

# Indian Institute of Technology Delhi

## Department of Chemical Engineering

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Date: 12<sup>th</sup> December, 2011

Department of Chemical Engineering wishes to purchase a 'Lab scale fluidized bed reactor' as per the specifications given below. Please send your quotations to the undersigned (Attn. :Sushil Kr Saraswat) in a sealed cover super scribed with '**Lab Scale fluidized bed reactor, Chemical Engineering Department**' and due date. Technical and financial bids (in separate envelopes) must reach the Department Office by 05.01.2012, 5:00 pm.

### Technical details

**REACTOR MODULE: (The tentative flow sheet is attached)**

Sr. No.	Description	
<b>1</b>	<b>Reactor Tube</b>	<b>1 No.</b>
	Type	Flanged
	MOC	Inconel 800 HT
	Design Temperature	1000 °C
	Design Pressure:	10 Bar
	Reactor tube dimensions	1 inch (ID) x 30 inch L (Approx.)
	Make	Standard
<b>2</b>	<b>Furnace Heater for Reactor Tube:</b>	<b>1 No.</b>
	Heating	Electric Furnace Heating with controlling devices
	Type	Split Type
	No. of Zones	3
	Temperature	Up to 1000 °C with accuracy of $\pm 5$ °C

	Make	Please specify (as per international standard)
<b>3</b>	<b>Premixer / Preheater :</b>	<b>1 No.</b> (split type furnace)
	MOC for tube	SS 316
	Reactor tube dimensions	1/4 inch (ID)x 10 inch L
	Temperature	300 °C with accuracy of $\pm 2$ °C

### FEED MODULE:

<b>1</b>	<b>Gas Feeding Module</b>	<b>1 Nos.</b>
<b>2</b>	<b>Mass Flow Controller</b>	<b>3 Nos.</b>
	Gases	H <sub>2</sub> , N <sub>2</sub> & CH <sub>4</sub>
	Flow Range:	10-300 ml/min with accuracy of $\pm 1$ ml/min
	MOC (wetted Parts):	SS 316
	Catalyst particle size in reactor	60 -500 micron
	Bulk density of catalyst particle	0.86-0.98 g/cm <sup>3</sup>
	With fluidization velocity	0.18-2.0 m/s
	Make:	Please specify ( as per international standard)
<b>3</b>	<b>Valves, Fittings, Tubing</b>	Please specify (as per international standard)
	MOC	SS 316
	Make :	Swagelok or branded

### OUTLET MODULE

1	<b>Cyclone separator</b>	
	Dimension	Please specify ( as per international standard )
	MOC :	Inconel 800 HT
	Design Pressure	10 Bar
	Make :	Please specify ( as per international standard)
2	<b>Back pressure regulator</b>	
	Type	Manual/Automatic
	MOC :	SS 316
	Pressure	10 bar
	Make	Please specify ( as per international standard )
3	<b>Condenser</b>	
	Type	Spiral coil in shell type
	MOC :	SS 316
	Design pressure	10 bar

**CONTROL PANEL**      **1 No.** Microprocessor PID Based Control panel 9 PID - (6 Temperature controllers, 3 Flow controllers) (Please specify details).

The reactor system should include the following key components:

- A gas handling and mixing sub-system used to blend and regulate the flow of reactant gas to the bottom of the reactor. The lower portion of the reactor incorporates an easily replaced porous metal gas diffusion plate and the top of the reactor widens abruptly to form a disengaging zone for the fluidized bed.
- Separate heaters are provided for both the main reactor and disengaging zone. A multipoint thermocouple is provided for monitoring the internal reactor temperature distribution.
- A heated cyclone separator or filter is provided immediately downstream of the reactor to capture the fines resulting from particle attrition.

- The reaction products are then cooled by a condenser and collected in a product receiver.
- The system pressure is maintained by a back pressure regulator.

**Warranty:** System should be quoted with warranty of at least one year. The GLC system should be complete in all respect along with Standard Accessories to install commission and to demonstrate with our samples. The supplier should also provide all the connectors, cables etc. along with the system. The supplier should provide training at our lab free of cost.

**Terms and conditions**

- The supplier must be an authorized dealer/distributor of the principal/manufacture and should furnish authorization certificate from the principal/manufacture. Quotation without authorization certificate will be rejected.
- CIF New Delhi prices should be quoted with all the terms and conditions i.e. applicable taxes, installation and warranty and delivery schedule.
- Quotations must be valid for at least three months from the date of the NIQ.
- A special discount /rebate wherever admissible keeping in view that supplies are being made for educational purpose in respect of public institution of national importance may please be indicated.
- Vendors are advised to have a personal discussion to undersigned if they have any confusion for the same.
- Attach all the technical literature and a list of similar installations done in India.
- A special discount /rebate wherever admissible keeping in view that supplies are being made for educational purpose in respect of public institution of national importance may please be indicated.
- The institute reserves right to accept or reject any or all quotations without stating the reasons thereof. **The discretion of increasing or decreasing of the quantity demanded or selecting only one items out of all quoted also vests with the Institute.**
- If the quote is being submitted by a representative of the manufacturer, a valid agency-ship or dealership certificate authorizing the agent to quote to IIT Delhi on behalf of the manufacturers should be enclosed.

