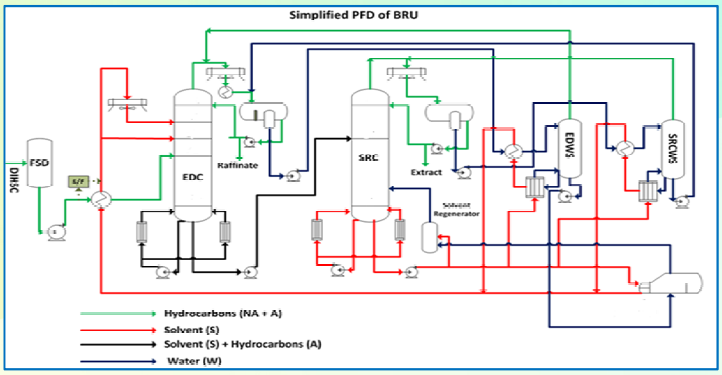
CSIR IIP-RIL Technology for Simultaneous Production of US Grade Gasoline and High Purity Benzene from FCC Naphtha

Creating Future Fuels

About Technology

- **Economic, energy efficient Extractive Distillation based process** for simultaneous production of US Grade Gasoline (Benzene content < 0.4 wt.%) and high purity benzene (Benzene purity > 97 wt. %) from Fluid Catalytic Cracker (FCC) C6 rich Heart Cut Naphtha
- **~0.6 MMTPA plant successfully commissioned in RIL Jamnagar in May 2016 under J3 Expansion Project**
- **Total expenditure incurred till commercialization : ~ Rs. 300 Crores INR**
- **Exports, year-wise, in quantity, value and markets : ~0.6 MMT/Annum, enables export of low Benzene Gasoline**



Simplified process flow diagram

Salient Features of Technology

- **First of its kind technology in the world**
- **Fully indigenous technology**
- **Low CAPEX and OPEX compared to other existing technologies worldwide for benzene/ aromatics recovery**
- **Solvent system is highly stable (thermally and chemically)**
- **Can process impurity laden feedstock without requirement of any pre-processing step like SHU**
- **With increase in Propylene demand FCCU severity is increasing which results in more benzene in FCC gasoline. Thus there is high probability to license these unit within/ outside India to Refiners who want to make quality gasoline & recover benzene as product**

Economic Figures

- **Expenditure incurred on R&D : ~ 3.0 Crore INR**
- **Year wise profitability (Production of gasoline and benzene) : ~ 340 Crores INR Annually**
- **Payback period for 0.6 MMTPA plant at current price: ~1.5 Years**

Societal Impact

- **Direct Employment:** ~28-30 Lakh Man Hours in R&D, Engineering, Construction, etc.
- **Indirect Employment:** ~10-12 Lakh Man Hours in Fabrication of Equipment and Steel
- **Mobile Sources Air Toxics (MSAT) emission can reduce by ~25% vol. with the use of benzene lean gasoline**
- FCC gasoline comprises nearly 10-20 % of the gasoline pool in a typical refinery hence with this technology Gasoline will contain less benzene overall.
  - New passenger vehicle / Portable containers will emit less benzene
  - Lower PM emissions
  - Reduced exposure to Benzene will result in lower health treatment cost

Plant commissioning May 2016, RIL Jamnagar

Accolades for the Technology

- **7 International Patents, 1 National**
- **National Award from TDB, DST GOI (2019)**
- **ICC Award for Excellence in Process Design – 2016**
- **Best Technology Award – CHT & MoPNG (2015)**
- **CSIR Technology Award for Innovation (2014)**

Future Potential

- Technology will soon become the need of the hour, for efficient recovery of high value benzene from olefinic FCC heart cut Naphtha
- It can be used for recovery of benzene from Raw PyGas w/o the requirement of any pre-hydrotreatment step for removal of di-olefins
- Can be extended for processing Waste Plastic / reformed Bio derived naphtha

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