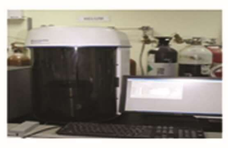
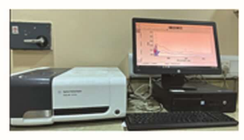
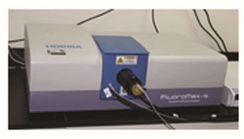
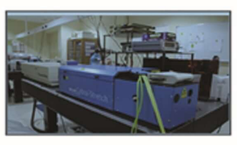
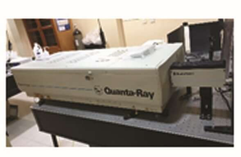
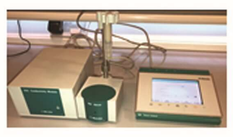
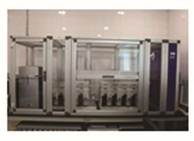
جامعة الكويت
KUWAIT UNIVERSITY

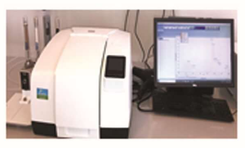
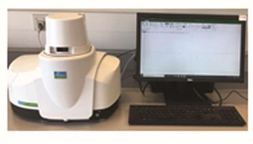
Research Sector
General Facilities & Specialized Research Units & Laboratories
Science

