

CLL371 | Chemical Process Technology and Economics

# $\text{NH}_3$ PRODUCTION FROM $\text{H}_2$ AND $\text{N}_2$

Presentation by

**Aman Rajoria** 2020CH70153

**Abhijeet Gautam** 2020CH10069

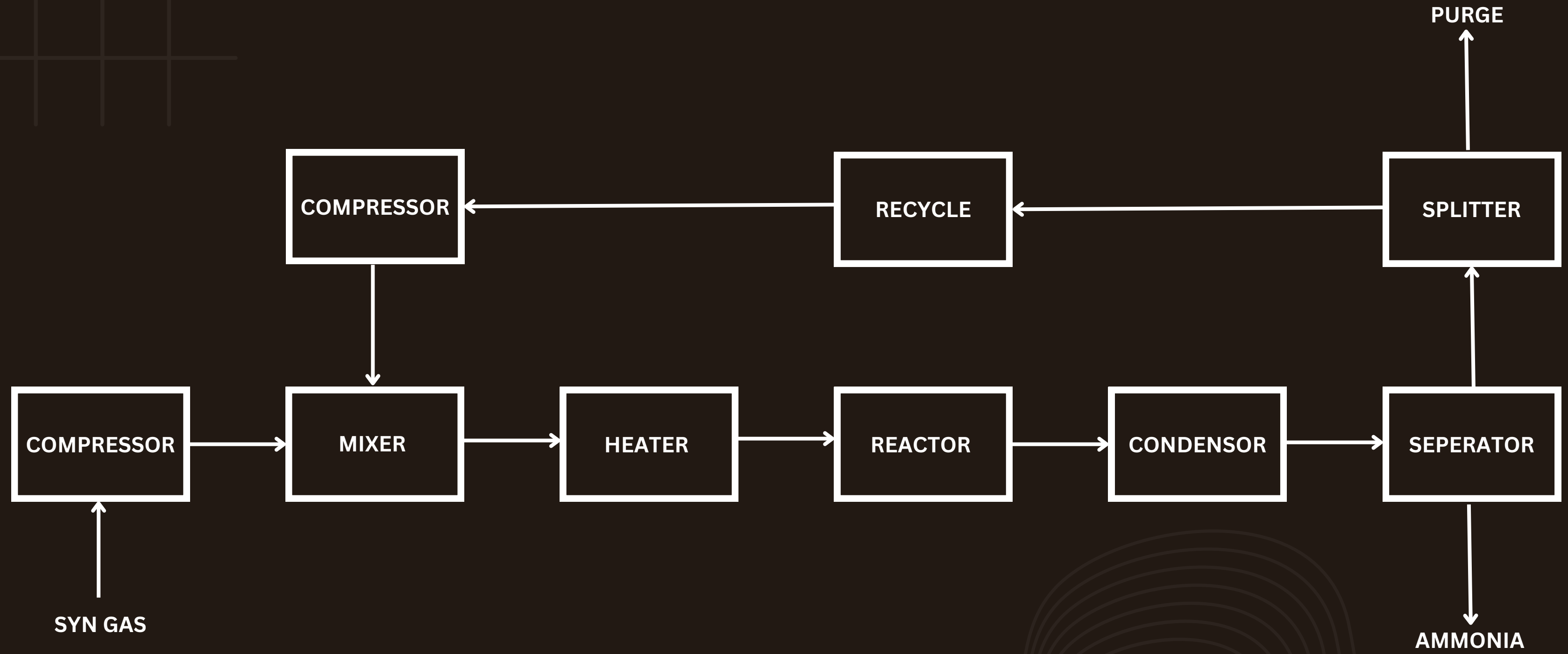
**Avik Ghosh** 2020CH10081

**Aryaman Das** 2020CH10077

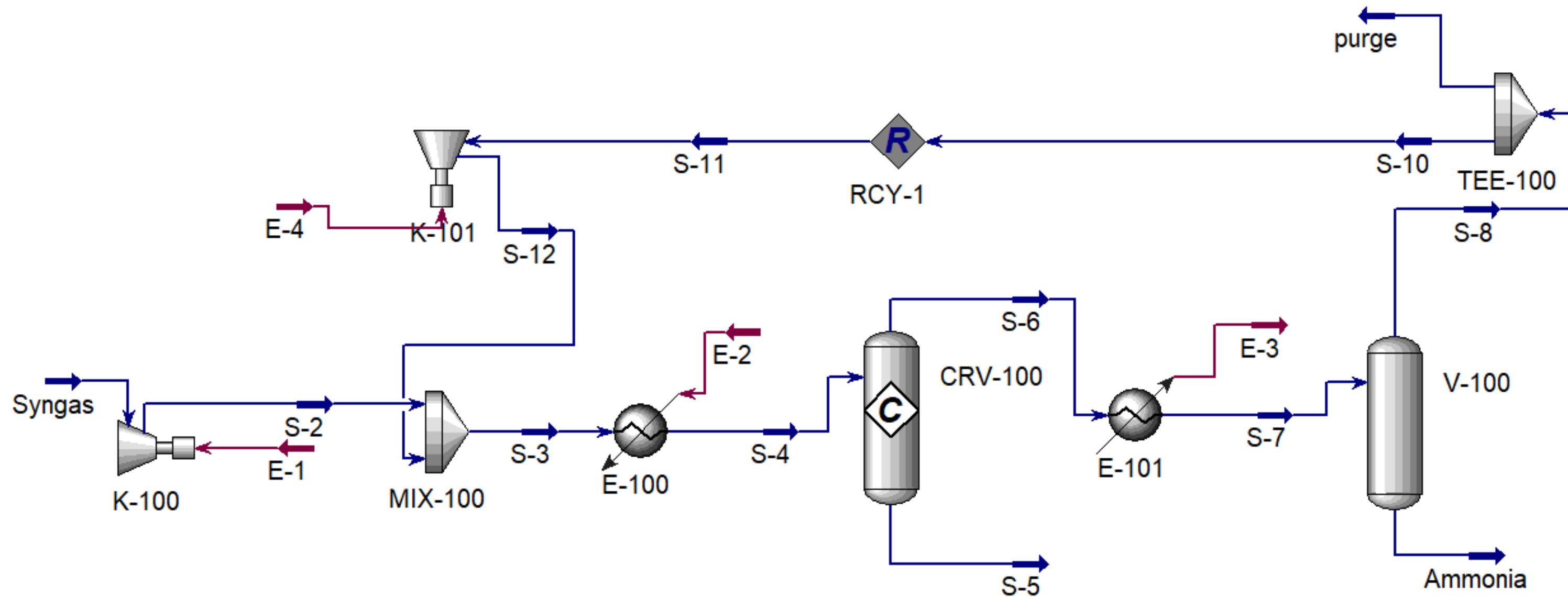
**Chirag Khandelwal** 2020CH70162

**Tanishq Yadav** 2020CH10138

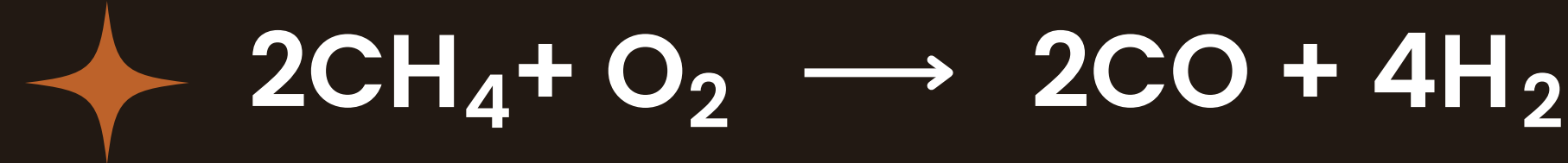
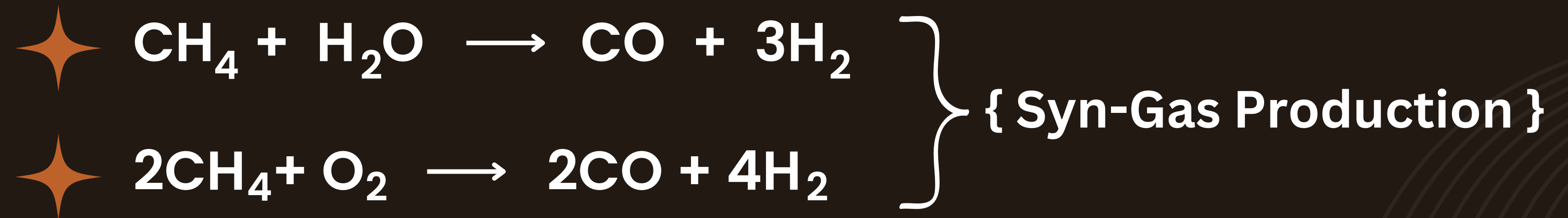
# Block Diagram



# Process Flow Diagram



# Reaction Involved



{ Syn-Gas Production }

# Syn-Gas Conditions

## {Feed Conditions}

- ✦ Temperature = 280 C
- ✦ Pressure = 25.5 bar
- ✦ Molar Flow Rate = 7000 kgmol/h

### MOLAR CONCENTRATIONS

- ✦ N<sub>2</sub> = 0.2474
- ✦ H<sub>2</sub> = 0.7372
- ✦ CO = 0.0024
- ✦ Ar = 0.0027
- ✦ CH<sub>4</sub> = 0.0103

# Equipment Specifications

## Compressor 1

Delta P = 249.5 bar  
Adiabatic efficiency = 75%

## Cooler

Temperature = 10 C  
Pressure drop 100bar

## Heater

Temperature = 500 C  
