

# Chapter 1

## Lecture # 1-3

- **Process Diagrams**
- **Block Flow Diagrams (BFD)**

# Chemical Process Diagrams

THE MOST EFFECTIVE WAY OF COMMUNICATING INFORMATION ABOUT A PROCESS IS THROUGH THE USE OF **FLOW DIAGRAMS**

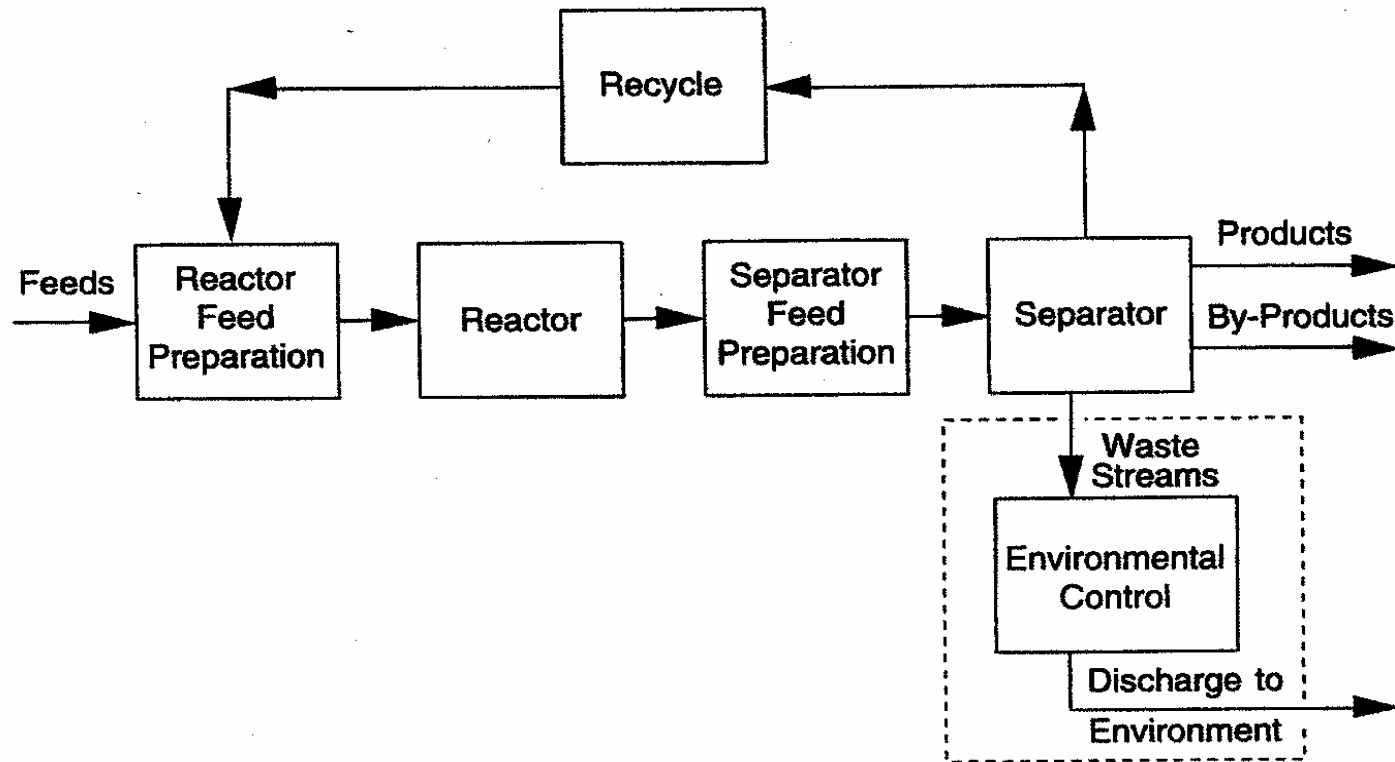
## Input-Output Diagram

A crude block flow diagram in which only feed and product streams are identified.

# Block Flow Diagram

Break the process into its basic elements such as reaction, separation, and recycle sections.

