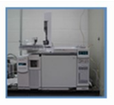
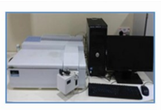
جامعة الكويت
KUWAIT UNIVERSITY

Research Sector
General Facilities & Specialized Research Units & Laboratories
Engineering & Petroleum

اسم الجهة Institute/Department		اسم الجهاز Equipment name	الجهة المصنعة Manufacturer	وصف موجز للجهاز Equipment Description	صورة الجهاز Equipment photo	استخدامات الجهاز uses of equipment
GE03/08	Engineering & Petroleum	Advanced Electrochemical System potentiostat	Princeton Applied Research	fundamental to modern electrochemical studies using three electrode systems for investigations of reaction mechanisms related to redox chemistry and other chemical phenomena. By doing that the system's thermodynamic and kinetics can be studied.		"* Cyclic voltammetry (CV): Studying the redox properties of materials * Electrochemical impedance spectroscopy (EIS): Analyzing interfacial properties of electrodes and electrical properties of materials * Corrosion studies: Measuring Corrosion rates and developing mitigation strategies * Battery testing: Evaluating Battery performance during charge and discharge cycles"
GE03/08	Engineering & Petroleum	Agilent Gas Chromatography Mass spectrometer (GC-MS)	Agilent	GC/MS) instrument separates chemical mixtures (GC) and identifies the components at a molecular level (MS). During the GC, a mixture will be separated into individual substances when heated and carried through a column with an inert gas (e.g. Helium). The separated substances by the column opening are flowing into the MS, which identifies compounds by the mass of the analyte molecule and search in mass library		"* Crude oil characterization: Identifying and quantifying components in crude oil to guide refining processes * Refining process monitoring: Ensuring production of desired products with specified quality standards * Petroleum product quality control: Detecting and quantifying impurities, additives, and contaminants in petroleum products"
GE03/08	Engineering & Petroleum	"Analytical Balance (x2)"	PIONEER	measure weight or mass for different samples.		measure weight or mass for different samples.
GE03/08	Engineering & Petroleum	Automatic Asphaltene analyzer	cosmo-trade	determine asphaltene contents based on both IP and ASTM Method at the same time. Available for measuring of Toluene,Quinoline Insolubles in taras and related materials for the carbon fiber industry. Conforming to JPI-5S-45-95.		"* Measuring asphaltene content in different oil samples * Monitoring asphaltene instability in oil "
GE03/08	Engineering & Petroleum	Automatic Petroleum Refractometer	Koehler	used to analyze a sample based on Refractive Index, which is a fundamental physical property. This property is used in conjunction with other properties to characterize pure liquids including hydrocarbons and their mixtures.		Measuring refractive index of petroleum products
GE03/08	Engineering & Petroleum	Centrifuge (x2)	Hettich	used for the separation of fluids, gas or liquid, based on density. Separation is achieved by spinning a vessel containing material at high speed; the centrifugal force pushes heavier materials to the outside of the vessel.		"* Separating mixtures based on density * Purifying liquids: Centrifuges are commonly used to purify liquids by removing solid contaminants."
GE03/08	Engineering & Petroleum	Crude Oil Fractional Distillation System	BR Instrument	to fractionate the petroleum crude oils into simple fractions for further study. This fractioning is based on the difference of boiling points of chemicals in crude oil. In order to operate under safe temperatures and to enhance evaporation, working under vacuum conditions is required		"Crude oil fractionation: The system can be used to fractionate crude oil into different components, such as gasoline, diesel, kerosene, and heavier fractions. "
GE03/08	Engineering & Petroleum	Deionized water system	SUEZ	high-purity water which is essentially free from ionic contaminants is required. Water of this quality can be produced by a di water system.		provides high-purity water for different applications in various research experiments
GE03/08	Engineering & Petroleum	DensoMeter	Rudolph Research Analytical	Through the use of a piezo-electronic system. At a constant temperature, these harmonic frequencies will have constant and a reproducible value. The U-tube is then filled with the sample at the same constant temperature. The frequency of the U-tube will shift; the shift in this frequency is directly proportional to the mass of the sample inside the U-tube. Accordingly, the mass would be measured. Since the volume of the U-tube is constant, then the density can be measured.		measure the density of liquids samples with high accuracy and precision.
GE03/08	Engineering & Petroleum	Determination of Oxygenates in Gasoline (GASOHOL)	Varian	The system contains a specially designed column, which only passes the ethers and alcohols to the detector, while all other components are vented out.		"* separating and analyzing volatile compounds, including oxygenates in gasoline. * works as a normal Gas Chromatography (GC) system."
GE03/08	Engineering & Petroleum	Differential Scanning Calorimeter	NETZSCH	thermo analytical technique in which the difference in the amount of heat required to increase the temperature of a sample and reference is measured as a function of temperature. Both the sample and the reference are maintained at nearly the same temperature throughout the experiment. Generally, the temperature program for a DSC analysis is designed such that the sample holder temperature increases linearly as a function of time.		study thermal properties of samples: It helps determine phase transitions, Specific Heat Capacity, enthalpy changes, and glass transition temperatures of these materials.
GE03/08	Engineering & Petroleum	Elemental Analyzer	Elementar	The analyzer uses a combustion process to break down the desired substances into simple compounds. The final products would be in the form of CO2, H2O, N2 and SO2. The components are separated by definite adsorbing columns, and finally they detected by the thermal conductivity detector for C, H, N and Infrared detector for S.		used for the simultaneous determination of carbon, hydrogen, nitrogen, and sulfur (CHNS) in a wide range of solid and liquid samples.
