

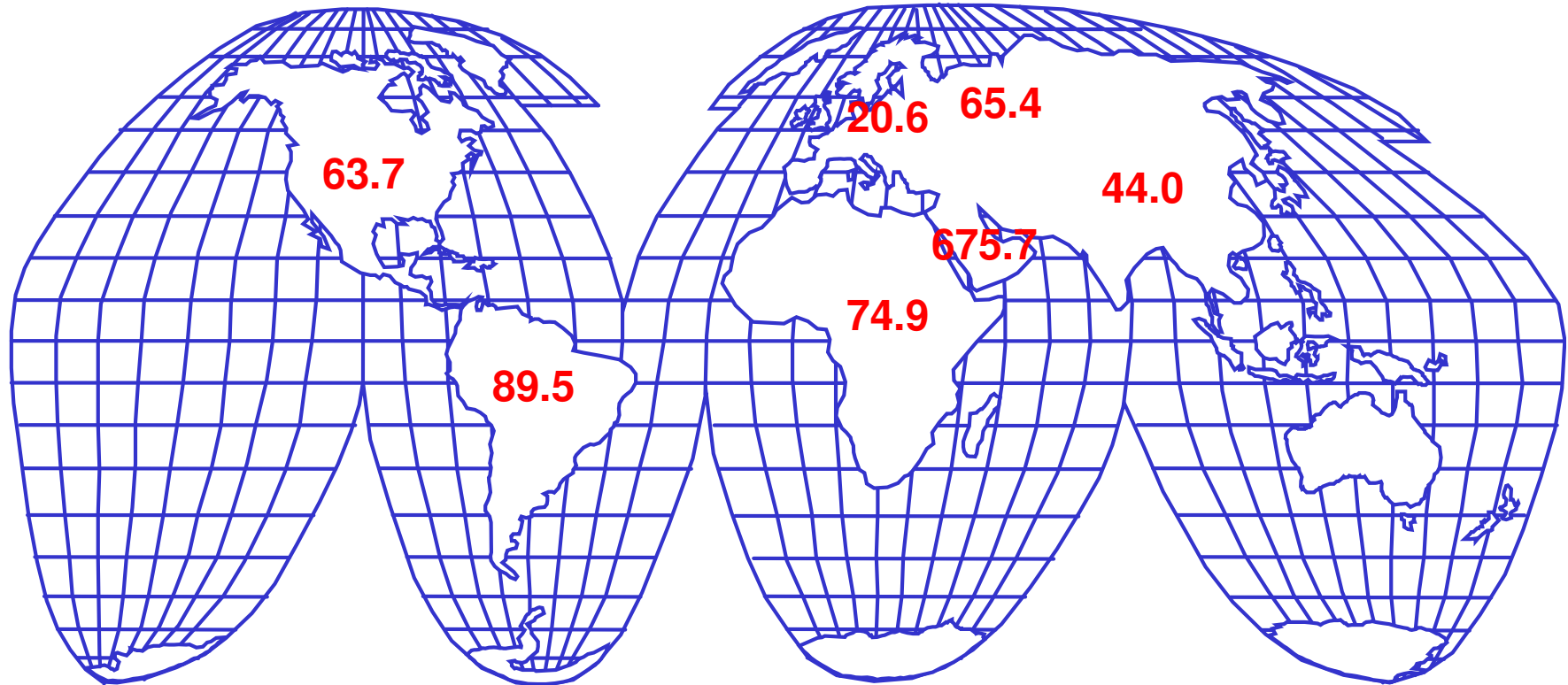
# *A Green Chemistry Module*



## **Petretec – Dupont's Technology for Polyester Regeneration**

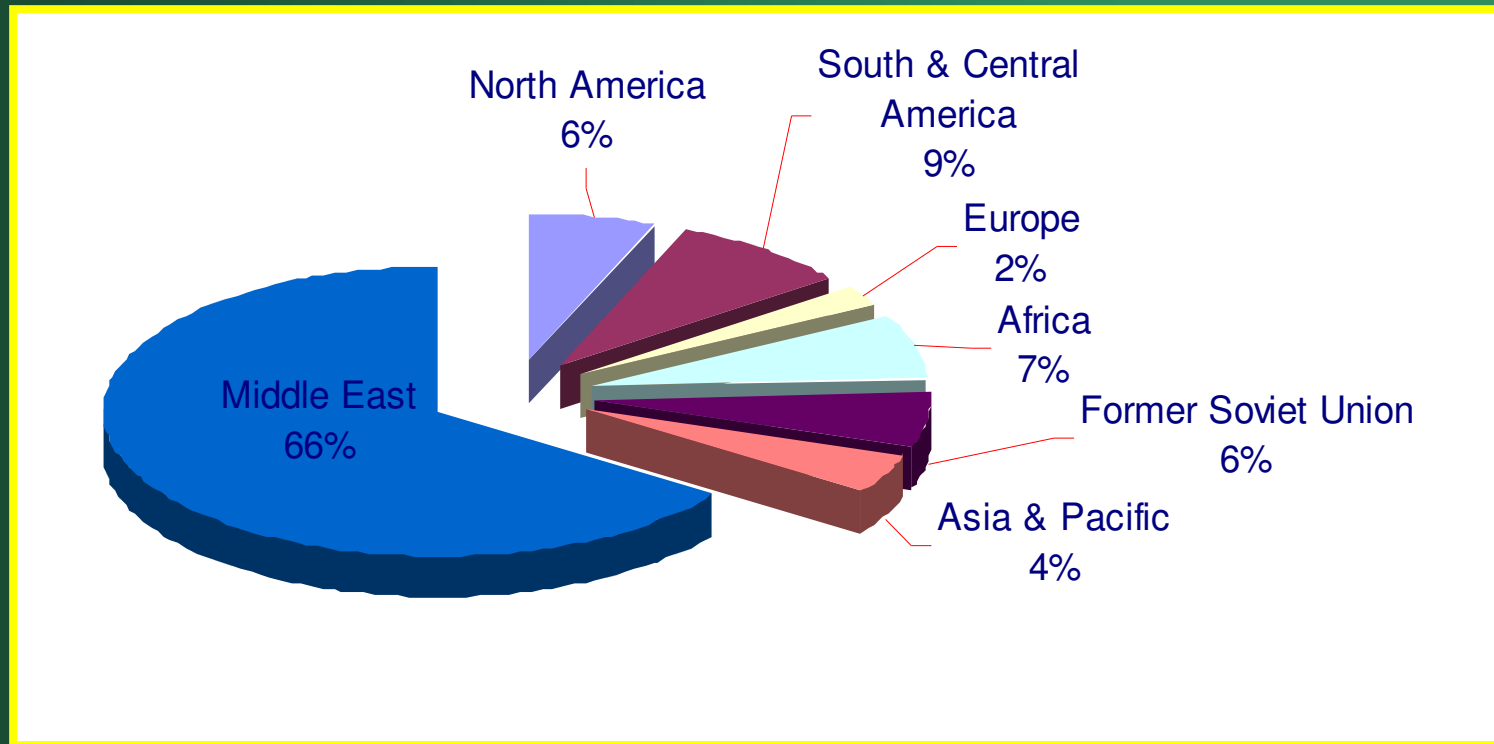
*Presidential Green Chemistry Challenge Award*