# Generic Diagram



The Six Elements of the Generic Block Flow Process Diagram

# Generic Block Diagram

- Each of these blocks may contain several unit operations. For example, A separation section might contain (four distillation columns, two flash units, and a liquid-liquid decanter)
- Reactor Feed preparation and Separator Feed Preparation sections mainly involve changing the conditions (temperature and pressure) of the process streams to the conditions required by the reactor or separator.

# Block Flow Diagram (BFD)

include the material balance calculations.

# Process Flow Diagram (PFD)

complete mass and energy balance and preliminary equipment specifications.



# Piping and Instrumentation Diagram (P&ID)

includes the mechanical and instrumentation details.

# Level of Process Diagrams

Input/output diagram



Generic diagram



BFD

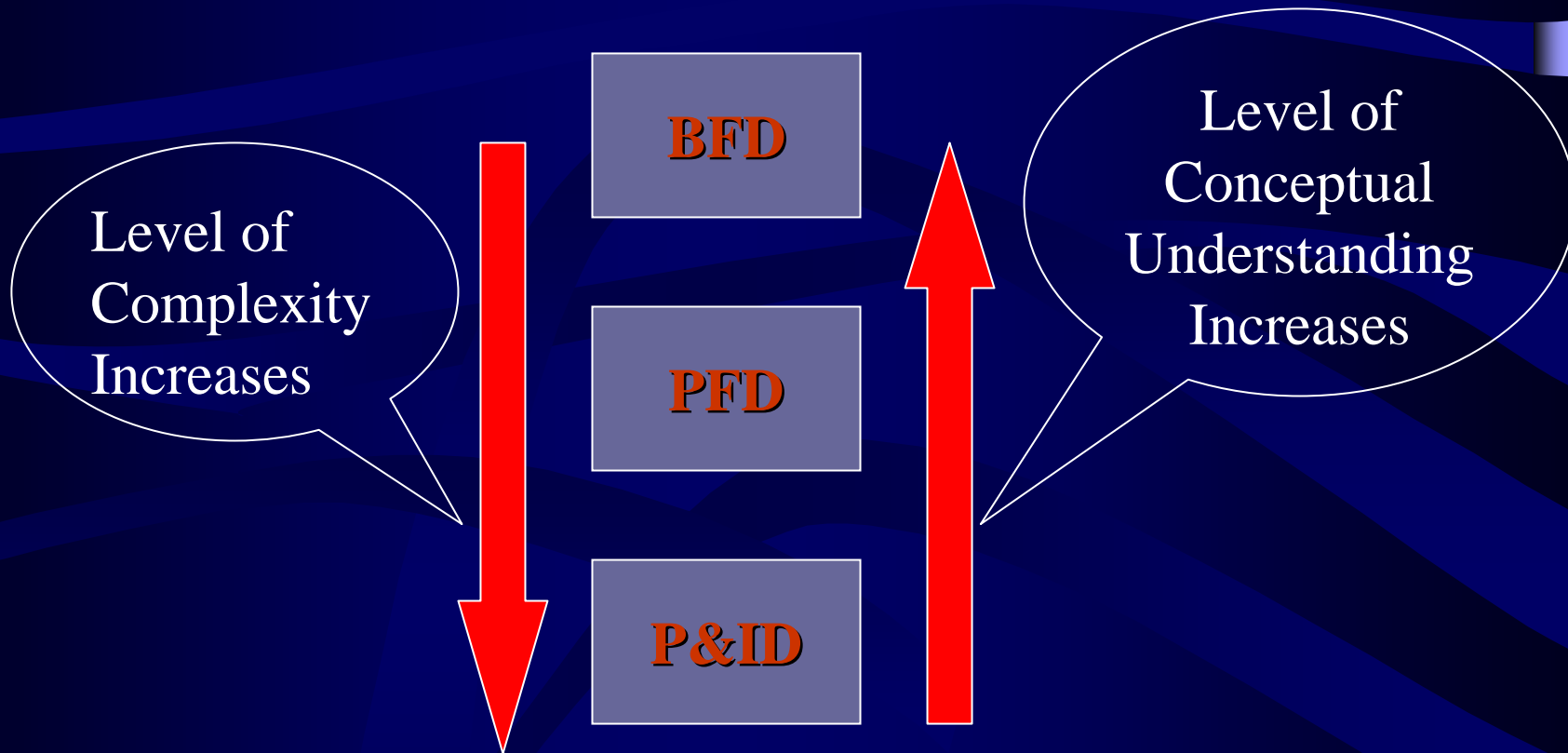


PFD



P&ID

# Level of Process Diagrams



# Block Flow Diagram (BFD)

- Shows overall processing picture of a chemical complex .
- Useful as an orientation tool.
- Used to sketch out and screen potential process alternatives.

