PS7000: Petrochemical Operations Simulator

The PS-7000 is a simulation software package is rigorous and detailed simulation models of Petrochemical plants. The benefits of this package are:

For Academic

- Industrial Exposure for Students.
- In-depth Process Understanding.
- Carry out In-house projects.
- Sound Fundamental Concepts of Process Control and safety with DCS Operations.
- Understanding the Intricacy & Complexity of process dynamics.

For Industries

- Improved Plant Safety.
- Smooth Startup & Shutdown.
- Evaluation of Operator Proficiency.
- Faster Recovery from External/Internal Process Disturbances.
- Increased familiarity of Controls & Interlock Systems.

The package consists of simulation models for various Fertilizer plants. Each model simulates a fertilizer plant with its control, instrumentation and safety systems and field devices. The Instructor can invoke malfunctions, disturbances and instrument failures and evaluate the trainee performance. Trainee can perform normal operations, emergency operations as well as startup / shutdown operations on these models.

PS-7001: BTX Production:

The Hydrocarbon feed containing Benzene, Toluene and Xylene are separated through fractionation in series of three fractionation columns. Each column is equipped with steam reboiler, overhead condenser, overhead accumulator, reflex pumps and bottom pumps.

PS-7002: Ethylene Oxide Production:

Ethylene feed is mixed with recycled ethylene and mixed with compressed and dried air, heated, and then fed to the reactor. The reaction is exothermic, and high-pressure steam is made in the reactor shell. Conversion in the reactor is kept low to enhance selectivity for the desired product. The reactor effluent is cooled, compressed, and sent to a scrubber where ethylene oxide is absorbed by water. A fraction of the unreacted vapor stream is purged and the remaining is recycled. The aqueous product stream is cooled, throttled and distilled to produce the desired product. The required purity specification is 99.5 wt % ethylene oxide.

PS-7003: Phthalic Anhydride Production:

The key reactants for the production of phthalic anhydride are naphthalene and excess air. Naphthalene is fed into the naphtha furnace. Naphthalene is heated and vaporized in the naphtha furnace using fuel gas, E-01 and then air is mixed with the vaporized naphthalene. The mixture is then allowed to react in the fluidized bed reactor in the presence of vanadium oxide coated on silica gel as catalyst. The temperature at which reaction will be occurring is 536.15K. 100% conversion of naphthalene is achieved and products leave the fluidized bed reactor as vapors. The reaction is -411 exothermic and the temperature of the reactor is controlled by circulation of the molten salt as coolant. The coolant is circulated through the coils inside the reactor and the heat carried away by the coolant is used to produce the high temperature steam in a heat exchanger.

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PS-7004: Styrene Production:

Ethylbenzene is mixed in the gas phase with 1015 times its volume in high-temperature steam, and passed over a solidcatalyst bed. Styrene is a monomer which is used to make polystyrene is produced by dehydrogenation of Ethyl Benzene in a two stage packed bed reactor. The feed component, Ethyl Benzene is heated by using high pressure steam in a heat exchanger. At this elevated temperature, the feed is further mixed with steam generated from a steam generator which dilutes the components as well as rise the temperature of the feed. The steam generator uses the low pressure steam as its feed and increases the temperature of steam by burning fuel oil. Then the feed components traverse the two stage packed bed reactor and styrene can be obtained from the second reactor.

PS-7005 Ethylene Glycol Production:

Ethylene glycol is produced from ethylene, via the intermediate ethylene oxide. Ethylene oxide reacts with water in the presence of acids or bases as catalyst to produce ethylene glycol. Ethylene glycol is widely used for the production of the polyester fibers and it is used as an antifreeze compound. Ethylene glycol is manufactured I by-using ethylene oxide and water with sulphuric acid as catalytic agent in reactors placed in series. Ethylene oxide is fed into the first reactor where it reacts with the water to produce ethylene glycol. Water is mixed with sulphuric acid, which acts as catalytic agent before feeding into the reactor. The reactants are allowed to react in the first reactor where the mixture is constantly stirred with an impeller, which is placed as the reactor mounting. The reactor is cooled externally by water-cooled jacket provided at the periphery of the reactor since the reaction is exothermic in nature.

PS-7008 Propylene Glycol Production:

Ethylbenzene is mixed in the gas phase with 1015 times its volume in high-temperature steam, and passed over a solidcatalyst bed. Styrene is a monomer which is used to make polystyrene is produced by dehydrogenation of Ethyl Benzene in a two stage packed bed reactor. The feed component, Ethyl Benzene is heated by using high pressure steam in a heat exchanger. At this elevated temperature, the feed is further mixed with steam generated from a steam generator which dilutes the components as well as rise the temperature of the feed. The steam generator uses the low pressure steam as its feed and increases the temperature of steam by burning fuel oil. Then the feed components traverse the two stage packed bed reactor and styrene can be obtained from the second reactor.

PS-7009 Ethanol Rectification Unit:

Ethanol is produced from the fermentation of molasses obtained from the sugar industries. The molasses is an organic mass which contains large amount of Carbohydrates which is converted into ethanol, carbon di oxide and many other impurities. Since ethanol needs to be obtained we use the method described in this model. CO2 is removed initially itself from the mixture containing large amounts of ethanol, water by flashing. Then the remaining is stripped with help of steam in Column-2 and then the products are distilled in other two columns C-03 and C-04. Then finally pure ethanol is obtained which has a purity of 97.58 % and the remaining is water.

Besides supply of above standard simulation plants, we develop rigorous custom simulation models for your plants based on the plant configuration, design parameters, operating data and instrumentation and safety systems. These custom models are very useful for training / re-training your operators/engineers as well as control / safety system verification, validating operating procedures, de-bottlenecking studies and what-if analysis.

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