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| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 01 | **Flue Gas Analyzer** | 01 | Operating Temp. -10 °C to 55 °C  Storage temperature: -20 °C to 50 °C  Temp. Measuring range: -40 to +1200 °C  Pressure Measurement range: 0 to +300 hPa  O2 Measurement Range: 0 to 25% Vol.  CO Measurement (without H2 Compensation): at least upto 10,000 ppm  Ambient CO Measurement: at least upto 500 ppm  NO Measurement: From 0 to 4000 ppm  NO2 Measurement: From 0 to 500 ppm  SO2 Measurement: From 0 to 5000 ppm  Ambient CO2 Measurement: at least upto 10,000 ppm  **Control Unit** - Providing remote control operation up to 300 ft away  Color graphic display to see in dark or bright conditions  Go wireless with long-range 300 ft. Bluetooth (or wired to over 3,000 ft.) to eliminate long sample lines  **Analyzer box** - for high accuracy measurements  Containing up to six sensors, pumps, gas path, sample conditioning  Conditions the gas sample automatically, thermoelectric (peltier) chiller  Automatic flow-controlled high strength pump  User defined programs with onboard memory to 250,000 values  User configured testing programs  Printer should to available  Standard gas sampling probes & storage.  Batteries 4AA Type.  **Warranty**: Minimum 02 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 02 | **Total Nitrogen Analyzer** | 01 | -It should analyze water, liquid, solid and gas samples from very low levels (20 ppb) to very high concentrations (5000 ppm).  -It should be capable to new types of analyses (from nitrogen to sulfur and/or chlorine).  -It should be equipped with a liquids and solids auto sampler.  **Warranty**: Minimum 03 years repair and maintenance with parts warranty  **UPS**- compatible with equipment at least one 1 hour backup |  |  |
| PSW & WTF 03 | **Chemical peristaltic pump** | 03 | Precise peristaltic pump delivers flow rates from 0.07 to 1140 mL/min. Its speed can be adjusted manually and automatically through the external control interface. Store the running parameters automatically. Provide Tubing and spare parts. Warranty at least for 2 years |  |  |
| PSW & WTF 04 | **Peristaltic pump**  **(Water and sediment sampling)** | 02 | Exceptional field durability, Operate from 60 to 600 RPM, Up to 1 liter/min. Operate to a depth of 27 feet (8 meters), Variable speed control , AC only, combination , Two pumping stations available, which can be piggybacked for multi-station pumping • Reversible flow feature for back-flushing • Disposable and dedicated tubing means controlled costs and no decontamination issues. |  |  |
| PSW & WTF 05 | **Peristaltic pump with head** | 10 | variable-speed consol drive, flow range=0- 1700 mL/min, easy load Pump head |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 06 | **Small RO Unit (mobile cabinet)** | 01 | The RO unit should be fully self-contained in a mobile cabinet. Comprehensive instrumentation should be provided with digital meters displaying temperatures and system pressure. In addition to the membrane module, the cabinet also should house, feed and permeate tanks, a plate heat exchanger and positive displacement pumps. Connection to cooling water and a suitable electrical supply in all that is required for normal operation. All parts in contact with the process fluid should be constructed from hygienic design materials such as stainless steel, PTFE and silicone rubber.  The RO/UF unit should an efficient Clean-In-Place (CIP) facility and could be easily dismantled for servicing or maintenance.  The unit should be supplied with a pack of both (4+4) extra modules of R.O. Membranes and U.F. Membranes  Membranes could be installed or removed rapidly for use in either process.  Using small quantities of process fluid, operating parameters could be established and then optimized to effect a confident transition to full-scale.  