

RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY, JAIS, AMETHI

CORRIGENDUM-1

Date: 25.06.2019

Please refer to E-Tender on RGIPT/JAIS/E-OPN/LAB/2019-20/09 in rgipt.euniwizarde.com portal & Institute Website for the procurement of High Pressure High Temperature Rheometer with FTIR.

Name of Equipment	High Pressure High Temperature Rheometer with FTIR
Submission Date	24.06.2019 (Monday) before 3pm
Date & Time of Opening of Techno- Commercial bid	24.06.2019 (Monday) at 4pm
Revised Submission Date	11.07.2019 (Thursday) before 3pm
Revised Date & Time of Opening of Techno- Commercial bid	11.07.2019 (Thursday) at 4pm

A. Revised Technical Specifications: High Pressure High Temperature Rheometer with FTIR

- 1) The Rheometer should have the capability to perform Rheological Studies in following modes:
 - a) Rotational
 - b) Oscillatory
 - c) Transient (Creep & Recovery)
 - d) Squeeze and Tack test
- 2) The Rheometer should have following torque specifications:
 - a) Maximum Torque: 200 mNm or better
 - b) Minimum Torque, Rotation: At least 10 nNm or better
 - c) Minimum Torque, Oscillation: At least 2 nNm or better
 - d) Torque Resolution: 0.1nNm or better
- 3) The Measurement Motor should be Synchronous EC Motor or AC Drag Cup type to give the best Oscillatory response for the following wide range of frequencies in both Control Shear Stress and Control Shear Strain Operating modes
 - a) Minimum Frequency: 10 E-6 Hz
 - b) Maximum Frequency: 100 Hz or better
- 4) The Angular deflection and Speed measurement should be done with a High Resolution Optical Encoder. This should allow the user following range of
 - a) Angular deflection range: 1 to infinity micro-Radians
 - b) Angular deflection Resolution: ≤ 12 nano- Radians
 - c) Maximum Speed: 4500 rpm or better
- 5) Bearing - Instrument should be a fully digital instrument employing the latest Digital Signal Processing with high precision air bearing/magnetic bearing motor with lowest inertia of 10-5 kgm² or less.
- 6) The equipment should also meet the following parameters
 - a) Normal Force Range: 0.01-50 N or better
 - b) Normal Force Resolution: 0.5 mN-1mN or better
- 7) The Rheometer should have the following functionalities like employ a Quick Fit concept of connecting tools without any threading or special fixtures. The Rheometer should have to capability to wirelessly identify the connected tools. The Tools should be supported with Automatic Locking system to allow ease of Sample loading & trimming.

- 8) The Rheology Software should have built-in templates and software must be compatible with Windows 7 or Windows 10 operating systems. The software should be pre-programmed for all types of materials and testing protocols for all type of Rheology variables to obtain data profiles like
 - i. Viscosity Curve as a function of Time, Temperature, Shear Rate and Shear stress
 - ii. Complex Viscosity as a function of Time, Temperature, Frequency, Strain and stress
 - iii. Shear Stress as a function of Shear Strain to identify the LVER (Linear Visco-Elastic Region) of the Sample
 - iv. Elastic (G'), Loss (G''), Complex Modulus (G^*), Tan δ as a function of Time, Temperature, Frequency, Strain and Stress in Shear mode
 - v. Elastic(E'), Loss(E''), Complex Modulus(E^*), Tan δ as a function of Time, Temperature, Frequency, Strain and Stress in Linear mode
 - vi. Creep Compliance as a function of Time at different Temperatures in Single or Multiple Creep Zones.
- 9) Software package re-installation (in case required) and software updations during the warranty period, in case any, need to be provided to us free of charges.
- 10) The system should be offered with suitable & branded windows operating system based PC workstation.
- 11) Power Supply for the equipment - 220V - 240V, 50 Hz
- 12) Suitable Measuring Geometries and Temperature control should be included
 - A. Parallel Plate Geometry
 - Measuring Plate Dia: 50-60 mm
 - B. Cone Geometry
 - Measuring Cone Dia: 50-60 mm with angle 2°
- 13) Temperature Control with Circulation thermostat
Electrical temperature control device with insulated hood for upper geometry and with circulation thermostat for temperature ranging from -40°C to 400°C for measuring geometries
 - Cone/plate
 - Parallel plate
- 14) Compressed air system with dryer along with the filter should also be quoted and supplied from OEM.
- 15) Other Accessories: Following accessories must be quoted along with instrument -
 - a. Pressure cells (up to 400 bar and 300°C) : for testing samples at elevated pressures. Cell should be designed as closed systems, which can be filled with the sample and pressurized. The pressure can be increased by either increasing the temperature or using an external pressurization, e.g. a pump to compress the sample volume during the filling process.
 - b. It must be supplied with rupture disk, temperature sensor, block valve, pressure sensor with digital manometer and hand pump.
 - c. Double gap cylinder geometry & cylindrical geometries must be supplied with the pressure cell to handle all kind of liquid from very low viscous to high viscous.
 - d. A FT-IR coupling module must be quoted to enables a new level of understanding of rheological properties and processes, which depend on changes on the molecular structure which enable us to study deformations and orientations of molecules as function of shear.
 - e. This must have facility of insitu-spectroscopy investigation of chemical reactions in the measuring gap such as chemical or thermal curing.

Features of FT-IR coupling module: Following features must be there in FT-IR coupling module:

- Simultaneous rheological and FTIR spectra measurements
- Working must be on ATR (attenuated total reflection) principle
- Analysis of structural changes on the molecular level under shear/deformation

FTIR Specifications

- SNR of at least 50,000:1 with spectral resolution of 0.25cm⁻¹
- System should be inbuilt with NG 11 and NIST standards
- Wave number precision of at least 0.0008 cm⁻¹
- Upgradeable with variable collection speed from 0.16 to 3.1 cm/sec and 40 spectra/sec rapid scan feature.
- Approvals of CE, ETL, ISO and software with cloud-based spectroscopy software allows users to upload, share, and analyze their data anytime, anywhere, on any device

f. Please quote The Du Noüy ring with other accessories for interfacial rheology based on a BiCone geometry enables us to perform temperature controlled interfacial experiments.

- The system should be upgradable to Raman spectroscopy module or with Microscope Module to provides positive chemical identification and a spectral fingerprint unique to a material, and which can reveal morphology and structural changes during phase transitions

Computer Specifications: 22 Inches or better, 1920x1080 or better, Intel core i5 (7th or latest generation), RAM:4 GB and upgradeable further, DDR4 or better, 1 TB or better, Mechanical Hard Drive, Wi-Fi, Bluetooth 4.0, Number of USB 2.0 ports :2; Number of USB 3.0 Ports: 1,Wireless Keyboard and Mouse, Operating system :Windows 1064 bit

- Multifunction Laser Jet Colour Printer and 5 KVa UPS

B. On-site Installation and Training free

C. Five years on-site warranty with spares.

Note: Highlighted portions are the changes in conditions. The other terms & conditions remain unchanged.

This issues with the approval of Competent Authority.

Sd/-

Assistant Registrar (Accounts)