

 IIT PALAKKAD	भारतीय प्रौद्योगिकी संस्थान पालक्काड Indian Institute of Technology Palakkad अहलिआ एकीकृत कैम्पस, कोज़िहपारा Ahalia Integrated Campus, Kozhipara पालक्काड- 678557 Palakkad – 678 557	दूरभाषसंख्या/ Phone no: 04923 – 226300/ 590/ 586 ईमेल/ Email : purchase@iitpkd.ac.in
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Ref No: IITPKD/CHY/DJ/049/2017

Date: 25.10.2017

Due Date of the tender: 09.11.2017 @ 3 PM

TENDER FOR INVITING QUOTATIONS

Dear Sirs,

On Behalf of Indian Institute of Technology Palakkad quotations are invited for “**Continuous Flow Hydrogenation Reactor**” confirming to the specification in the Annexure.

- Preparation of Bids:** - The tenders should be submitted **under two-bid system** (i.e.) Technical bid and Financial bid. The technical bid should consist of all technical details along with commercial terms and conditions. No prices should be included in technical bid. Financial Bid should indicate item – wise prices for the items mentioned in the technical bid. The technical and the financial bids should be put in separate cover and sealed. Both sealed covers should be put into a bigger cover.
- Compliance sheet for the specification & OEM Brochure has to be attached along with Technical bid. Vendor has to fill the compliance sheet and mention page number or reference number in OEM brochure. Unfilled / partial filled sheets lead to disqualification.**
- The Quotations duly sealed and superscribed on the envelope **with the reference No. and due date, should be addressed to the undersigned so as to reach him on or before the due date stipulated above. Fax and Email quotation are not acceptable.**
- The price should be quoted per unit and packing and delivery charges should be indicated separately. The offer/bids should be exclusive of Taxes and Duties, which will be paid by the purchaser as applicable. However the percentage and of taxes and duties as on date should be clearly indicated.
- The Quotations should be valid for **sixty days** from the due date and the period of delivery required should also be clearly indicated.
- If the item is under DGS&D Rate contract No. and the price must be mentioned. It may also please be indicated whether the supply can be made direct to us at the Rate contract price (Please note that we are not Direct Demanding Officers). If so please send copy of the RC.
- Local Firms:** Quotations should be for free delivery to this Institute. If Quotations for Ex-Godown delivery charges should be indicated separately.

8. **Outside Palakkad:** Quotations should be for **F.O.R. at IIT Palakkad**. If F.O.R. consignor station, freight charges by passenger train / lorry transport must be indicated. If Ex-Godown, packing, forwarding and freight charges must be indicated.
9. Goods shall not be supplied without an official supply order.
10. **Custom Duty:** Custom Duty which will be paid at a concessional rate against duty exemption certificate.
11. **Payment:** Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later. No advance payment will be made. The Tenderer have to furnish the bank details along with tender like Account No, Account Name, IFSC Code, Bank address etc.
12. **Submission of Bids:** Quotation should be sent to the following address “**The Registrar, Indian Institute of Technology Palakkad, Ahalia Integrated Campus, Kozhipara, Palakkad -678 557, Kerala**”, Phone No: 04923 226 586/590, Email: purchase@iitpkd.ac.in.
13. **Delivery Period:** 10-12 Weeks from the date of Purchase order, failing which PO may be cancelled.
14. **Delay in Supply or Liquidate damages:** If the supplier fails to deliver the stores within the time specified in the purchase order, the purchaser will recover from the supplier as liquidated damages a sum of one- half of one percent (0.5%) of the P.O value of the undelivered stores for each calendar week of delay. The total liquidated damages shall not exceed five percent (5%) of the P.O price of the unit or units so delayed. Stores will be deemed to have been delivered only when all their component parts are also delivered. If certain components are not delivered in time, the stores will be considered as delayed until such time as the missing parts are delivered.
15. **Late offer:** The quotation received after due date will not be considered. Please ensure that your offer is sent well in advance to reach the Institute by the due date.
16. **Loading and unloading charges will be borne by the supplier.**
17. **Warranty:** Warranty Clause should be indicated clearly.
18. **Acceptance and Rejection:** IIT Palakkad has the right to accept the whole or any parts of the Tender or portion of the quantity offered or reject it in full without assigning any reason.