Pressure drop = 0.1 bar

## Purge rate

1% of S-8 Steam

## Conversion reactor

Conversion = 40%  
Base component : Nitrogen

## Compressor 2

Delta P = 100.1 bar  
Adiabatic Efficiency = 75%



# Stream Conditions

Stream No.	Stream Description	Contents	Temp.	Pressure (bar)	Mass flow rate (kg/hr)
1	Gas feed to compressor	N2 ,H2, CO, Ar, NH3, CH4	280	25.5	61300
2	Compressed stream to mixer	N2, H2, other	948.7	275	61300
3	Feed to heater	N2, H2, other	948.7	275	61300
4	Heated feed to ammonia reactor	N2, H2, other	500	274.9	61300
5	bottom liquid stream from reactor	N2, H2, NH3	856.6	274.9	0
6	heated feed from Reactor to cooler	N2, H2, NH3, other	856.6	274.9	61300
7	feed to separator	N2, H2, NH3, other	10	174.9	61300
8	Top product stream from separator	N2, H2, other	10	174.9	42640
9	Bottom product ammonia	NH3, other	10	174.9	59540
10	Input feed to Recycler R	N2, H2	10	174.9	42214
11	Recycle stream	N2, H2	10	174.9	42214
12	Outlet compressed stream to mixer	N2, H2	61.91	275	42214



Thank  
You!