# *World Proven Reserves of Crude Oil*



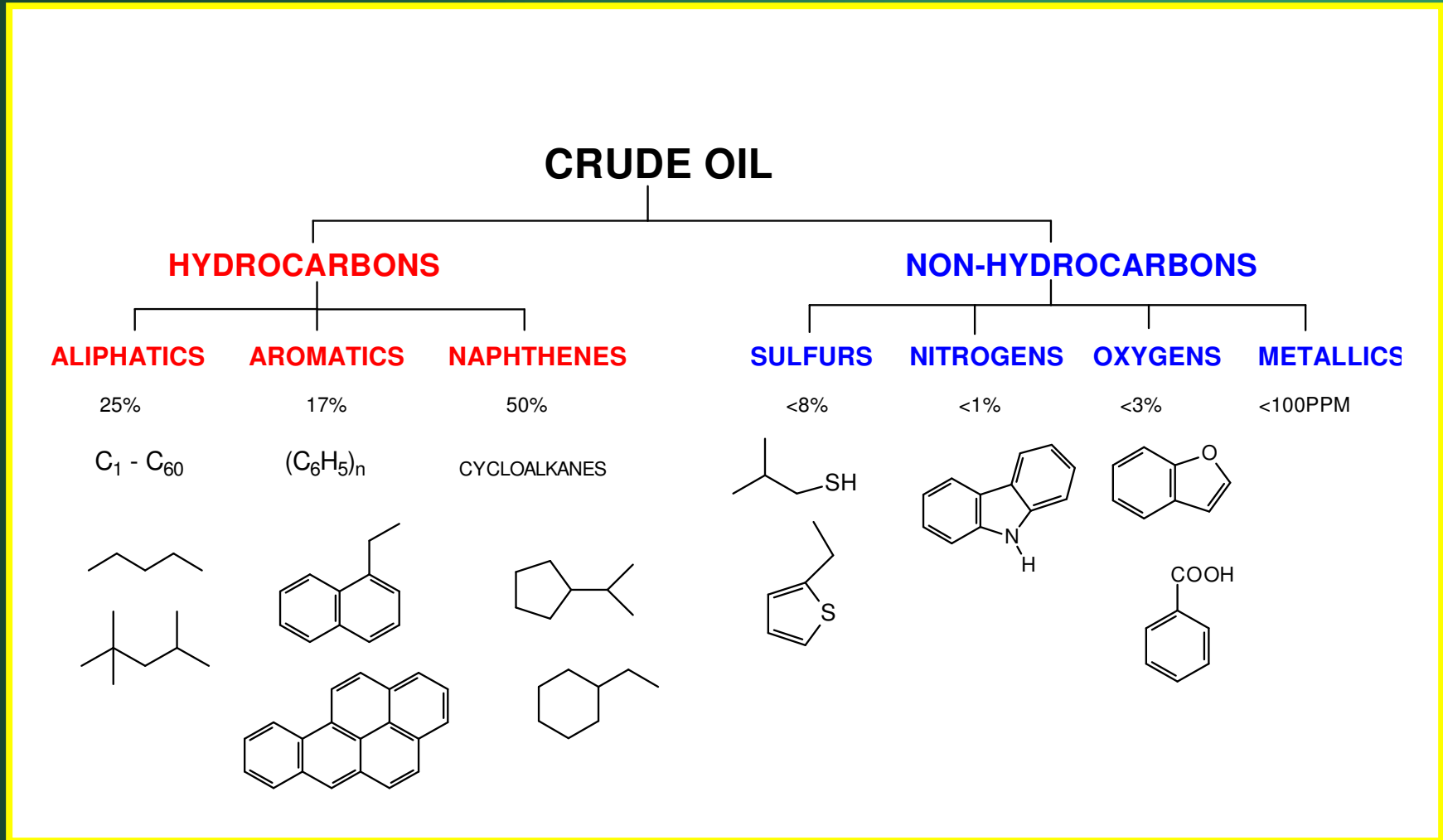
thousand million barrels