Yours faithfully,

Encl: Specifications

Registrar, IIT Palakkad

TECHNICAL SPECIFICATION FOR CONTINUOUS FLOW HYDROGENATION REACTOR

Sl. No.	Description	Specification
1	Name of the Equipment	Continuous flow table-top hydrogenation reactor
2	Scope of the Equipment	<ul style="list-style-type: none"> • Continuous flow hydrogenation reactor is useful for functional group transformations in organic substrates. • The reactor will be capable of hydrogenation reactions by combining a flow of organic/aqueous substrates and H₂ gas in the presence of catalyst at 100 °C and 100 bar pressure • Useful to study different kinds of organic/aqueous substrates • Useful to study hydrogenation property of heterogeneous catalysts
3	Reactor capability	<ul style="list-style-type: none"> • The reactor should have functional modules such as Flow of Substrate/Solvent module, Hydrogen Supply, Catalyst Cartridge, Heating and Control module.
4	Flow module	<ul style="list-style-type: none"> • The solvent/substrate must be introduced into the reactor at a steady flow of 0.3 to 3 mL/min via an external High Pressure pump. • The material of construction must be resistant to all organic liquids and aqueous solutions. The material of construction must be mentioned. • Resistance to acids and bases is desirable. • Collection of products and unreacted substrates must be carried out externally at the end of reaction tubing. • Flow system can be adjusted such that the reaction time must be between 2 – 10 min.
5	Hydrogen supply	<ul style="list-style-type: none"> • Equipment must possess an integrated hydrogen generation facility preferably from water source. • Additional provision to connect external H₂ flow from a pressurized cylinder is desirable. This inlet must have standard connection settings such as 1/8 or 1/16 of an inch in SS material. Anything other than this must be highlighted

		<p>in the quote.</p> <ul style="list-style-type: none"> • H₂ generator should be able to generate a pressure of 1 to 100 bar and a maximum flow rate of 20 -25ml/min. • Built in automated hydrogen drying mechanism must be attached. • System should able to generate deuterium gas to perform deuterated reactions. • Built in hydrogen leak detection mechanism and shut off must be provided.
6	Heating module	Rapid heating rates (atleast 15 °C/min) must be possible from ambient to 100 °C to allow reactions in the pre-heated conditions.
7	Catalyst cartridge	<ul style="list-style-type: none"> • A catalyst cartridge packed with standard catalysts should be available as a cartridge that can be easily attached to the flow line of the solvent/substrate and lie in the heating zone. The cartridge must be easy to install or dispose. • Dimensions of cartridge should be a cylinder with a length of 25 – 35 mm and a diameter of 3 – 5 mm. • Catalyst cartridge should be capable of holding 0.1 to 0.3 g of powder catalyst. • The cartridge should be tightly sealed so that reactions can be carried out at high pressure. • Should have facility to pack in house catalysts in above cartridges.
8	Number of units	<ul style="list-style-type: none"> • 1 No. of completely functional hydrogenation reaction module with integrated gas supply, flow and control systems. • Consumables such as tubings, nuts, connectors and adaptors for 3 years of operation. • 5 Nos of catalyst cartridge filled with 10% Pd/C • 5 Nos of catalyst cartridge filled with Raney Ni catalyst must be quoted. • 100 Nos of empty cartridge with one end sealed with 8 µm filter suitable to test custom made catalysts. The dimensions of the empty catalyst cartridges must be same as described above. • A metal mechanical closer to seal the empty cartridge of 25 – 35

		mm must also be provided in a single consignment.
9	Control module	Parameters such as temperature, pressure, hydrogen production, and flow-rate must be adjusted through the screen, providing simple and rapid reaction set-up, system monitoring, and reaction control.
10	Power supply	220 – 240 V, Single Phase, 50 Hz.
11	Other details	Any other special precautions or installation requirements must be highlighted in the quote.
12	Warranty	Warranty of one year from the date of installation
13	Training	Adequate training must be provided to the end user in using all the modules, changing the catalyst cartridge and loading a new catalyst cartridge.
14	Inspection & Acceptance criteria	<ul style="list-style-type: none"> • One standard hydrogenation reaction using a standard catalyst will be carried out. • Packing a custom made catalyst in an empty cartridge and running a reaction without any leaks.
15	Vendor details	<ul style="list-style-type: none"> • The vendor must provide a contact details of users in India to who such an equipment is already supplied. • The vendor must have proof of experience in supply and service support of hydrogenation systems. • The vendors must list down their service centres in Kerala/Tamil Nadu and details of factory-trained engineers who will take care of after-sales service support. • The vendor must also specify the details of other product lines supplied.
16	Manuals	All the user manuals must be provided along with the equipment
17	Delivery	10 – 12 weeks from the date of PO