# Block Flow Diagram (BFD)

- Block Flow Process Diagram (BFPD)
  - BFPD forms the starting point for developing PFD
  - BFPD is helpful in conceptualizing new processes
  - See Fig 1.1
- Block Flow Plant Diagram
  - Gives a general view of a large complex plant
  - See Fig 1.2

# Block Flow Process Diagram

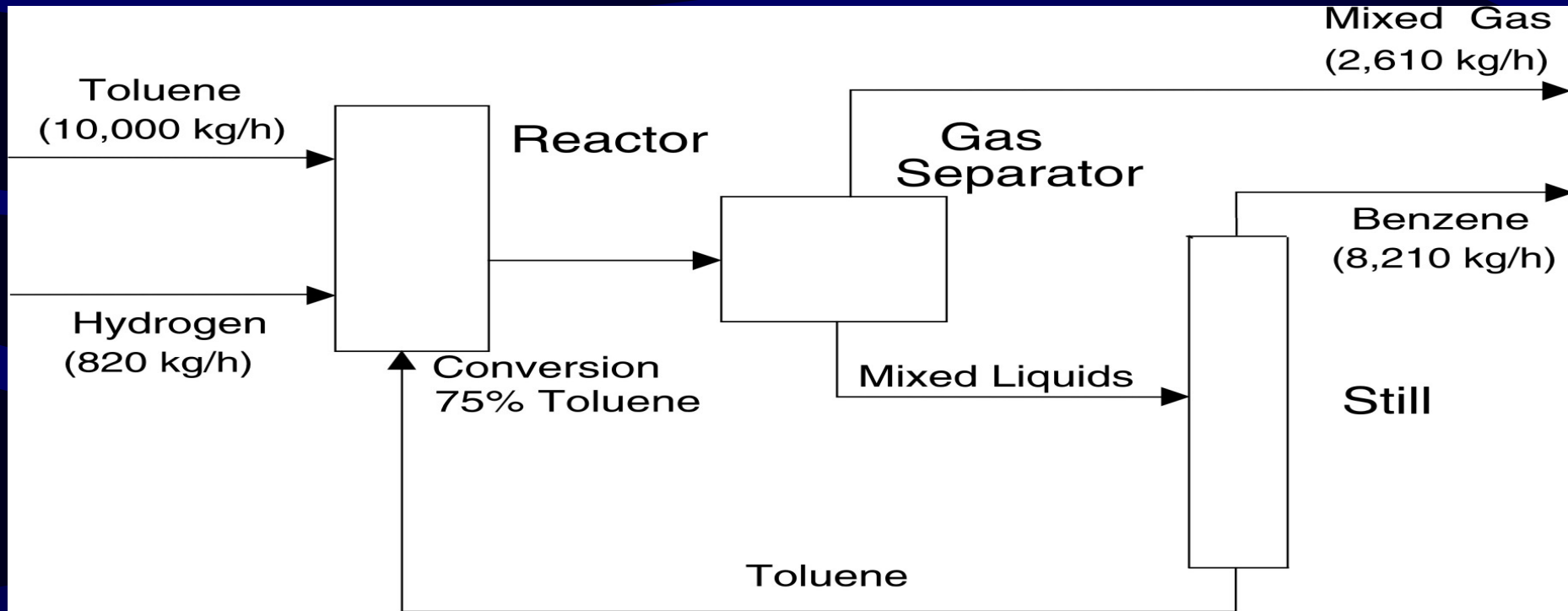


Figure 1.1: Block Flow Process Diagram for the Production of Benzene

# Block Flow Plant Diagram

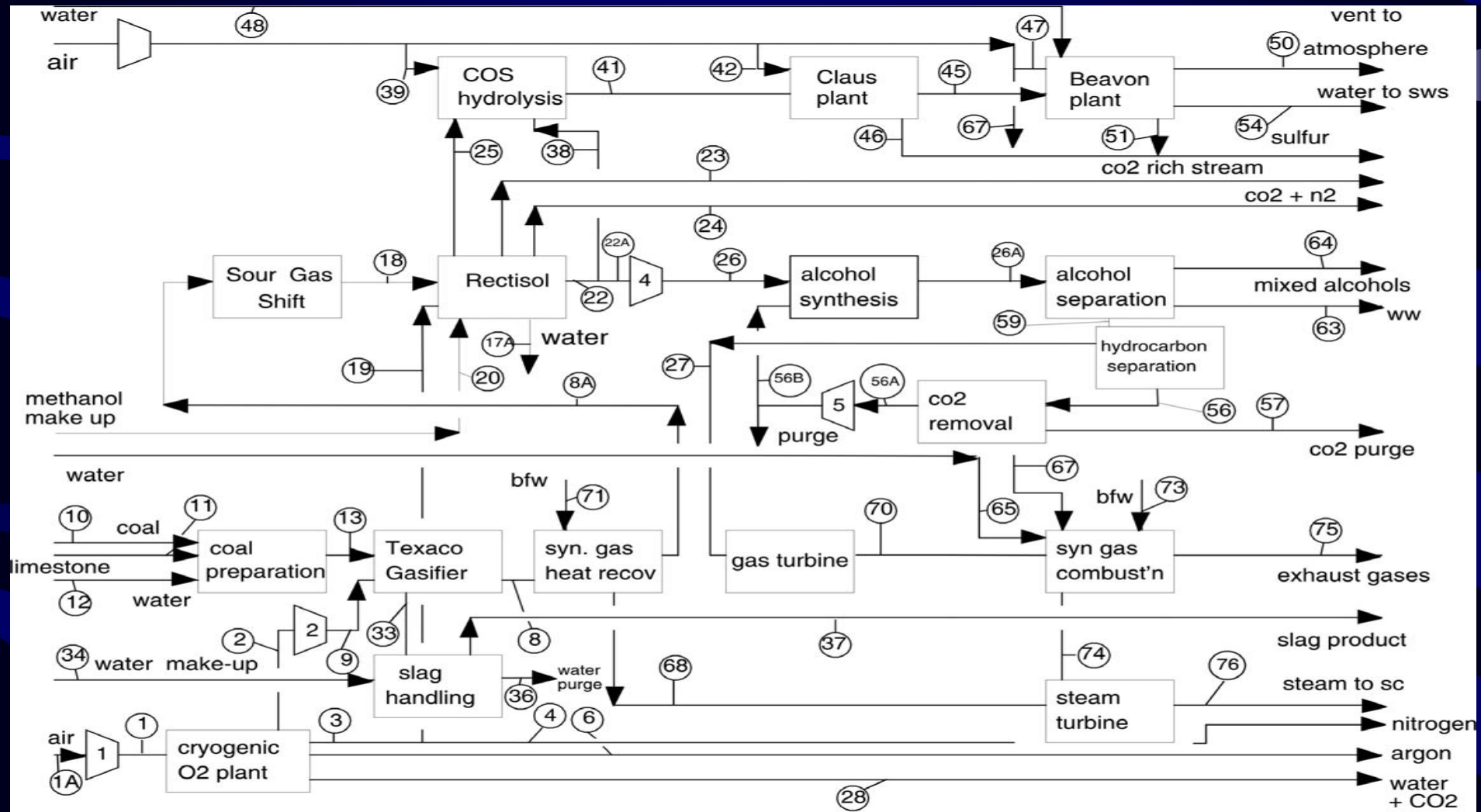


Figure 1.2: Block Flow Plant Diagram of a Coal to Higher Alcohol Fuels Process

# Conventions and Formats for BFD

- 1) Operations shown by blocks
- 2) Major flow lines shown with arrows
- 3) Flow goes from left to right whenever possible
- 4) Light streams toward top with heavy stream toward bottom
- 5) Critical information unique to process supplied
- 6) If lines cross, then horizontal line is continuous
- 7) Simplified material balance provided



*THANK YOU*