Specifications  Concentration/clarification/ fractionations and standardization of:   * + milk   + whey   + fruit juices   + vegetable juices   + alcoholic beverages * Treatment of effluent * Enzymes, antibiotics and organic acids   Flow rates: 30, 18, 15 and 9 L/minute  Pressures: Variable up to 55 bars  Membrane Module suitable for two (provide 2 extra pairs)  Tube side volume: 75ml  Typical permeate flow: 5-50ml/min  Feed tank capacity: 15 liters  Permeate tank capacity: 15 liters  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 07 | Anaerobic Reactor | 01 | A self-contained, floor-standing anaerobic tank reactor, volume 20 liters  Configurable as:  − Continuous Stirred Tank Reactor (CSTR)  − Packed Bed Reactor (PBR)  − Up flow Anaerobic Sludge Blanket Reactor (UASB)  It should have following :   * Stirrer, motor and baffles should be removable for non-stirred configurations * Variable depth liquid sampling points * Measures reactor temperature, jacket temperature and vessel pH * Programmable logic controller (PLC) provides temperature control, pH control and gas collection (rate and totalisation) calculations * Jacket heating system with pump and hot water vessel. Temperature is PID controlled room temperature to 55oC. * Automated volumetric gas collection system measures, which adds less than 10 bar back pressure in the reactor. * Complete with an automated pH dosing system to maintain the vessel pH within a predetermined range (user programmable) * User calibration of pH and gas collection system * Feed flow rates from 0.06 to 4.8 l/hr (using interchangeable peristaltic hoses) * Gas sample point * Data logger and software as standard (requires PC)   **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 08 | **Electro Spinning System** | 01 | This system should have the following components:  1. High voltage power supply (0-30 KV DC, precise adjustable)  2. Collector (rotating metallic drum)  3. Syringe pump (multi nozzles)  4. Coaxial nozzles in different sizes  Additional: One High voltage power supply (0-30 KV DC, precise adjustable)  **Power requirements**  200-240 V AC, 50/60Hz, single phase  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| PSW & WTF 09 | **Biofilm Annular Reactor** | 02 | Biofilm Annular Reactor consists of a stationary outer cylinder and a rotating inner cylinder. Process fluid will be circulated in the annulus between the two cylinders.   * This should operate with a variable speed motor. * The rotational speed of the inner cylinder is to be set to provide liquid/surface shear similar to the pipe flow shear of the process water system. * It should be manufactured using an inner, slotted polycarbonate cylinder and a glass outer cylinder. * It should be Twenty (20) slides flush mounted on the rotating inner cylinder. * The slides should be in stainless steels, plastics, and various alloys * The reactor unit should be autoclavable to 121o C. * It should be jacketed for temperature control.   **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 10 | **Autoclave** | 01 | It should be quipped with a fully automatic microprocessor control with LCD-Display and foil keyboard. A large variety of accessories for example, FDA/ GMP conform version, exhaust air filtration or push-through version, makes it possible to fit the autoclave for every application.   * Autoclave chamber capacity of 440 liters with pressure controller * It should have automatic door with low-maintenance door seal. * It should be equipped with a warm holding program for liquids and timer for programming start time point. * It should have a long-life flexible temperature sensor for the sterilization time trigger. * Vacuum pump set with a water saving device for single-stage or fractioned prevacuum and final drying under vacuum * Transport and loading trolley for ergonomic loading and unloading.   **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| PSW & WTF 11 | **Auto Clave Vertical Loading**. | 01 | Capacity: 60 liters, Temperature up to 123o C, Temperature accuracy ± 0.5oC at 121oC, Pressure up to 1.2 kg-f/cm2, Digital pid control with sensor, Fully automated sterilization cycle.  