GE03/08	Engineering & Petroleum	Energy Storage System (battery cycler)	Arbin	multiple independent-channel testing system designed for Research and Development and/or Production of batteries and other electrochemical energy-storage devices. Each channel operates independently of the others enabling users to run tests on multiple batteries at the same time. Each channel in the Energy Storage system is a true potentiostat and galvanostat with charging and/or discharging capability.		"* Testing battery performance over multiple cycles * Characterizing battery parameters * Simulating battery performance under various conditions"
GE03/08	Engineering & Petroleum	Fourier Transformation Infrared Spectroscopy (FTIR)	Thermo	The specimen's transmittance and reflectance of the infrared rays at different frequencies is translated into an IR absorption plot consisting of reverse peaks. The resulting FTIR spectral pattern is then analyzed and matched with known signatures of identified materials in the FTIR library.		"* identify unknown substances by comparing their FTIR spectra to reference spectra of known compounds. * determine the structural characteristics of molecules by analyzing the vibrational frequencies of their functional groups. * quantify the concentration of specific functional groups in a sample. This quantification is based on the intensity of the corresponding absorbance peaks in the FTIR spectrum."
GE03/08	Engineering & Petroleum	Fuel Reformulyzer (PIONA)	PAC	Fuel reformulator analyzer is based on multi-dimensional column switching technique. After sample introduction, a set of columns and traps separates the sample into different hydrocarbon groups to determine carbon number distribution of each group: Paraffins, Olefins, Napthenes, Aromatics or Oxygenates.		"measure the relative concentrations of major hydrocarbon groups in gasoline: paraffins, isoalkanes, olefins, naphthenes, and aromatics.
GE03/08	Engineering & Petroleum	Fume Hood (x2)	Biobase	used to handle odorous materials, toxic gases, reactive materials, chemicals that can spatter, aerosols, carcinogens, flammables or other toxic and volatile materials.		used to handle odorous materials, toxic gases, reactive materials, chemicals that can spatter, aerosols, carcinogens, flammables or other toxic and volatile materials.
GE03/08	Engineering & Petroleum	Gel Permeation Chromatography System	Shimadzu	determining the molecular weight distribution in polymer, proteins and petroleum complex compounds (e.g. Asphaltenes and Resins).		for analyzing macromolecules, providing valuable information about their molecular weight distribution, size, structure, and impurities.
GE03/08	Engineering & Petroleum	Gloves Box		a sealed container that is designed to allow one to manipulate objects where a separate atmosphere is desired. Built into the sides of the glovebox are gloves arranged in such a way that the user can place their hands into the gloves and perform tasks inside the box without breaking containment.		"* Handling Hazardous Material * Working with Air-Sensitive Materials: Glove boxes provide an inert atmosphere, filled with argon, to protect air-sensitive materials from oxidation or degradation. * Preparing Samples for Analysis: prevent contamination of samples and ensure the integrity of the analytical results."
GE03/08	Engineering & Petroleum	Low Level Sulfur Analyzer (LLSA)	PAC	The sample is combusted with oxygen at a temperature of 1050 °C. The combustion gases are routed through a membrane drying system to remove all water and then to the sulfur detector module for quantization. The SO2 is exposed to ultraviolet radiation of a specific wavelength. This radiation is re-released in the form of sulfur fluorescence. The fluorescence is detected by a photomultiplier tube (PMT) and it is proportional to the amount of sulfur in the original sample.		used to measure the sulfur content of samples, particularly where trace amounts of sulfur existed>
GE03/08	Engineering & Petroleum	Muffle furnace	Koehler	sed for high-temperature testing applications such as loss-on-ignition or ashing. Muffle Furnaces are compact countertop heating sources with insulated firebrick walls to maintain high temperatures.		for high-temperature processing, drying and heat treatment
GE03/08	Engineering & Petroleum	OVEN VACUUM 65L (x3)	Medline Scientific	used to remove moisture, solvents, and gases from materials through controlled heating under reduced pressure conditions. It's commonly used in laboratories, research, and industrial settings for drying, degassing, heat treatment, and testing under controlled vacuum environments.		"* Rapid and Efficient Drying: significantly accelerate the drying process compared to conventional ovens by reducing atmospheric pressure. * Degasification of Materials. * Solvent Removal: used to remove solvents from samples. This is essential for concentrating solutions, preparing samples for analysis, and recovering valuable solvents."
GE03/08	Engineering & Petroleum	Parallel Jacketed Reactors (x4)	Syrris	of single or parallel jacketed automated reactors with volumes from 50ml to 250ml. The system can either be manually controlled or automatically controlled by the Atlas PC Software		batch system for chemical synthesis, offering precise temperature control, automation capabilities, and a wide range of vessel sizes.
GE03/08	Engineering & Petroleum	PH Conductivity Meter	Thermo	measures the acidity (pH) and electrical conductivity of a solution. It's used in water quality testing, agriculture, chemical analysis, food industry, aquaculture, industrial processes, environmental studies, research.		measures the acidity (pH) and electrical conductivity of samples.

GE03/08	Engineering & Petroleum	pyrolyzer CDS Pyroprobe	CDS Analytical	cracking of solid or liquid sample under inert conditions at high pressure is very important task for the identification of the chemical structure of the substance, especially those which are constructing from many components either in solid or liquid state.		used to thermally decompose samples and analyze the resulting volatile fragments using gas chromatography (GC) and mass spectrometry (MS).
GE03/08	Engineering & Petroleum	RHEOMETER	Anton Paar	characterizes the flow of a substance in response to forces, its rheology.		"* measure the viscosity of fluids * perform shear rheological measurements, which involve applying shear stress to a material and measuring its resulting shear rate."