# *World Proven Crude Oil Reserves*

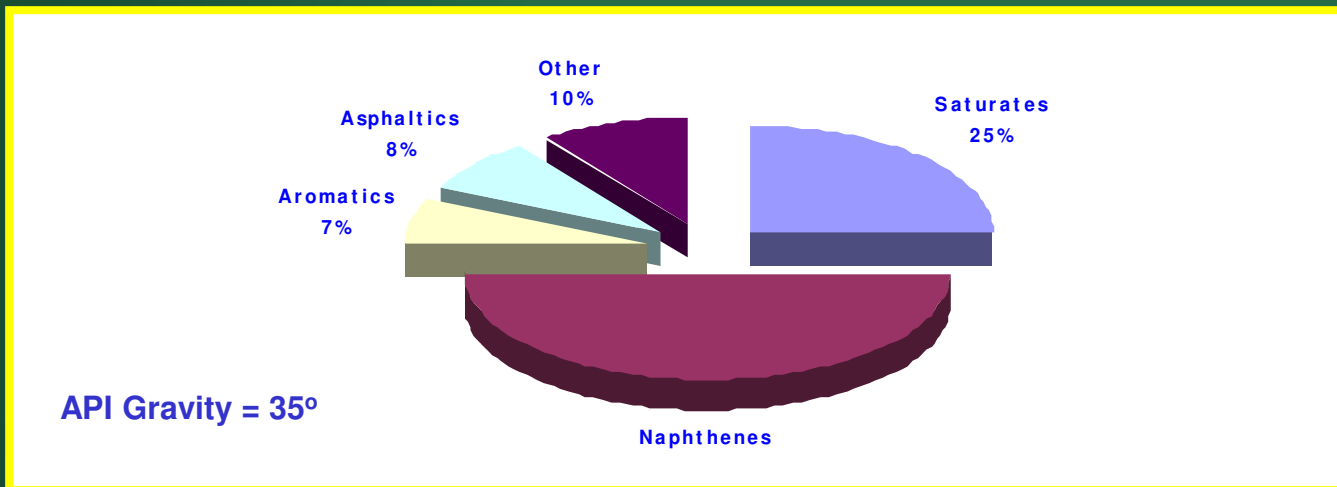
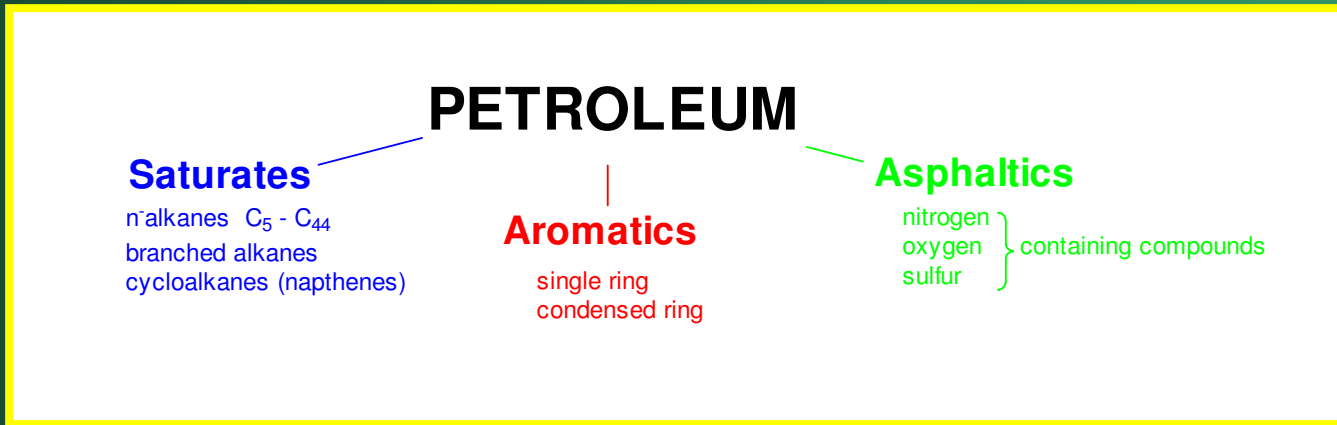