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 12 | **Confocal Laser Scanning Microscope for Multi-User** | 01 | Speed: 19 × 2 speed levels, up to 13 images/sec  With 512 × 512 pixels (max. 430 images/sec), up to 6875 lines per second  Applications: Confocal microscopy applications in cell biology, neuroscience, cancer research, developmental biology / Three dimensional, fluorescence imaging of cells, tissues, and model organisms / Live cell imaging / Spectral imaging / Multiphoton imaging for deep tissue imaging / Imaging cleared tissues / single molecule imaging and FCS/FCCS applications / correlative microscopy with super resolution or electron microscopy  Validated Applications: Microscopy, Fluorescence, Multichannel Fluorescence, Live Cell Imaging, FRET, FRAP, 3D Imaging, Time Lapse, NIR  Detector 3 or 34 descanned spectral channels (GaAsP and/or PMT), Airyscan detector, 2 additional GaAsP channels (BiG.2), Up to 6 non-descanned GaAsP detectors, Up to 12 non-descanned GaAsP or PMT detectors total, Transmitted light detector (T-PMT)  Resolution: 4 × 1 to 8192 x 8192 pixels  Also for multiple channels, continuously adjustable  Lasers 355 nm, 405 nm (UV laser), 440 to 633 nm (VIS laser)  NIR laser for multiphoton imaging - Ti: Sa, OPO  Equipment Type (standardized)Laser Scanning Confocal, Multiphoton  Features (standardized) Camera Compatible, Incubator/Control Chamber |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 13 | **Bipotentio-Stat** | 01 | Windows-based electrochemical instrument  **Galvanostat:** · Galvanostat applied current range: 3nA – 250mA · Applied current accuracy: 20 pA ± 0.2% if > 3e-7 A, ±1% otherwise · Applied current resolution: 0.03% of applied current range · Measured potential range: ±0.025 V, ±0.1 V, ±0.25 V, ±1 V, ±2.5 V, ±10 V  Electrometer: Waveform Generation and Data Acquisition:  **Experimental Parameters**: CV and LSV scan rate: 0.000001 to 10,000 V/s, two channels simultaneously · Potential increment during scan: 0.1 mV @ 1,000 V/s · CA and CC pulse width: 0.0001 to 1000 sec · CA minimum sample interval: 1 us, both channels · CC minimum sample interval: 1 us · True integrator for CC · DPV and NPV pulse width: 0.001 to 10 sec · SWV frequency: 1 to 100 kHz · i-t sample interval: minimum 1 us, both channels · ACV frequency: 0.1 to 10 kHz · SHACV frequency: 0.1 to 5 kHz · FTACV frequency: 0.1 to 50 Hz, simultaneously acquire 1st, 2nd, 3rd, 4th , 5 th, and 6th harmonics ACV data · IMP frequency: 0.00001 to 1 MHz · IMP amplitude: 0.00001 V to 0.7 V rms  **Accessory**: · User's manual in pdf format, no printed manual · Electrode leads · USB communication cable · Power cord  **Sub parts of Boiopotentiostate**: Ag/AgCl Reference Elec (porous Teflon tip) 3/pk(3pk); Pt Wire Counter Electrode (5 pk); 25um dia. Au Microelectrode 3/pk(1 pk); 25um dia Pt Microelectrode 3/pk(1 pk); 2mm dia. Au Working Electrode 3/pk(2 pk); 2mm dia. Pt Working Electrode 3/pk(1pk); 3mm dia. GCE 3/pk(3 pk); Non-aqu Ag/Ag+ Ref Ele (porous Teflon tip) 3/pk(1pk); Calomel Reference Electrode(2 ea); Mercury/Mercurous Sulfate Ref Electrode(2 ea); Electrode Leads for CHI760E(2 ea); Simple Cell Stand(2 ea); Cell Top (including Pt wire counter electrode) 2 ea; Cell Top (including Pt wire counter electrode) 2 ea; Glass Cell 15 ea; Teflon Cap 10 ea; Printed Electrodes (3-electrodes) 40/pk(1 pk); 3mm dia. Printed carbon electrode 40/pk(1 pk); CS-3A Cell Stand Ver 1.1(1 ea); SVC-3 Voltammetry cell(2 ea); CB-EE Remoto cable(1 ea);  IDA (Au) 10 um(2 ea); IDA (Pt) 10 um(2 ea); IDA (Carbon) 10 um(2 ea); Cable kit for IDA electrode(2 ea).  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 14 | **Lab MBR for wastewater Treatment** | 01 | Bioreactor tank , size (LxDxH, cm) 50x25x30 , Feed tank of volume of 30-40 liters, Level control tank of volume of 3-4 liters, feed pump, Circulation pump to level control tank, Air pump maximum flow rate 550 l/h , Air diffuser (5 units), Bubble size 100-500 µm, Air flow meters, Submerged membrane module (depend on requirement), Vacuum pump, Centrifugal pump , digital pressure gauges , Valves and pipeline, 04 Cross flow membrane module s(Microfiltration), automatic data acquisition system from pressure gauges to PC,  All the required components. Easy to operate and maintenance.  Warranty: 03 years for service. |  |  |