GE03/08	Engineering & Petroleum	Simulated Distillation (Sim Dist)	Agilent	A GC method used to characterize petroleum fractions and products, since it permits quick determination of their boiling range distribution. Samples are analyzed on a non polar chromatographic column that separates the hydrocarbons in the order of their boiling points.		identify and quantify unknown compounds, determine the purity of chemicals, and study the composition of complex mixtures
GE03/08	Engineering & Petroleum	Thermogravimetric Analyzer (TGA)	TA Instruments	Thermogravimetric Analysis (TGA Q50) measures the amount and rate of change in the weight of a material as a function of temperature or time in a controlled atmosphere. Measurements are used primarily to determine the composition of materials and to predict their thermal stability at temperatures up to 1000°C.		"* study the thermal decomposition behavior of materials * quantify volatile components in materials * study the hydration and dehydration behavior of materials * study the oxidative degradation of materials, such as polymers and plastics, under controlled temperature and oxegen conditions. "
GE03/08	Engineering & Petroleum	Thermogravimetric Analyzer (TGA)	METTLER TOLEDO	Thermogravimetric Analysis (TGA 2) measures the amount and rate of change in the weight of a material as a function of temperature or time in a controlled atmosphere. Measurements are used primarily to determine the composition of materials and to predict their thermal stability at temperatures up to 1100°C.		"* study the thermal decomposition behavior of materials * quantify volatile components in materials * study the hydration and dehydration behavior of materials * study the oxidative degradation of materials, such as polymers and plastics, under controlled temperature and oxegen conditions. "
GE03/08	Engineering & Petroleum	Ultrasonic Cleaner	Cole Parmer	cleaning method that uses ultrasound and a liquid to clean objects. Because it is reliable, it is often used for the final cleaning of components and tools. Ultrasonic baths use Cavitation bubbles induced by high-frequency pressure (sound) waves to agitate a liquid.		"* utilize high-frequency sound waves to agitate liquids and remove contaminants from various materials. * "
GE03/08	Engineering & Petroleum	UNIVERSAL DRYING OVEN (x2)	Labtech	used for drying, heating, testing environmental stresses, such as changes in temperature, light and humidity.		used for drying, degassing, and sterilizing various materials under controlled conditions.
GE03/08	Engineering & Petroleum	UV-Visible Spectrophotometer	Perkin Elmer	UV/Vis spectrophotometer measures the intensity of light passing through a sample (I), and compares it to the Intensity of light before it passes through the sample (Io). The ratio I / Io is called the transmittance, and is usually expressed as a percentage (T%).		"* quantify the concentration of substances in solutions. * dentifying the presence of specific substances based on their characteristic absorption spectra. * "
GE03/08	Engineering & Petroleum	Water Determination- Karl Fischer Titration	Metrohm	Coulometric water determination is primarily used for the determination of small amounts of water.		for measuring water content with high accuracy and sensitivity.

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GE01/17	Engineering & Petroleum	Crude Oil Compositional Analyzer	(VINCI)	Analyze quantitatively or preparatively obtain specific fractions of oil or refined products, (fractions containing Aromatics, Resins or Saturates)		"• Liquid analyzer for crude oil and condensates analysis. • Detailed Liquid Analysis of hydrocarbons up to C36 + • Molecular weight and distribution up to C36 + • Results in Weight %, mole %, volume %"
GE01/17	Engineering & Petroleum	Cryette Molecular Weight Analyzer	(VINCI)	Measuring freezing point and molecular weight		"• Precise measurements of freezing point depressions of solutions with freezing points from −10 to +10 °C • Fast, accurate molecular weight determinations • Measuring concentration in less than 2 minutes • Simple operation minimizing operator technique"
GE01/17	Engineering & Petroleum	Equilibrium Flash Separator	(VINCI)	Designed to flash pressurized liquids and measure the gas oil ratio at equilibrium conditions.		"* Accurate liquid volume measurement * Possibility to heat sample with an external heating fluid * measure the gas oil ratio at equilibrium conditions. * Liquid readings through graduated pyrex tube *Two stage system with first stage maximum pressure of 500 psi while the second is at atmospheric pressure"
GE01/17	Engineering & Petroleum	Fluid Eval	(VINCI)	Fluid Eval is designed to study phase behavior of hydrocarbon fluids at reservoir conditions of pressure and temperature.		"* Versatile, can be used for either oil and gas condensates studies * Very efficient stirrer based on a combined rocking mechanism and magnetic driven stirrer * Automatic phase detection"
GE01/17	Engineering & Petroleum	Cooling System (for Fluid Eval)	(VINCI)	The Cooling System can be connected to the air bath of the Fluid Eval to provide sub-ambient temperatures up to -20°C.		*Providing sub-ambient temperatures up to -20°C for Fluid Eval
GE01/17	Engineering & Petroleum	Gas Analyzer	(VINCI)	Separating the chemical components of a sample mixture, detect them to determine their presence or absence in how much percent		"• Hydrocarbons analysis up to C36 • Weight %, mole %, volume % provided • Molecular weight and distribution up to C36 • Reporting facilities provided "
GE01/17	Engineering & Petroleum	Gas Booster	(VINCI)	Gas Booster is designed for compression of low-pressure field gas samples into cylinders.		"• compression of low-pressure field gas samples into cylinders. • Admission pressure: 225 to 2,900 psi • Max outlet pressure: 15,000 psi • Working temperature: ambient to 50 °C"
GE01/17	Engineering & Petroleum	GOR Apparatus	(VINCI)	The purpose of the GOR apparatus is to flash pressurized liquids and measure the gas oil ratio at equilibrium conditions.		"• Measuring Gas Oil Ratio at equilibrium conditions • Flow rate: 100 cc/min "
GE01/17	Engineering & Petroleum	Heating Trolley for Gas Cylinder	(VINCI)	Heating Trolley is used to maintain the temperature of gas samples during sample transfer to maintain reservoir conditions.		"• Maintaining the temperature of gas cylinders • Temperature: Ambient to 100 °C • Temperature accuracy: 0.1 °C"