as percent of 1296 thousand million barrel total

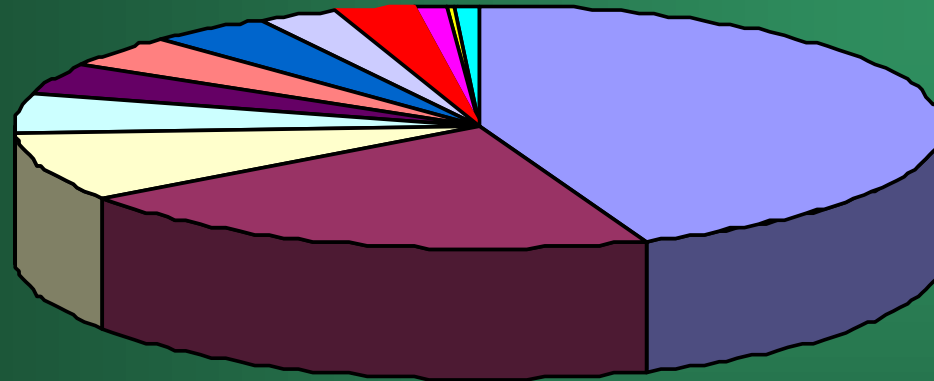
# Composition of Crude Oil



# Crude Oil Classification

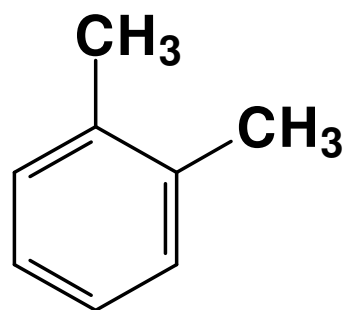


# *The Uses of Crude Oil*

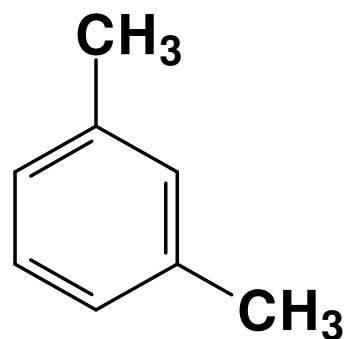


- |                                   |                        |
|-----------------------------------|------------------------|
| ■ Gasoline                        | ■ Distillate Fuel Oil  |
| ■ Kerosene Jet Fuel               | ■ Residual Fuel Oil    |
| ■ Liquefied Refinery Gases        | ■ Still Gas            |
| ■ Coke                            | ■ Asphalt and Road Oil |
| ■ <b>PETROCHEMICAL FEEDSTOCKS</b> | ■ Lubricants           |
| ■ Kerosene                        | ■ Other                |