| PSW & WTF 15 | **Stirred Cell for filtration tests**, 200 mL | 02 | Cap, stir bar, body, membrane holder: polystyreneGasket, O-ring: Silicone;Base, stir bar support: Acetal;Pressure tube: Polyethelene;Filtrate tube: Tygon® tubing;Stir bar retaining ring, washer: 316 stainless steelStirred Cell: Maximum Working Volume, mL: 200; Membrane Diameter, mm: 63; Effective Membrane Area, cm2: 28.7; Hold-up Volume without tubing, mL: less than 0.1; Height, cm: 15.5; Base, cm: 8.4  Dipsensing pressure vessels for filtratrion (Volume=5L, stainless steel) |  |  |
| PSW & WTF 16 | **Dispensing pressure vessel for filtration** | 01 | 5 liters, stainless steel 316 stainless steel body; stainless steel fittings; fluoroelastomer gaskets and O-rings; molded Neoprene rubber base fittings. Maximum Inlet Pressure, bar =6.9 bar |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 17 | **Pressure gaug**e | 10 | w/Tee connector, 0 to 3bar |  |  |
| PSW & WTF 18 | **Digital Pressure gauge** | 04 | Output pressure sensor, w/T-connector, -1 to 3bar, Output Signal: 4-20mA (2 wire), |  |  |
| PSW & WTF 19 | * **Infrared CO2 analyzer:** | 01 | Measurement Range: 0-20,000 ppm  RMS Noise at 370 ppm with 1 sec signal filtering: <1 ppm  Accuracy: <3% of reading  Calibration Drift  Zero Drift: <0.15 ppm/°C  Span Drift: <0.03%/°C  Total Drift at 370 ppm: <0.4 ppm/°C  Measurement Principle: Non-Dispersive Infrared (NDIR)  Traceability: Traceable gases to WMO standards from 0 to 3,000 ppm. Traceable gases to EPA protocol gases from 3,000 to 20,000 ppm  Pressure Compensation Range: 15 kPa - 115 kPa (2.2-16.7 psi)  Maximum Gas Flow Rate: 1 liter/min (0.035 ft3/min)  Output Signals: Two Analog Voltage (0-2.5V or 0-5V) and Two Current (4-20mA) Digital: TTL (0-5V) or Open Collector  DAC Resolution: 14-bits across user-specified range  Source Life: 18,000 Hours (~2 years continuous use)  Power Requirements: Input Voltage 12-30 VDC; 1.2A @ 12V (14W) maximum during warmup with heaters on; 0.3A @ 12V  (3.6W) average after warmup with heaters on Operating Temperature Range: -20 to 45  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| PSW & WTF 20 | **Ultrasonic processor with thumb pulse** | 01 | **150 microliters to 150 milliliters**  Power supply: Net power output: 130 Watts. Frequency: 20 kHz  CONVERTER: Piezoelectric lead zirconate titanate crystals (PZT) with pulsing button. Diameter: 11 ⁄4" (32 mm) Length: 53 ⁄4" (146 mm)) Cable length CV 18: 5‘ (1.5 m)  STANDARD PROBE: Tip diameter: 1 ⁄8" (3 mm). Processing capability: 250 µl to 10 ml.\* Length: 57 ⁄16" (138 mm). Titanium alloy Ti-6Al-4V. Autoclavable  ELECTRICAL REQUIREMENTS: 220 V, 50/60 Hz  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 21 | **SYRINGE, INFUSION/WITHDRAWAL PUMP, 220 V** | 02 | Max. No. of Syringes: 2  Syringe Size: 10 µl to 140 ml  Advance Per Microstep: 0.165 micron (1/16 step)  Max Step Rate (1/2 Step): 1600/sec  Min Step Rate: 1 step / 100 sec.  Accuracy: ±<1%, Reproducibility: ±0.1%  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| PSW & WTF 22 | **Glass syringes and needls to be used with item # 21.** | 01 | 1.0 ml glass syringe plus 5 needles  2.5 ml glass syringe plus 5 needles  5 ml glass syringe plus 5 needles  10 ml glass syringe plus 5 needles  25 ml glass syringe plus 5 needles  50 ml glass syringe plus 5 needles  100 ml glass syringe plus 5 needles  Conical needle with side port for penetration of septa, thin-gauged vinyls and plastics without coring for 25 ml syringe (5)  Conical needle with side port for penetration of septa, thin-gauged vinyls and plastics without coring for 50 ml syringe (5)  Needles for 100 ml syringe (5)  25 µl Syringe with needles (5)  50 µl Syringe with needles (5)  100 µl Syringe with needles (5)  500 µl Syringe with needles (5) |  |  |
| PSW & WTF 23 | **Air Sampling pump** | 02 | **5,000 cc/min** , ambient or standard temperature and pressure corrected display data-logging for up to 16 sampling events  back pressure capability of up to 40" H2O in high flow and up to 40" H2O in low flow |  |  |