GE01/17	Engineering & Petroleum	High Pressure High Temperature Viscometer	(VINCI)	This Viscometer measures fluid viscosity at reservoir conditions.		"Measuring fluid viscosity at reservoir conditions • Temperature range: up to 190 °C • Pressure range up to 15,000 psi • Viscosity range: 0.02 cP to 10,000 cP • Accuracy: ±1% FS • Reproducibility: ±0.8 % of reading "
GE01/17	Engineering & Petroleum	Moisture Analyzer (PM 880)	GE Panametrics	The PM880 AC hygrometer is a complete, portable system with options and accessories to meet all industrial moisture measurement needs. Measurement of Moisture Dew Point in gases and PPM Dissolved Water in hydrocarbon liquid		"• Measuring moisture and humidity in gases and non-aqueous liquids"
GE01/17	Engineering & Petroleum	Positive Displacement Pump	(VINCI)	Motorized syringe pump based on plunger piston by using manifold to refill or drain the syringe, a pressure transmitter with its digital display and local controller.		"• Delivering specified pressure, flow rate and volume • Working pressure: 20,000 psi • Flowrate: max 25 cc/min"
GE01/17	Engineering & Petroleum	Positive Displacement Pump	(VINCI)	The pump meets requirements of any application where accurate pressure, flow rate and volume measurements are needed in ambient and high temperature conditions.		"• Delivering specified pressure, flow rate and volume • Maximum pressure rating: 15,000 psi • Pressure accuracy: 0.1% • Maximum flow rate: 25 ml/min • Single stroke volume: 500 ml"
GE01/17	Engineering & Petroleum	Recombination Cell Apparatus	(VINCI)	The RCA 1000 instrument is based on a high pressure, high temperature recombination cell to give a homogeneous mixture of the reservoir fluid.		"• Recombining samples to give a homogeneous mixture of the reservoir fluid • Pressure: 15,000 psi (1,000 bar) • Max working temperature: Ambient to 175 °C"
GE01/17	Engineering & Petroleum	Sample Restoration Unit (2 arms)	(VINCI)	Very useful for the restoration of the fluid sample, this apparatus enables to heat and agitate the sample to the reservoir temperature while pressurizing the same sample at the reservoir pressure using an external high-pressure pump.		"• Restoration of the fluid sample (agitation & heating) • Temperature: Ambient to 200 °C • Temperature accuracy: ± 0.5 °C "
GE01/17	Engineering & Petroleum	Thermometer with Probe	FLUKE	The 1524 Reference Thermometer is designed to be reliable, stable, temperature measuring instrument that can be used in the field or laboratory. The instrument measures, graphs and record temperature using Platinum Resistance Thermometers (PRT), thermocouples (TC), and thermistors.		Measuring, graphing, and recording temperature
GE01/17	Engineering & Petroleum	Titrate System	MANTECH	The titrate system can measure PH, alkalinity, fluoride, ammonia, residual chlorine, TAN, TBN, H2S/mercaptan, total acidity, salt, chloride		"• Titrating, measuring PH, alkalinity, fluoride, ammonia, residual chlorine, TAN, TBN, H2S/mercaptan, total acidity, salt, chloride • Automates 26-300 sample in single batch • Non-destructive sample preparation allows for up to 5 parameters on a single sample • Parameter such as: ph, turbidity, alkalinity by titration, electrical conductivity, salinity, total hardness, etc..."
GE01/17	Engineering & Petroleum	Titrator	GR Scientific Limited	To measure water content of samples by measuring the amount of electrolysis current necessary to produce the required iodine.		"• Measuring water content of samples • Titration method: Aquamax KF Coulometric Titration • Measuring range: 1 uL - 10 mg water • Moisture range: 1 ppm – 100% water • Maximum titration speed: 2 mg/min • Maximum electrolysis current: 400 mA"
GE01/17	Engineering & Petroleum	Vacuum Pump	Edwards	Sealed Rotary Vacuum Pump to draw gas molecules from a sealed volume in order to leave behind a partial vacuum		"• Applying vacuum in a sealed volume • Level of Vacuum: HIGH VACUUM to .1 Micron (1Torr – 10-3 Torr) • CFM / L/M (Displacement): 22.5 CFM"
GE01/17	Engineering & Petroleum	Core Flooding System	TEMCO, INC	Core Flooding System are advanced, modular, computer controlled and configured for liquid permeability, water flood, water flood susceptibility and unsteady state liquid/liquid, gas/liquid relative permeability tests and other applications.		"• Measuring permeability, unsteady state liquid/liquid, gas/liquid relative permeability • Confining pressure up to 15,000 psig • Pore pressure up to 14,500 psig • Temperature up to 300 °F (150 °C) with Viton seals. For temperature up to 430 °F (200 °C) • Automated data acquisition and logging of pressures, temperature, flow rate and displaced fluid along with automated file back-up is controlled by the operating software • Environmentally Safe Oven rated to 450 °F (±1 degree) with automatic temperature control and lighted interior, with Class 1 safety features."

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GE 01/08	Engineering & Petroleum	Atomic Force Microscope	Agilent	Agilent 5420		It is one of the foremost tools for imaging, measuring, and manipulating matter at the nano-scale. The information is gathered by "feeling" the surface with a mechanical probe. Different conducting cantilevers used for scanning depend on the mode and the type of the sample.
GE 01/08	Engineering & Petroleum	RF Impedance/ Material Analyzer	Agilent	Agilent E4991A		The E4991A RF impedance/material analyzer offers ultimate impedance measurement performance and powerful built in analysis function. It is useful for dielectric and magnetic material measurement in wide frequency range.
GE 01/08	Engineering & Petroleum	Precision Impedance Analyzer	Agilent	Agilent 4294A		"It is an integrated solution for electrical measurement of R, L, C, Z and G in a wide frequency range. **Key Specifications** • Frequency: 40 Hz to 110 MHz • Basic accuracy: +/- 0.08 % • Test signal level range is 5 mV to 1 Vrms or 200 uA to 20 m Arms. • DC bias range is 0 V to +/-40 V or 0m A to +/- 100 mA. • Excellent High Q/Low D accuracy which enables analysis of low -loss components"
GE 01/08	Engineering & Petroleum	Mask Aligner	Karl SUSS	Karl SUSS MA4-12300039		The MA4 Karl Suss mask aligner is equipment used for micro-lithography to transfer the micro electronic circuit layout onto the wafer. A mask is placed above the wafer. The mask has the desired circuit pattern on it. A high intensity ultraviolet light is placed over the mask. The light only transmits through the mask openings allowing the pattern to be transferred to photoresist.