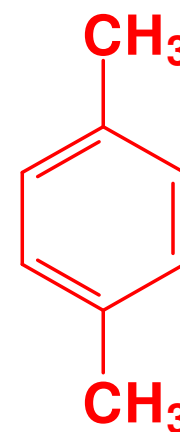
# *The Xylenes*



*ortho*



*meta*



*para*

**Boiling Point**  
**Melting Point**

144°C  
-25°C

139.3°C  
-47.4°C

137-138°C  
13-14°C

**CRUDE**

Petroleum delivered from well field

**DESALTING**

Water washing to remove impurities

**REFINING**

Distillation to separate by boiling point ranges

**REFORMING**

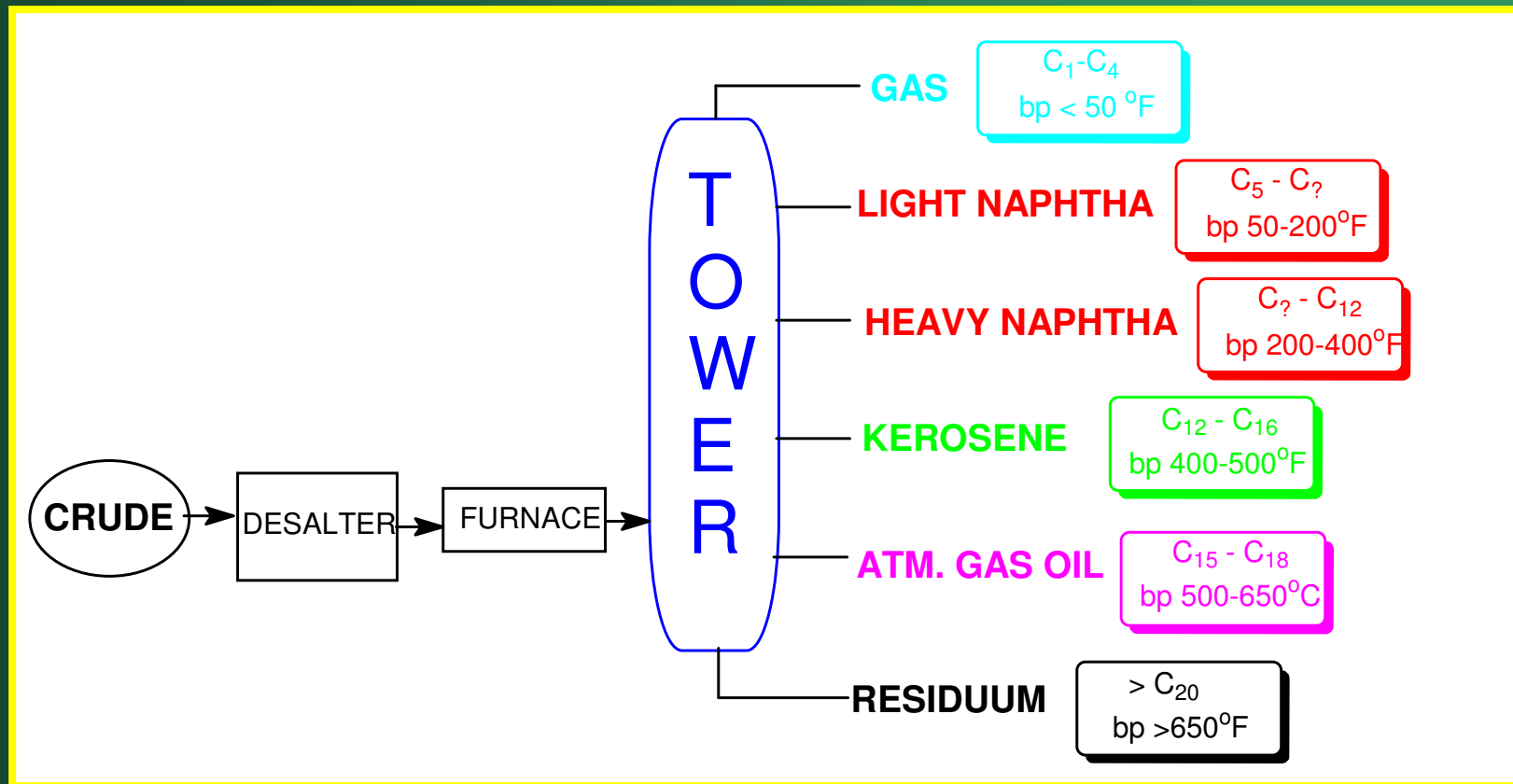
Conversion reactions to alter molecular structures

