 백만톤

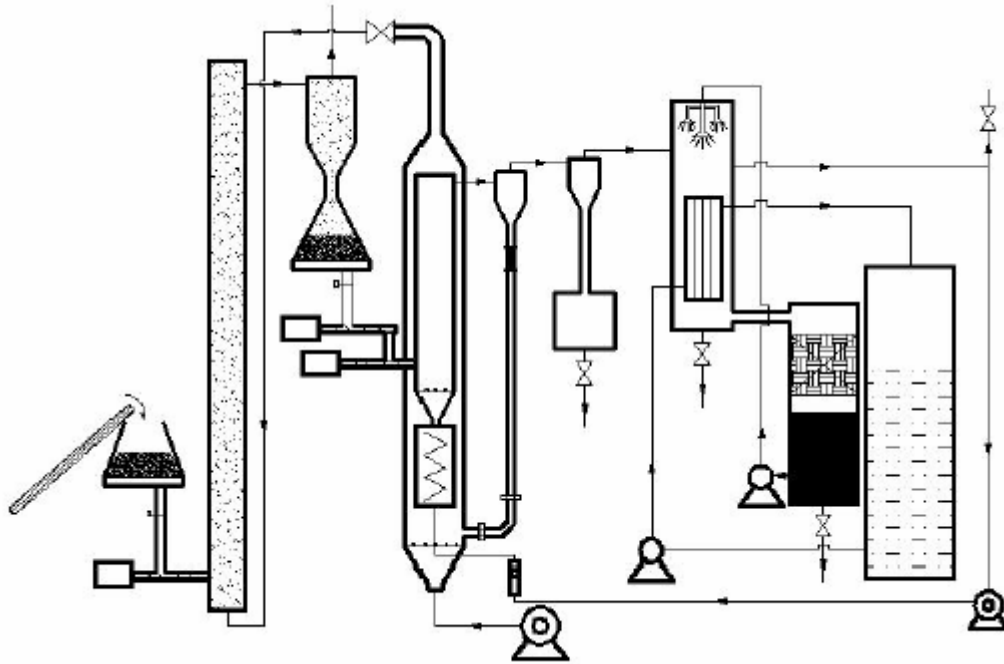


## 2. 바이오매스의 액체전환

# 바이오매스를 이용한 액체 연료 생산



# 금속 열분해 개론



# 공정 요구사항

## Drying

- <10%. Feed moisture and reaction water report to bio-oil

## Comminution

- ~2mm for fluid-bed reactor

## Fast pyrolysis

- High heating rate ( $\geq 1000^{\circ}\text{C/s}$ ), moderate temperature ( $470\sim 550^{\circ}\text{C}$ ), short residence time ( $\leq 2\text{s}$ )

## Char separation

- Efficient char separation needed

## Liquid recovery

- Quickly cool and condensation



# 파일럿 장치

- **Process capacity: 120kg/h**
- **Fluid-bed reactor**
- **Auto-thermally pyrolysis**
- **Continuously work**
- **Scrubbing with bio-oil**
- **Bio-oil yields:**
  - ≥ 50% for agricultural
  - ≥ 60% for wood

# 실험결과

Feedstock	Rice husk	Corn stalk	Cotton Stalk	Sawdust
Bio-oil yields / wt%	51	57	56	60
Caloric value / MJ/kg	16.16	16.41	16.77	16.91
Energy efficiency / %	60	63	63	64
Moisture content / wt%	27.4	28.2	27.8	26.6
Specific gravity/ -	1.1~1.2	1.1~1.2	1.1~1.2	1.1~1.2
Viscosity at 40°C and 25% water	50~120cP	50~120cP	50~120cP	50~120cP
pH	2.8~3.5	2.8~3.5	2.8~3.5	2.8~3.5

# 바이오오일 주성분

Chemical compound identification	Quantification (Area% of GC-MS)	Chemical compound identification	Quantification (Area% of GC-MS)
Acetic acid	17.72	2,5-diethoxy-tetrahydrofuran	2.66
methyl acetate	5.32	2-hydroxy-3-methylcyclopent-2-enone	2.14
ethyl isobutyrate	0.36	1-(3,5-dimethoxyphenyl)ethanone	0.65
furan-2-carbaldehyde	4.83	4-allyl-2,6-dimethoxyphenol	0.44
2-oxopropyl acetate	1.04	4-hydroxy-2-methoxybenzaldehyde	6.84
phenol	2.14	2,5-dimethoxybenzaldehyde	2.40
o-cresol	1.12	2-methoxy-4-methylphenol	1.67
p-cresol	1.30	2-methoxyphenyl acetate	1.95
1,2-benzenediol	5.55	4-ethyl-2-methoxyphenol	0.45
m-cresol	4.67	4-allyl-2-methoxyphenol	1.91
anthracene	0.80	3-methylbenzaldehyde	2.86
pyrene	0.52		