GE 01/08	Engineering & Petroleum	Spin coater	SUSS MicroTec	SUSS MicroTec RC5 STD		The RC5 Karl Suss spin coater is a machine used to deposit uniform thin films to flat substrates. Usually a small amount of coating material is applied on the center of the substrate. The substrate is then rotated at high speed in order to spread the coating material by centrifugal force.
GE 01/08	Engineering & Petroleum	UV-VIS-NIR Spectrophotometer	Shimadzu	Shimadzu SolidSpec – 3700		Solidspec-3700 spectrophotometer is used for the measurement of reflection (specular and/or diffused), transmission and absorption properties of a material as a function of wavelength. The Integrating Sphere and Direct Direction Unit are used for the optical measurements. Liquid samples, small and large solid samples can be measured using special attachments. In addition, color analysis and film thickness measurements can be carried out.
GE 01/08	Engineering & Petroleum	Tabletop Furnace	Nabertherm	Nabertherm 30-3000-L 5/12/P330		The table-top Muffle furnace is used for annealing samples with a temperature range of 30 to 1100 degree celcius. It has two satge heating ramps, one stage holding time and one stage cooling ramp
GE 01/08	Engineering & Petroleum	Step profiler-	KLA-Tencor	KLA-Tencor profiler-AlphaStep-D120 XP-200		The KLA-Tencor D120 Stylus profiler is a mechanical machine that can measure step heights up to millimeter range and can give the line profile of the steps.
GE 01/08	Engineering & Petroleum	4-Point Probe	Veeco	Veeco FPP-5000		"It is a simple apparatus for measuring the resistivity of semiconductor samples. By passing a current through two outer probes and measuring the voltage through the inner probes allows the measurement of the substrate resistivity. "
GE 01/08	Engineering & Petroleum	IC inspection microscope	Olympus	Olympus MJL		It can be used to get microscopic images of samples with 5X, 10X, 20X and 50X lenses and the images can be saved to a computer for later use
GE 01/08	Engineering & Petroleum	Probe Station	Semiprobe	PS4L (M4-M8)		4 probe station with a microscope (10x), light box and swing area, attached with a source-meter that measures I,V,R and P.
GE 01/08	Engineering & Petroleum	Quasi Steady State Photo Conductance (QSSPC)	Sinton Instruments	WCT-120		"QSSPC technique monitors the material quality during fabrication process. Lifetime data is interpreted and open-circuit voltage (versus illumination) curve is mapped. Standard offline wafer life-time tool: WCT-120 Available measurements: • Lifetime • Sheet Resistance • Emitter saturation current density • Trap density Suns-Voc Suns-Voc stage is usually attached with WCT-120. It displays standard I-V format as well as the Suns-Voc curve. The measurement is at open circuit so the effect of series resistance is negligible. "
GE 01/08	Engineering & Petroleum	Source Meter	Kiethley	KIETHLEY Series 2600B		"Source meter Specification: • Voltage rate: up to 40 Vdc • Current rate: 3A max at 6Vdc and 1A max at 40 Vdc • Variable impedance"
GE 01/08	Engineering & Petroleum	Elga DI water system	ELGA	CN200RDM1-230		It provides DI water with a conductivity of 18.2 megaohm
GE 01/08	Engineering & Petroleum	Wet Bench 1	FPS	REYNOLDSTECH		It is configured for chemical and semiconductor wafer processing
GE 01/08	Engineering & Petroleum	Wet Bench 2	FPS	REYNOLDSTECH		It is configured for chemical and semiconductor wafer processing
GE 01/08	Engineering & Petroleum	Wet Bench 3	FPS	JST Manufacturing ST0215A0		It is configured for chemical and semiconductor wafer processing
GE 01/08	Engineering & Petroleum	Advanced Ferroelectric /Multi Ferro electric Tester		P-HVA10-OP220		It executes hysteresis, pulse, leakage, IV and CV measurements without changing the sample connections. Thin films and bulk ceramics can be tested.

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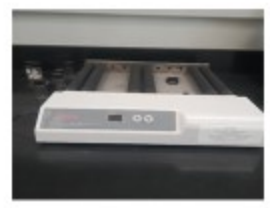
GE01/07	Engineering & Petroleum	Cross Section Polisher	JEOL	For SEM sample preparation. It uses an argon ion beam to gently remove material from a sample's surface.		"1. Gold wire Bond. 2.Galvanized Coating. 3.Fiber Optics. 4. Thin Film Analysis"
GE01/07	Engineering & Petroleum	Field Emission Scanning Electron Microscopes (FE-SEM)	JEOL	Electron microscope produces images of a sample by scanning the surface with a focused beam of electrons. And is used to study the morphology, topology, and detailed surface structure of solid materials in nanometer range.		"1. Materials evaluation and identification. 2. Quality control screening for analysis of failure and defect in product and process. 3. Examination of surface and powder morphology (including particle size & analysis). 4. EDS elemental analysis of contamination, corrosion, and oxidation. 5. EBSD structural analysis of crystalline materials that includes grain size measurement, grain boundary characterization, and texture development."
GE01/07	Engineering & Petroleum	High performance Liquid Chroma-tography (HPLC)	Shimadzu	the device is based on chromatographic technique and it is used to detect anions and cations in liquid samples		"Analysis of anions and cations in liquid samples such as: 1. Food. 2.Beverages. 3.Petrochemicals. 4. Chemicals. 5.Environmental Samples."
