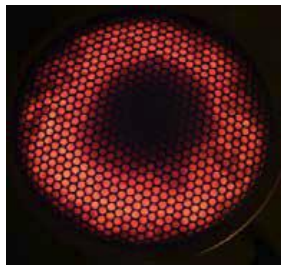


**Continuous flow reactors** are common unit operations in chemical processing plants. They are found throughout the petroleum, petrochemical and numerous other industries. The Chemical Reactor Trainer is a reduced scale plant that demonstrates continuous flow exothermic chemical reactions.

### Learning outcomes include:

- **Chemical reaction kinetics**
- **Exothermic chemical reactions**
- **Material balances**
- **Industrial stoichiometry**
- **Continuous flow reactor operation and measurement**
- **Flow, temperature and pressure control**
- **Equipment start-up and operating procedures and safety systems**
- **Process control concepts for manual and automatic operation (DCS or PLC)**
- **Impact of varying operating conditions of reactant flow, excess or limiting reactants and residence time**



*Direct and Catalytic Reaction Heads*



### Learning / teaching material provided

Including instructor notes, student exercises modules and service manuals

### Equipment Specification Highlights:

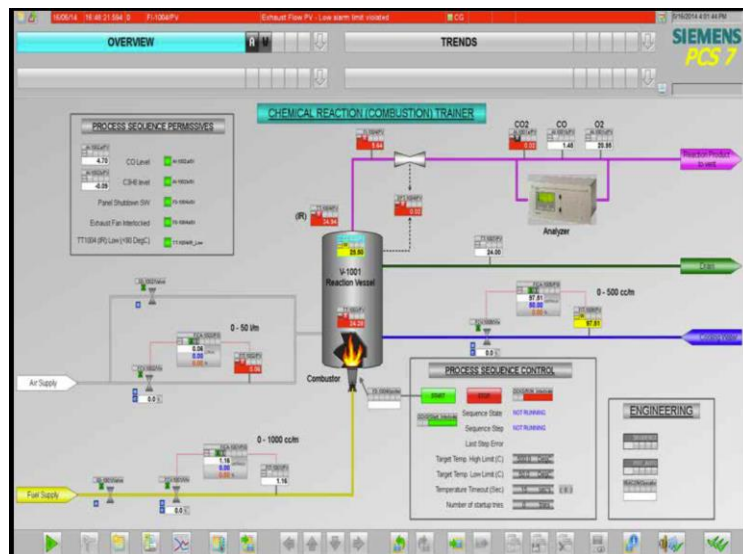
- Continuous up-flow reactor with interchangeable direct reaction and catalytic reaction tips
  - Stainless steel reactor vessel with external water cooling 250mm (10") OD X 500mm (20") high
  - Electronic ignition system and Integral flame viewing port
  - Flow measurement and analysis of reactant streams (fuel, and air)
  - Thermocouple and Infra-red temperature measurement and automated control valves
  - Dedicated Industrial standard SCADA operator interface, with trending and data export capability
  - Interlocking ESD / safety system to stop fuel flow and initiate air purge in the event of a flame failure
- Time to reach steady state after a reasonable step change - less than 10 minutes
- Complete unit mounted on a stainless steel frame approximate overall dimensions – 2184x600x1829 cm high (86" wide x 24" deep x 72" high)

### Utilities:

- Electrical power single phase 120VAC (other world voltages - please specify)
- Instrument Air
- Cooling water
- Propane canister

### Options / Custom design

- Dedicated air compressor, receiver and pressure control
- DCS control
- Large Screen Display



Example of typical operator interface (DCS or SCADA / HMI)

Reactants are hydrocarbon fuel (propane) and atmospheric oxygen;  
Reaction products are combustion flue gasses (CO<sub>2</sub>, CO, and H<sub>2</sub>O).

***Students gain real operating experience focusing on the processes of exothermic chemical reactions as well as control theory and operation.***