TECHNICAL SPECIFICATION

FOR:

STANDARD

AMI-EZ

CHEMISORPTION ANALYZER

Revision 0

May 13, 2020

PREPARED BY:

ALTAMIRA INSTRUMENTS

149 DELTA DRIVE, SUITE 200

PITTSBURGH, PA 15238

USA

System Specification

1. Basic System Specifications

System Operating Pressure	ambient
Gas Inlet Pressure Range	20-40 psig
Maximum Furnace Operating Temperature	500°C; optional to 1200°C
Furnace Heating Rate	Up to 50°C/minute
Maximum TCD Operating Temperature	200°C
Flow Controller	Rotameter with range of 15-150 cc/min
Materials of Construction	
Plumbing	316SS
Sample U-tubes	quartz
Wetted parts	316 Stainless Steel, Viton (Buna-N & Kalrez optional)
Catalyst Charge	0.1-1.0 grams (1/4'' u-tube)
No. of Ports	5 (4 carrier/treatment; 1 pulse); option for 7
Power Supply	
Hardware Cabinet	220 or 110 / 15 A; single phase
Computer	220 or 110 / 15 A; single phase
Dimensions	
Hardware Cabinet	64cm W x 64 cm H x 64 cm D

2. Procedures

The AMI-300Lite-*eco* system is designed to perform the following characterization experiments:

- Temperature Programmed Reduction (TPR)
- Temperature Programmed Oxidation (TPO)
- Temperature Programmed Desorption (TPD)
- Temperature Programmed Reaction
- Pulse Chemisorption plus Pulse Calibration
- Isothermal Gas Phase Reactions

3. Gas Feed

The simplified flow scheme used on the AMI-EZ requires only one rotameter for controlling and regulating gas flows. It allows for precise control of the selected gas between 15-150 cc/min. There are 4 gas inlet ports shared by treatment and carrier gases.

4. Heater and Sample Reactor

The AMI-EZ utilizes a highly efficient compact heater design. Its nominal maximum temperature is 500°C. The temperature is controlled through a software-controlled independent PID loop. Sample U-tubes can easily be installed and removed.

The sample station is located near the center front of the instrument. Quartz sample U-tubes are held in place by Ultra-torr® compression fittings.

An optional high temperature furnace is available for operation up to 1200°C. A quick cool feature using forced air to provide rapid cool down times is included.

5. Thermocouples

Two type-K thermocouples are fixed to the heater. One thermocouple feeds the heater over-temperature control. The second thermocouple serves as the control for the PID control loop.

6. Thermal Conductivity Detector

Uses a high quality 4-filament TCD, with high resolution, linearity, accuracy and stability. Standard filament material is tungsten.

7. Computer Control (Local computer can be supplied)

The system is controlled by a personal computer, which controls and monitors process parameters, acquires data in real time, monitors alarms and takes proper action, trends both real time and historical data, and generates reports and graphs. The computer comes fully installed with a Windows based operating system. Minimum specifications are:

-i5 processor
-4 GB RAM
-Hard disk 500 GB
-17” LED monitor

8. Software Features

The software is based on LabVIEW for Windows and is configured by Altamira Instruments to the specific I/O of the reactor system. The configuration for basic operation of the unit includes the following features or more if required:

- Manual operation (operator flow schematic screen)
- Real time data trending
- Historical data trending
- PID calibrations
- Signal filtering
- Alarm history windows
- Creation, storing, and recalling a set of experimental actions
- Data storage and records of selected parameters, process data, and alarms
- Multitasking capability

The Altamira Analysis software provides post-processing of experimental data generated by the control system. Extensive signal processing and report generation features are incorporated.

- Seamlessly import and “zip” archived data generated by control software
- Enhanced report generation capabilities
- “Drag and drop” base-lining, signal smoothing, and numeric integration
- Descriptive calculations including uptake, % dispersion, % consumption and more
- “Undo” feature reverts signals to previous state

- Apply signal transformations including scaling, time-shifts, and dependent offsets
- View pulse data in sequential or overlay mode
- Manually adjustable and automatic peak fitting
- Export signals as text tab-delimited files compatible with other processing and report software

9. Safety Features

A number of features have been incorporated into the design of the AMI-EZ Catalyst Characterization System to ensure safe operation:

1) Hardware over-temperature protectors for the furnace located in the control cabinet. This feature is preset for a temperature within the safety range of the entire system;

2) Pressure relief valve on reactor

10. Installation and Training

Included in the price of the instrument is support (email, phone, skype, teamviewer) to assist the customer with installation. The customer is invited to Altamira to be trained on the instrument and instructed on the easy start-up/installation procedure before the instrument ships. This is included in the cost. Installation and demonstration of the system performed by Altamira Instruments personnel at the customer site may be arranged for an additional fee. Please note: if stated in the formal proposal that installation is included, then that clause supersedes this paragraph.

11. Acceptance Procedure

Client will formally accept the instrument and release any retention amounts after the instrument is installed. This procedure will ensure the instrument:

- Flow paths are correctly plumbed;
- All valves work properly;
- TCD operates properly;
- Furnace ramps the temperature in a linear fashion and maintains a stable hold at the end of the ramp;
- A single Temperature Programmed Reduction (TPR)

12. SEAL MATERIALS

The chemical compatibility chart below can be used to determine, which seal material will work best with your applications. The AMI-EZ comes standard with Viton or Buna-N seals.

Chemicals	Viton	Buna-N	Premium
Acetone	Do Not Use	Do Not Use	Excellent
Acids			
Chromic	Excellent	Do Not Use	Excellent
Hydrochloric	Excellent	Do Not Use	Excellent
Hydrofluoric	Excellent	Do Not Use	Excellent
Nitric	Excellent	Do Not Use	Excellent
Phosphoric	Excellent	Do Not Use	Excellent
Sulfuric	Excellent	Do Not Use	Excellent
Amines	Do Not Use	Do Not Use	Excellent

Diethylamine	Do Not Use	Poor	Excellent
Ammonia			
10%	Do Not Use	Excellent	Excellent
Anhydrous	Do Not Use	Good	Excellent
Benzene	Good	Do Not Use	Excellent
Carbon Dioxide	Good	Excellent	Excellent
Hydrocarbons			
Aromatic	Excellent	Poor	Excellent
Naphtha	Excellent	Poor	Excellent
Nitrous Oxides			
Pyridine	Do Not Use	Do Not Use	Excellent/Good
Sulfur Materials			
Hydrogen Sulfide	Do Not Use	Do Not Use	Excellent/Good
Sulfates (SOx)	Excellent	Do Not Use	Excellent
Water			
Steam	Do Not Use	Excellent	Excellent

Premium seals include parts constructed of the following materials: Perlast, Kalrez, Kel-F, PEEK, Teflon, Tefzel, and EPDM.