GE01/07	Engineering & Petroleum	Auto Fine Coater	JEOL	" For SEM sample preparation. It applies a fine layer of gold or platinum on non-conductive sample for imaging in a SEM."		preparing specimens for SEM observation
GE01/07	Engineering & Petroleum	Rheometer	TA Intsruments	"A strain controlled rheometer that has the ability to perform various types of rheological tests (such as flow sweep, strain sweep, stress relaxation, small and large amplitude oscillatory shear tests.)at controlled temperature. "		"1. Dispersions and Suspensions: Paints, Coatings, Ink, Drilling fluids, Cosmetics, Foods, Pharmaceuticals, Personal products such as Shampoos, Shower gels.... etc. 2.Polymers: Polymer melts, polymer solutions, and polymer blends. Thermosetting polymers, nanocomposites, crude oil ...etc."
GE01/07	Engineering & Petroleum	Auto-nulling Spectroscopic Imaging Ellipsometer	NANOFILM (Accurion)	the device is based on an optical nondestructive technique that allow characterization of thin films, surfaces, and interfaces. And is used to obtain thin films thickness, refractive index and optical loss constant at various wavelengths.		"1. Material Science. 2.Biology & Biophysics. 3.Semiconductor Physics. 4.Microelectronics."
GE01/07	Engineering & Petroleum	Solutions Electron Beam Evaporator	CHA Industries, Inc.	A physical vapor deposition system that is used to create thin film coating		"1. Thin film deposition. 2.Material Science. 3.Lift-off processes. 4.Contact Metallization. 5.Micro/Nano fabrication."
GE01/07	Engineering & Petroleum	Nano-Indenter	Hysitron (Bruker)	nanoindenter is used for providing quantitative nanomechanical characterization of small volumes of material. Nanoindentation test is driven by a transducer used to apply an increasing load to some a preset value, allowing the indenter to penetrate the sample surface. The amount of load and size of the indenter tip are very small, so the indentation area may range between several square nanometers to few micrometers.		"1. Evaluation of hardness and elastic modulus at the nanoscale level for several materials, including: a. Thin films and coatings b. Metals and alloys c. Biomedical tissues d.Dental materials 2.Evaluation of fracture toughness at the nanoscale level. 3.Scratch and wear tests. "
GE01/07	Engineering & Petroleum	Atomic Force Microscope (AFM)	Agilent (CSInstruments)	Atomic force microscope (AFM) probes the surface of a sample with a sharp tip, a couple of microns long and often less than 100Å in diameter. The instrument generates a 2D/3D view at atomic-scale resolution and can be used to study roughness of surface		"1. Material Science. 2.Electro Chemistry. 3.Polymer science. 4.Life Science & Biotechnology."
GE01/07	Engineering & Petroleum	Microplotter	Sonoplot	Microplotter is a precision picoliter fluid dispensing system that uses controlled ultrasonics to deposit droplets in a noncontact manner as small as 5 µm wide. And is used for drawing features as small as 10 to 20 micron. And also enables the deposition of a wide range of materials, including solutions containing graphene, carbon nanotubes, nanoparticles, and polymers		"1. Used for drawing features as small as 10 to 20 microns. 2. Enables true contiguous lines for superior conductive traces. 3. Enables the deposition of a wide range of materials, including solutions containing graphene, carbon nanotubes, nanoparticles, and polymers. 4. Allows printing inks with viscosities up to 650 cP. 5. Allows accurate alignment and dispensing on substrates. "
GE01/07	Engineering & Petroleum	Universal Testing Machine (UTM)	Instron	X-ray diffraction (XRD) is an analytical technique based on the diffraction of X-rays by matter that is used for phase analysis, crystalline variants, and to study the grain and particle size of nanomaterials.		"1. Measure mechanical properties of different materials: a. Ferrous and non-ferrous metals. b. Polymers. c. Ceramics and construction materials. 2. Examination of mechanical behavior at different loading and temperature conditions. 3. Mechanical evaluation of components in aerospace, automotive and electronic industries. "
GE01/07	Engineering & Petroleum	Optical Microscope	Zeiss	A type of microscope that uses visible light and a system of lenses to generate magnified images of small objects. Used for high magnifications in micrometer range.		"1. Material Science. 2.Electro Chemistry. 3.Life Science. 4. Biotechnology. 5.Corrosion Analysis."
GE01/07	Engineering & Petroleum	Stereo Microscope	Zeiss	A type of microscope that uses visible light and a system of lenses to generate magnified images of small objects. Used for low magnifications in millimeter range.		"1. Material Science. 2.Nanotechnology. 3.Life sciences. 4. Pathology. 5.Biotechnology. 6.Dentistry."
GE01/07	Engineering & Petroleum	Vacuum Tube Furnace	Nabertherm	The tube furnace consists of a cylindrical cavity surrounded by heating coils embedded in a thermally insulating matrix. Operating Temp. up to 1300 °C. Precisely controlled gas supply system and can reach low vacuum level. Used for heat treatment.		"1. Heat treatment of metallic alloys. 2.Ashing. 3.Calcination. 4.Curing. 5.Fusion. 6.Loss on drying/Ignition."
GE01/07	Engineering & Petroleum	Precision Diamond Saw	Buehler	"precision cutting of a wide variety of materials. Used for sample preparation.		preparing specimens for SEM observation
GE01/07	Engineering & Petroleum	Ultra pure water system	Milli-Q	Produce de-ionized water directly from tap water. Used for sample preparation.		producing ultrapure water for sample preparation.
GE01/07	Engineering & Petroleum	Ultra pure water purification system	Thermo Scientific	Produce de-ionized water directly from tap water. Used for sample preparation.		producing ultrapure water for sample preparation.