**BLENDING**

Mixing to obtain maximum commercial characteristics

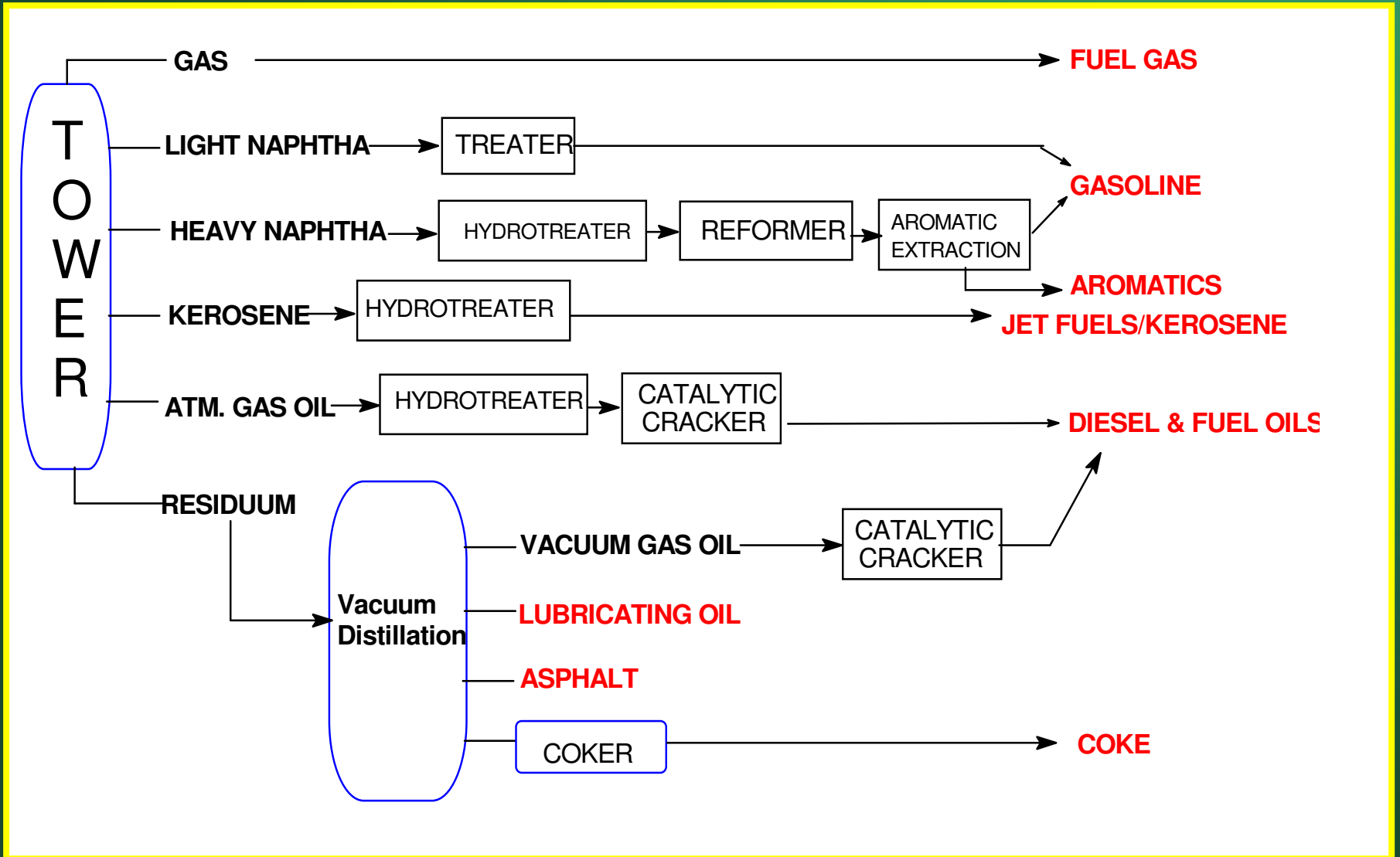


# Petroleum Refining

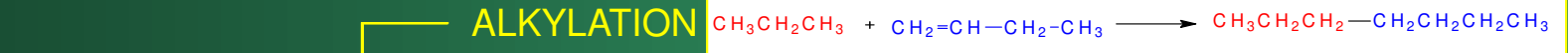
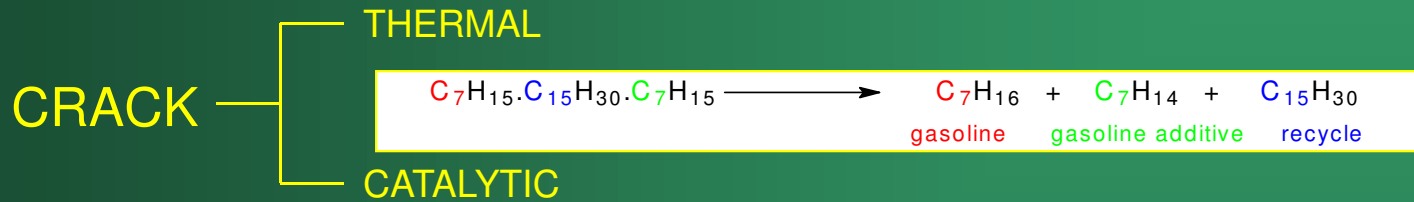


*Distillation – separation by boiling point*

# Petroleum Refining



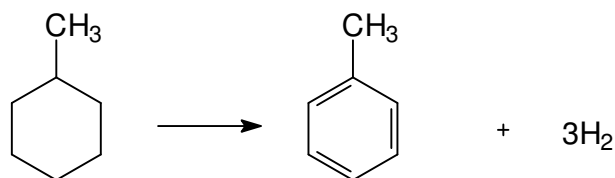
# Conversion Reactions



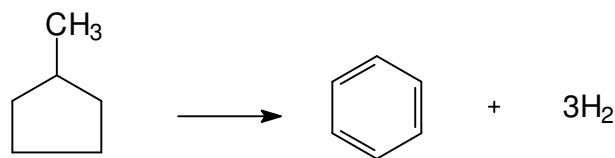
- REARRANGE
- REFORMING
  - ISOMERIZATION
- Dehydrogenation
  - Dehydroisomerization
  - Isomerization
  - Dehydrocyclization
  - Hydrocracking

# Catalytic Reforming – Conversion Reactions

## Dehydrogenation of cycloalkanes to aromatics



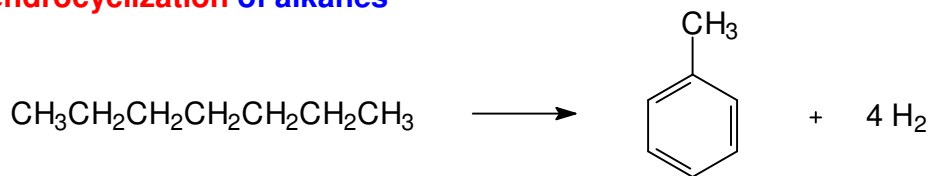
## Dehydroisomerization of cyclopentanes to aromatics