| PSW & WTF 24 | **Laser Scattering Particle Size Analyzer** | 01 | Particle size range from 0.1 – 1000µm,  Manual wet dispersion units  Manual dry powder dispersion unit  Particle size distribution: Suspensions, emulsions, dry powders  Data acquisition rate: 10kHz  Typical measurement time<10 s  Red light source: Max. 4mW He-Ne, 632.8nm  Lens arrangement: Reverse Fourier (convergent beam)  Effective focal length: 300mm  Detector:  Arrangement: Log-spaced array  Angular range: 0.032 - 60 degrees  Alignment: Automatic  Supply voltage: 220-240V (60Hz)  **Warranty**: Minimum 03 years repair and maintenance with parts warranty |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 25 | **Solid phase extraction manifold 24 ports** | 03 | for large volume sampler for 6 ml SPE tubes with SPE vacuum trap kit (polypropylene flask, a one-hole rubber stopper, 4” (10cm) of polypropylene tubing and 5’ (1.5m) of red rubber vacuum hose)  **Large volume sampler tube adapter** for use with SPE extraction manifold |  |  |
| PSW & WTF 26 | **Membrane module** | 20 | Microfiltration flat sheet, PTEF, area = 0.1 m2; nominal pore size=0.4µm; operating pressure = -50 to 0; dimensions (mm)= A5, 5t; Chemical resistance= 3000 mg/L Cl-, operating temperature 0-70oC; |  |  |
| PSW & WTF 27 | **Vacuum filtration set** | 02 | with 300 ml glass filter holder, clamp, 1000ml ground-joint flask |  |  |
| PSW & WTF 28 | **Float switches, Water Level sensor** | 10 | Stainless steel float switch, 2.4 inch long threaded section with a float diameter of one inch.  Overall stem length = 4.9 inches, temperature range= -10 to +80oC, lead wires = 22 ga., 9" |  |  |
| PSW & WTF 29 | **Sanitory Silicone tubing** | 02 packs | ID=7mm, 15M/pk |  |  |
| PSW & WTF 30 | **Air flow meter** | 10 | w/connector, 10L/min, with valves  Suitable for standard tubing for bench scale lab applications |  |  |
| PSW & WTF 31 | **Laboratory scale diaphragm air pump**: | 06 | Max flow 100 liter/min (3.5 cfm), low noise |  |  |
| PSW & WTF 32 | Overhead Stirrer with propeller | 04 | Mixing vol about 10L; Laboratory stirrer for simple stirring tasks of up to 10 liters (H2O) with ideal speed range from 40 - 1,200 rpm. Especially suitable for schools, universities and inspection laboratories  **Propeller**: 4 bleaded  Stirrer Ø: 100 mm  Shaft Ø: 8 mm  Shaft length: 540 mm |  |  |
| **Item code No.** | **Name of Equipment** | **QTY** | **Specification** | **Rate** | **Amount** |
| PSW & WTF 33 | **Ultrasonic water bath** | 01 | Capacity 5 to 10 L; Temp range: Ambient to 90 ⁰C. Stainless steel basket |  |  |
| PSW & WTF 34 | **Flask Platform Shaker (shaking incubator)** | 01 | Capacity: 16-32 flask/ 250 ml, temperature controlled |  |  |
| PSW & WTF 35 | **Mechanical Timer** | 20 | with switch knob (24 hours, 5 minutes interval) |  |  |
| PSW & WTF 36 | **HEPA Disposable Filter** | 02 pack x10 | Outlet Style= 1/4 to 3/8 in. stepped barb, Inlet Style= 1/4 to 3/8 in. stepped barb, Filtration Area (Metric) = 16cm2, Diameter (Metric) Disc= 50 mm, material (membrane) = Glass fiber, Autoclaved |  |  |
| PSW & WTF 37 | T**hermoplastic elastomer tubing for pump** | 03 pack | Tubing ID=3.1mm, Max Flow Rate (mL/min)=480, Max Pressure (PSI)=40, Max Temperature (Dynamic) (° C)=100 |  |  |
| PSW & WTF 38 | **SPE Bulk Packin**g, | 10 | pack of 100 g; Reservoir Capacity: 6 ml; Ploypropylene (PP) hardware and PE frits. Pk/30 |  |  |
| PSW & WTF 39 | **6 cc Vac cartridge**, | 10 | 150 mg sorbent; 30 µm particle, 30/pk |  |  |
| PSW & WTF 40 | **Activated magnesium silicate** | 05 | 1.0 g/3ml, PP SPE tubes, stainless steel or PE frits; Quantity: pk/50 |  |  |
| PSW & WTF 41 | **Ultrafiltration Discs**, | 04 pack | cellulose, 10 kDa NMWL, 63.5 mm |  |  |
| PSW & WTF 42 | **Polypropylene Tubing** | 02 | 3/16" X 1/4", 100' (package) |  |  |
| PSW & WTF 43 | **Silicone tube (Platinum-cured) for pumps** | 03 Pack | 3 m, ID=1.6mm, max flow rate=130 mL/min, min temperature(dynamic)= -40oC, max temperature (dynamic)= 100oC |  |  |
| PSW & WTF 44 | **Urethane tubing** | 05 pack | ID=8mm, 30 m/pack |  |  |

Signature with Stamp Signature

Contractor Procurement Manager

USPCAS-W, MUET, Jamshoro