GE01/07	Engineering & Petroleum	Static and Dynamic Light Scattering device	Malvern	"the insturment is used light scattering techniques to measure particle size and size distribution (in nano ranged. And also has the ability to obtain zeta potential and determine isoelectreic point."		"1. Particle Size: Colloid size and size distribution, pharmaceuticals, nanoparticles, emulsions. 2. Zeta Potential: Emulsion stability, formulation stability, water treatment, pigment performance, and impurity determination. 3. Molecular weight: Protein and polymer characteristics, Protein crystal screening, 2nd virial coefficient determination, oligomer identification, protein-melting point, micelle structure, protein-ligand binding. "
GE01/07	Engineering & Petroleum	Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES)	Varian (Agilent)	an analytical technique used to determine how much of certain elements (in ppm range) are in a sample.		"1. Biosciences and Material Sciences. 2. Pharmaceuticals, Clinical Research and Forensics. 3.Food and Agriculture. 4. Environmental and Chemical Analysis. 5.Fuels and Energy."
GE01/07	Engineering & Petroleum	UV- Visible Spectrophotometer	Varian (Agilent)	a technique used to measure light absorbance across the ultraviolet and visible ranges of the electromagnetic spectrum.		"1. Quantitative and qualitative analysis. 2. Biosciences. 3. Pharmaceuticals. 4. Clinical Research and Forensics. 5. Food and Agriculture. 6. Chemical Analysis. 7. Environmental. 8. Fuels and Energy. 9. Material Sciences."
GE01/07	Engineering & Petroleum	Polishing machine	Struers	" preparing materialographic specimens for microscopic examination. "		used in a range of different industries, including the food and beverage, dairy, chemical, pharmaceutical, and semiconductor sectors
GE01/07	Engineering & Petroleum	Dual High-Energy Ball Mill	SPEX	A ball mill is a type of grinder used to grind material into nano/micro size using different sized balls.		Mechanical alloying, nanomilling, slurry grinding, blending powders, mixing emulsions, and mechanochemistry.
GE01/07	Engineering & Petroleum	High Resolution X-Ray Diffraction (XRD)	Rigaku	X-ray diffraction (XRD) is an analytical technique based on the diffraction of X-rays by matter that is used for phase analysis, crystalline variants, and to study the grain and particle size of nanomaterials.		Academic research, Chemistry, Coatings, Materials science, Nanotechnology, Photovoltaic manufacturing, Semiconductor manufacturing, Pharmaceuticals, Advanced and new materials

جامعة الكويت
KUWAIT UNIVERSITY

GE01/07	Engineering & Petroleum	X-Ray Fluorescence Analyzer (WDXRF)	Rigaku	Wavelength Dispersive X-ray Fluorescence (WDXRF) is one of two general types of X-ray Fluorescence instrumentation used for elemental analysis applications.		"Materials science, Petroleum & petrochemicals. Cement, Coatings. Environmental, Food & food ingredients. Geology & minerals, Pharmaceuticals and Polymers."
GE01/07	Engineering & Petroleum	Fourier Transform Infra-Red Spectrometer (FTIR) with ATR	Agilent	Attenuated total reflection (ATR) is a sampling technique used alongside traditional infrared spectroscopy, which ultimately qualifies samples to be observed directly in either solid or liquid state, without additional preparation. FTIR stands for 'Fourier-transform infrared' spectroscopy: a technique that can be used to procure an infrared spectrum of either the emission or absorption of a liquid, solid, or gas sample.		"1. QA/QC of raw material and final products. 2.Simple in-house spectral database development. 3.Routine synthesis verification. 4.Reaction monitoring. 5.Determination of hydrocarbon contamination in water. 6.Sample defect and surface contamination analysis. 7.Teaching and research laboratory experiments. "
GE01/07	Engineering & Petroleum	Fourier Transform Infra-Red Spectrometer (FTIR)	Varian (Agilent)	Fourier transform infrared spectroscopy (FTIR) is a technique which is used to obtain infrared spectrum of absorption, emission, and photoconductivity of solid, liquid, and gas. And it is used to detect different functional groups in samples.		Identification of unknown materials and confirmation of production materials (incoming or outgoing)
GE01/07	Engineering & Petroleum	Electro Polishing Unit	Struers	Electropolishing is an electrochemical material removal process for metallic workpieces using an external source of electric current. It is used to polish, passivate and debur surfaces.		"1. Most of the metals can be polished /etched. 2.External etching. 3.Polishing/etching at sub-zero temperature. 4.Very good polish in limited time. 5.Excellent for Metallographic specimen preparation."
GE01/07	Engineering & Petroleum	Electro polishing Unit	Struers	Electropolishing is an electrochemical material removal process for metallic workpieces using an external source of electric current. It is used to polish, passivate and debur surfaces.		"1. Most of the metals can be polished /etched. 2.External etching. 3.Polishing/etching at sub-zero temperature. 4.Very good polish in limited time. 5.Excellent for Metallographic specimen preparation."
GE01/07	Engineering & Petroleum	Hardness Tester		Hardness tester, device that indicates the hardness of a material, usually by measuring the effect on its surface of a localized penetration by a standardized rounded or pointed indenter of diamond, carbide, or hard steel.		"1. Has one of the widest scales among hardness tests. 2.Useful for testing on a wide type of materials. 3.Testing very thin materials like foils is possible. "
GE01/07	Engineering & Petroleum	Tribometer	RTEC	A tribometer is an instrument that measures tribological quantities, such as coefficient of friction, friction force, and wear volume.		The tribometer can be used for several applications on thin or thick films, lubricants, materials, soft materials, hydrogels, bio materials, smooth or rough surfaces, flat or rough surfaces, transparent or opaque surfaces, Nano or macro scale, coating or bulk materials, and more.