- The exact specification sheet of the unit should be attached along with the details of the each item.
- **Quotation must indicate a delivery schedule which in no case should exceed 3 weeks from the date of placement of order.**
- **Our normal term of Payment is by (i) Letter of Credit for Foreign Suppliers (ii) for Indian Suppliers, by cheque within 30 days after receipt of goods/material in sound condition. Please note that advance payment will not be made. State clearly the Name and address of the Supplier to whom the order will be placed. Also mention to whom “Cheque/Draft to be made in favour of ..... and payable at ....(City/Country).”**
- The quotations should reach: **Mr. Sushil Kr. Saraswat C/o Prof. K. K. Pant, Chemical Engineering Department, Indian Institute of Technology Delhi, Hauz Khas, New Delhi – 110016 latest by 5:00 pm on 5<sup>th</sup> January, 2012.**

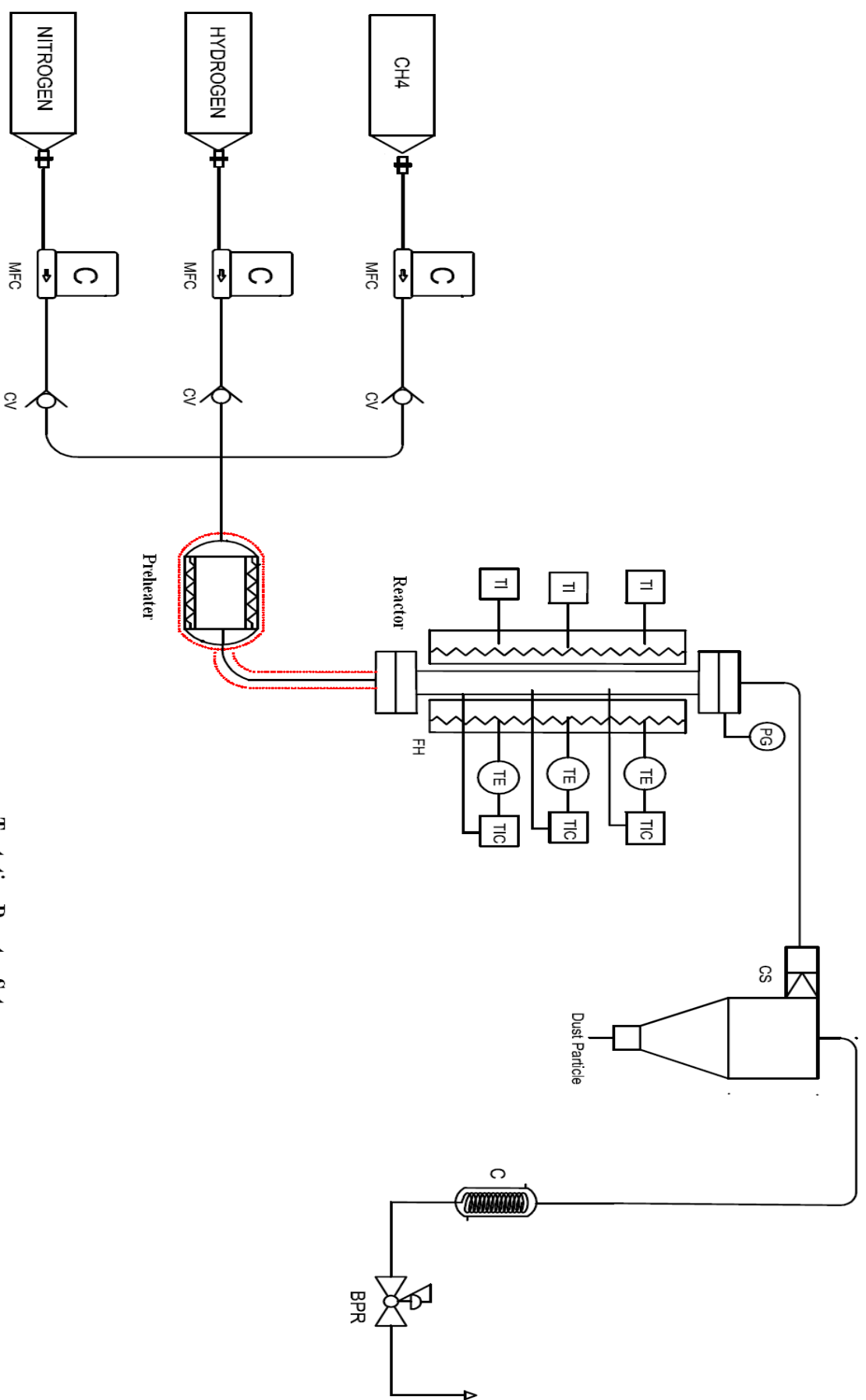
Prof. K. K. Pant

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Tentative Reactor Setup