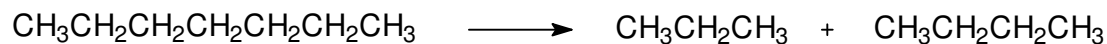
## Isomerization of alkanes



## Dehydrocyclization of alkanes

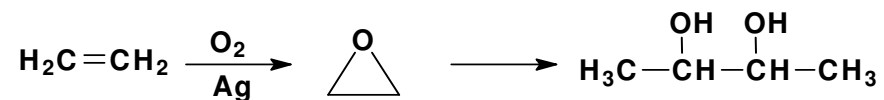


## Hydrocracking of alkanes

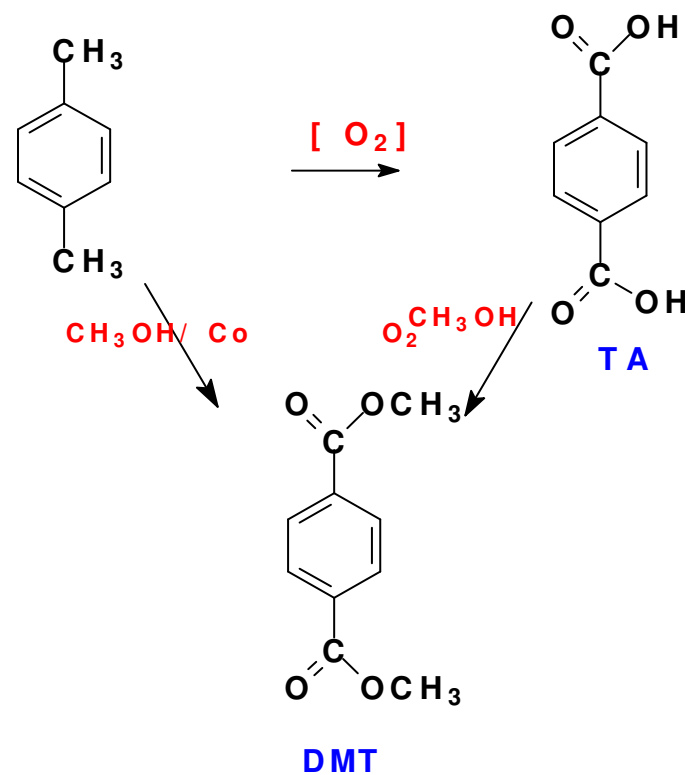


# Preparation of PET monomers

## Formation of ethylene glycol

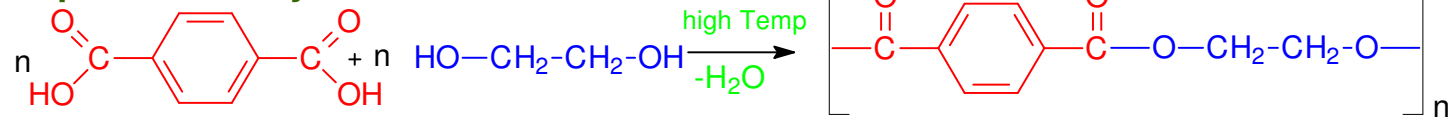


## Formation of TA and DMT

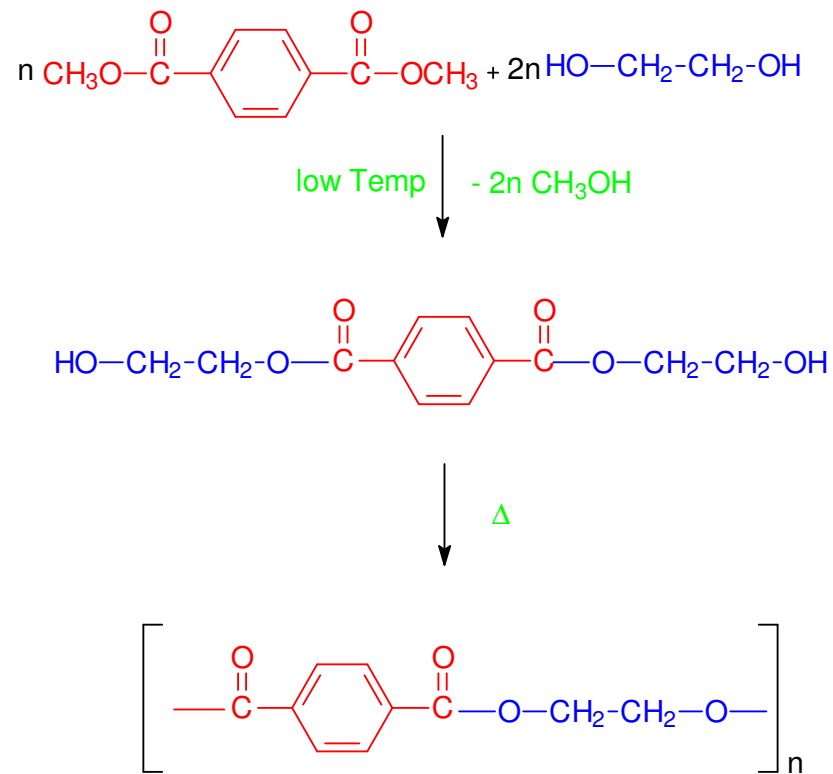