GE01/07	Engineering & Petroleum	THERMAL CONDUCTIVITY ANALYSER		Thermal Constants Analyzer is a non-destructive precision analysis of thermal transport properties including thermal conductivity, thermal diffusivity, and specific heat capacity.		Thermal conductivity is used to know about the materials ability to conduct heat
GE01/07	Engineering & Petroleum	Laboratory Glassware Washer	Biobase	used to wash and clean laboratory glassware		used to wash and clean laboratory glassware
GE01/07	Engineering & Petroleum	"Semi Micro Balance"	RADWAG	used to measure sample weight in micro range		used to measure sample weight in micro range
GE01/07	Engineering & Petroleum	Pellet Press 40T	Atlas	used to press and prepare pellets for XRF and XRD analysis		used to press and prepare pellets for XRF and XRD analysis
GE01/07	Engineering & Petroleum	Vaccum Pump for Filtration	ULVAC	used to filter samples and also used to prepare HPLC solvent		used to filter samples and also used to prepare HPLC solvent
GE01/07	Engineering & Petroleum	Vaccum Pump for Filtration	ULVAC	used to filter samples and also used to prepare HPLC solvent		used to filter samples and also used to prepare HPLC solvent
GE01/07	Engineering & Petroleum	Sieve Shaker	RETSCH	A sieve shaker automates the agitation of particles for particle separation and sizing distribution for a range of materials to meet quality control.		A sieve shaker automates the agitation of particles for particle separation and sizing distribution for a range of materials to meet quality control.
GE01/07	Engineering & Petroleum	Heating Bath	IKA	A heating bath is a laboratory heating device whose primary function is to temper/heat liquids or other media and thus to heat immersed vessels such as round bottom flasks, beakers, distillation or Erlenmeyer flasks. For this purpose, the heating bath filler, liquid, water or oil, is heated on a heating plate, usually with a magnetic stirrer, which is used to circulate the tempering liquid and distribute the heat better in the heating bath."		preparing specimens for SEM observation
GE01/07	Engineering & Petroleum	Mechanical Stirrer	IKA	is used for mixing and preparing samples		is used for mixing and preparing samples
GE01/07	Engineering & Petroleum	Furnace	JSR	used to heat and prepare sample		used to heat and prepare sample
GE01/07	Engineering & Petroleum	Microwave Reaction System	Anton Paar	Microwave digestion is a preparation technique for converting solid samples into solutions suitable for analysis by ICP		Microwave digestion is a preparation technique for converting solid samples into solutions suitable for analysis by ICP
GE01/07	Engineering & Petroleum	Ultrasonic Cleaner (Medium Size)	Bransonic	Ultrasonic cleaner is a device that uses ultrasound to agitate a fluid.		Ultrasonic cleaner is a device that uses ultrasound to agitate a fluid.
GE01/07	Engineering & Petroleum	Ultrasonic Cleaner (Small Size)	Soniclean	Ultrasonic cleaner is a device that uses ultrasound to agitate a fluid.		Ultrasonic cleaner is a device that uses ultrasound to agitate a fluid.
GE01/07	Engineering & Petroleum	Semi Micro Balance	RADWAG	used to measure sample weight in micro range		used to measure sample weight in micro range
GE01/07	Engineering & Petroleum	Analytical Balance	Mettler Toledo	used to measure sample weight in grams		used to measure sample weight in grams
GE01/07	Engineering & Petroleum	pH & Conductivity Meter	Hanna instruments	used to measure pH and conductivity of samples		used to measure pH and conductivity of samples
GE01/07	Engineering & Petroleum	Vacuum pump for desiccator	ULVAC	used for sample preparation		A vacuum pump is used to remove moisture and air from a vacuum desiccator, which is especially suited for materials that require dust-free, totally dry storage.

جامعة الكويت
KUWAIT UNIVERSITY

GE01/07	College of Engineering & Petroleum	Machanical Convection Oven	JEIO-Tech	used to dry samples		used to dry samples
GE01/07	College of Engineering & Petroleum	Hot Plate Stirrer	Fisher Scientifc	used to prepare sample by heating and mixing		used to prepare sample by heating and mixing
GE01/07	College of Engineering & Petroleum	Ceramic Hotplate Stirrer	Stuart	used to prepare sample by heating and mixing		used to prepare sample by heating and mixing
GE01/07	College of Engineering & Petroleum	Ceramic Hotplate Stirrer	Stuart	used to prepare sample by heating and mixing		used to prepare sample by heating and mixing
GE01/07	College of Engineering & Petroleum	Shaking Water Bath	Julabo	used to prepare sample by heating and mixing		used to prepare sample by heating and mixing
GE01/07	College of Engineering & Petroleum	Digital Refractometer	Hanon Instruments	A refractometer is a device for the measurement of an index of refraction (refractometry).		A refractometer is a device for the measurement of an index of refraction (refractometry).
GE01/07	College of Engineering & Petroleum	Vacuum Impregnation Unit	Struers	Vacuum Impregnation Unit is a self-contained unit for high quality encapsulation and impregnation of specimens with synthetic resins. Used to prepare samples for polishing		Vacuum impregnation equipment is used to prepare the impregnation resin. It includes dry and wet vacuums. The dry vacuum method ensures no interference with degassing the pores, as there is no liquid involved. The wet vacuum method allows the impregnation resin to penetrate the part at atmospheric pressure, enabling rapid processing. Vacuum impregnating equipment is used to apply a vacuum to an object to remove any air or gas from it, improving the adhesion of coatings or sealants.
GE01/07	College of Engineering & Petroleum	Laboratory Bottle Rotator	Thermo Scientific	e Bottle/Tube Roller is capable of rolling multiple size tubes or bottles. Used for sample preparation		e Bottle/Tube Roller is capable of rolling multiple size tubes or bottles. Used for sample preparation
GE01/07	College of Engineering & Petroleum	Glove Box	Labcobco	A laboratory glove box is a sealed container that allows handling of the inside contents under a controlled atmosphere. Used for sample preparation		allows manipulation of substances that must be contained within a very high purity inert atmosphere, such as argon or nitrogen. It is also possible to use a glovebox for manipulation of items in a vacuum chamber