# PET Polymerization Reactions

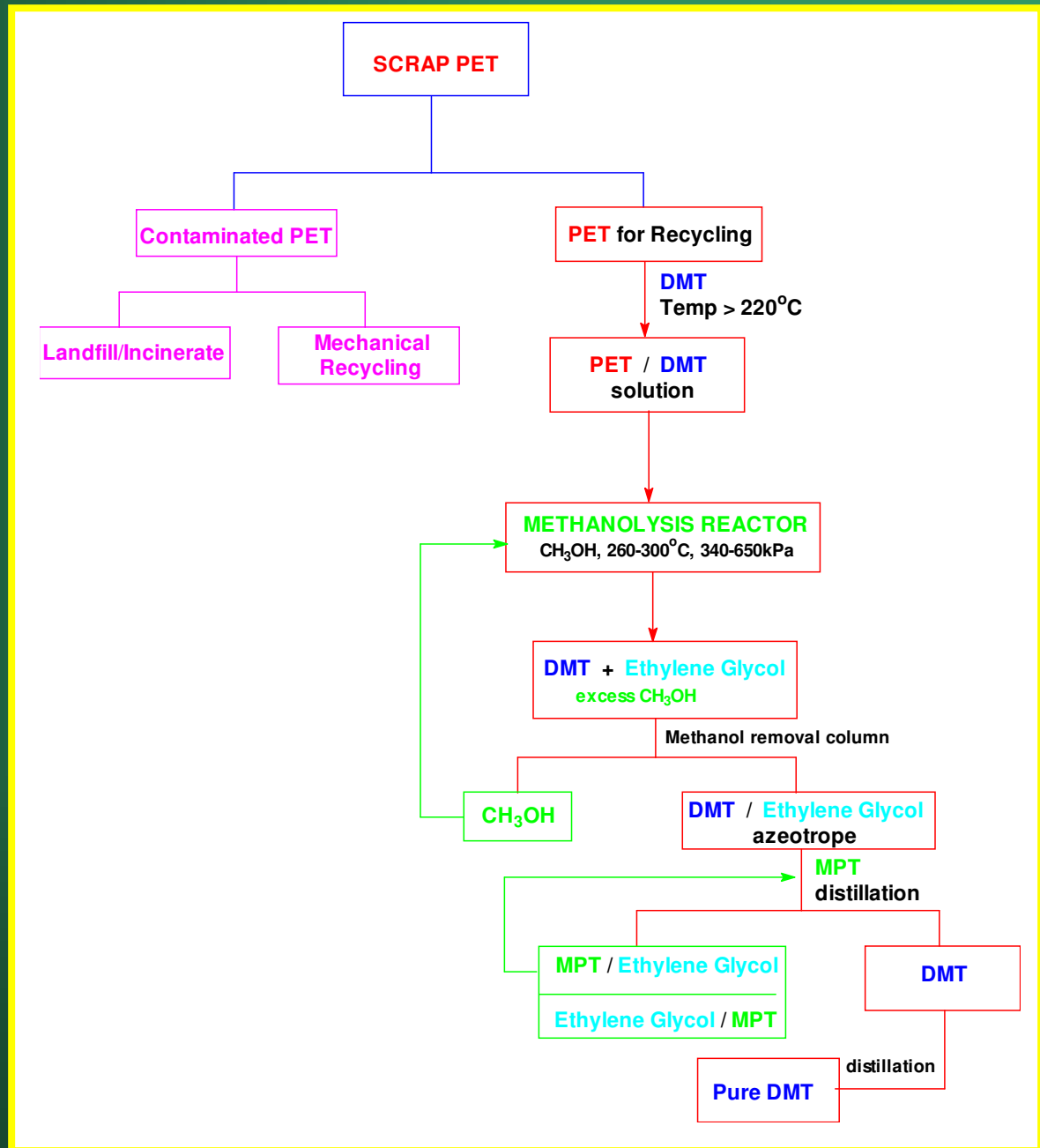
## Step Growth Polymerization - Condensation



## Ester Interchange - Transesterification

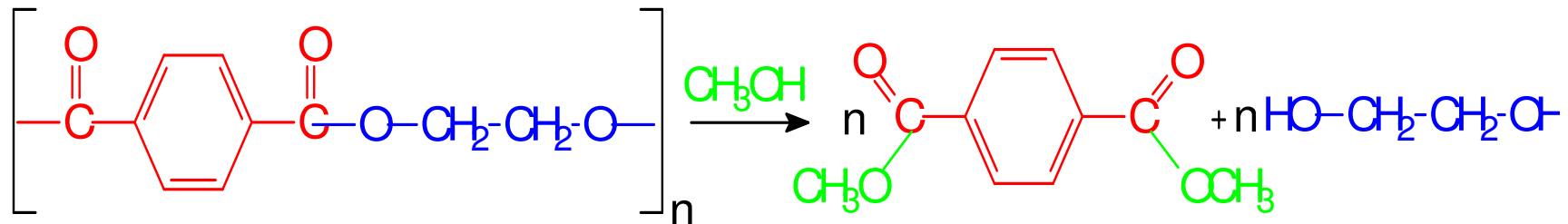


*The Dupont  
Petretec  
Process  
For  
Polyester  
Regeneration*



# *Petretec Polyester Regeneration*

## Methanolysis Reactor



260-300°C

340-650 kPa