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
GS 01/01	RSPU/ Science	1.Thermal Analyzer –	Shimadzu DTG60AH/TMA-60	Features: • Temperature range: Room temperature to 1100°C. • Programmable heating rate: 0.1 to 99.9°C / min to 0.1 to 99.9°C/h. • Temperature program format: Constant rate of heating/cooling. • Atmosphere: N2, H2, O2, CO2 and vacuum (static or dynamic). • Automation: Multi-tasking software for simultaneous 2 channel data acquisition and processing. • TMA analysis modes available: Constant rate up to 50 steps; constant rate elongation; shrinking strain measuring mode and cyclic loading mode. Applications: • Investigations on thermal stability of materials, stoichiometry and oxidation process. • Weight loss of plasticizers. • Studies on visco elastic behavior and glass transition.		• Investigations on thermal stability of materials, stoichiometry and oxidation process. • Weight loss of plasticizers. • Studies on visco elastic behavior and glass transition.
GS 01/01	RSPU/ Science	2. NMR	- Bruker DPX Avance 400	Features: • Magnetic field: 9.4 Tesla / 400 MHz; bore size: standard bore 54 mm. • Sensitivity: 1H: 220:1 (S/N) 0.1% EB; 13C: 120:1 S/N 10% EB. • Available nuclei: 1H, 13C, 31P, 19F, 15N; software: Topspin 1.3. • 5mm DUL 13C-1H/D -probe for 1H/13C. • 5mm DUL 13C-1H/D Z-GRD-probe for 1H/13C with variable temperature and Z-gradient. • 5mm PABBI 1H/D/19F-BB-ZGRD-probe for 2D experiments. • 10mm SEX 2H-1H/19F- probe for deuterium studies. • 5mm QNP 1H/13C/31P/19F Z-GRD-probe for 1H, 13C, 19F & 31P. Applications: • Elucidation of molecular structures & conformations. • Analysis of the content and purity in samples. • Determination of relaxation constants. • 1D NMR technique involves 1H, 2H, 13C, 19F, 31P, 15N, 33S, 17O, APT, DEPT45, DEPT90, DEPT135. • 2D NMR technique involves COSY, TOCSY, NOESY, ROESY (HOMO nuclear) & HSQC, HMBC (HETERO nuclear).		• Elucidation of molecular structures & conformations. • Analysis of the content and purity in samples. • Determination of relaxation constants. • 1D NMR technique involves 1H, 2H, 13C, 19F, 31P, 15N, 33S, 17O, APT, DEPT45, DEPT90, DEPT135. • 2D NMR technique involves COSY, TOCSY, NOESY, ROESY (HOMO nuclear) & HSQC, HMBC (HETERO nuclear).
GS 01/01	RSPU/ Science	3. Adsorption Analyzer -	ASAP 2020	Features: • Adsorption and desorption isotherms utilizing multiple gases such as N2, H2, CO2 etc. • Two independent vacuum systems. • Programmable two stations degas system. • Six gas inlet ports. • 1 mm Hg transducer micro-pore system delivers accurate porosity data on pores. Applications: • BET (Brunauer, Emmett, and Teller) surface area. • Langmuir surface area. • Total micropore volume and area by the t-Plot method. • Horvath-Kawazoe for micropore distribution. • BJH pore size distribution using adsorption isotherm. • BJH adsorption and desorption isotherm. • Dollimore-heal adsorption and desorption. • DFT pore size and surface energy.		• BET (Brunauer, Emmett, and Teller) surface area. • Langmuir surface area. • Total micropore volume and area by the t-Plot method. • Horvath-Kawazoe for micropore distribution. • BJH pore size distribution using adsorption isotherm. • BJH adsorption and desorption isotherm. • Dollimore-heal adsorption and desorption. • DFT pore size and surface energy.
GS 01/01	RSPU/ Science	4. Gemini -VII	Micromeritics	Features: • Rapidly and reliably produces accurate, repeatable surface area and porosity results. • Fully automatic operation. • Capable of measuring low surface area materials. • No pressure overshoot. Applications: • Single- and multipoint BET (Brunauer, Emmett, and Teller) surface area. • Langmuir surface area. • Total pore volume. • BJH pore size distribution using adsorption isotherm. • BJH adsorption and desorption isotherm.		• Single- and multipoint BET (Brunauer, Emmett, and Teller) surface area. • Langmuir surface area. • Total pore volume. • BJH pore size distribution using adsorption isotherm. • BJH adsorption and desorption isotherm.
GS 01/01	RSPU/ Science	5. Particulate Systems	–HVPAII	Features: • Uses the static volumetric method to obtain high-pressure adsorption and desorption isotherms. • Wide operating pressure range: high vacuum to 100 bar. • Broad temperature capability: From cryogenic to 500°C. • Excellent control of sample temperature by means of a recirculating temperature bath, cryogen dewar, or furnace. • Excellent data reproducibility. • Handles typical adsorbates such as N2, H2, CH4, Ar, O2, and CO2. Applications: • High-pressure adsorption and desorption isotherms. • Dual free-space measurement for accurate isotherm data. • Free space can be measured. • Isotherm and weight percentage plots created automatically. • Real-time charts for pressure vs time and temperature vs time. • Gas mixtures with up to three components can be used.		• High-pressure adsorption and desorption isotherms. • Dual free-space measurement for accurate isotherm data. • Free space can be measured. • Isotherm and weight percentage plots created automatically. • Real-time charts for pressure vs time and temperature vs time. • Gas mixtures with up to three components can be used.
GS 01/01	RSPU/ Science	4. Pycnometer AccuPyc II 1340		Test method covers determination of skeletal density of samples. High precision volume measurements and true density calculations on a wide variety of powders,solid and slurry samples		AccuPyc II Series of Pycnometers (Gas pycnometer) provides high-speed,high-precision measurements for determining the true density of • powders • solids • slurries.
GS 01/01	RSPU/ Science	8. Micro wave digestion system MultiWave Pro		Multiwave PRO is a high-end, high-performance platform system allows digestion of many types of samples.		• Used to dissolve metals present in solid samples, prior to sample analysis. • Digestion of soil, sludge, environmental water wastes, mining materials and fertilizers. • Plants, food products and pharmaceuticals. • Industrial and chemical compounds and nanomaterials.
GS 01/01	RSPU/ Science	9. Trilogy Laboratory Fluorometer – Turner Design		Trilogy® is a powerful yet easy to use instrument that offers many benefits for benchtop analysis of samples. Its all solid-state design (no moving parts) utilizes light emitting diodes, sensitive photodiodes, solid glass filters, and electronics to ensure reliable and repeatable readings with no instrument drift. Sensitivity is maximized and pre-set providing a broad measurement range from minimum detection levels to maximum linear concentrations without instrument adjustments. Up to 18 different calibrations can be stored, each calibration performed with up to five concentration standards. Data can be output directly into an Excel spreadsheet during measurements via USB or serial connection. Trilogy can be used for fluorescence, absorbance, or turbidity measurements by simply snapping in the appropriate module. Standard modules are pre-configured for select applications; custom modules can be built for user-specific applications. The Trilogy's small, compact design makes it a great addition to any laboratory analyzing fluorescence, absorbance, or turbidity properties of natural water samples.		Trilogy can be used for • fluorescence • absorbance • turbidity measurements of natural water samples

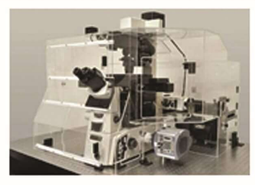
GS 01/01	RSPU/ Science	10. Particle Size Analyzer – Zetasizer		The Zetasizer Nano ZS is a high performance two angle particle, zeta-potential, and molecular size analyzer for the enhanced detection of aggregates and small particles. Samples may be measured at very low or high concentration using dynamic light scattering with 'NIBS' optics. Size may be measured in the range of 0.3nm to 10um. Zeta-potential may be measured in the range of 3.8nm to 100um. The flow mode option enables the system to be connected to an SEC or an FFF system to use as a detector for the size of proteins or nanoparticles. The MPT-2 Autotitrator allows the study of the effect of changes in pH, conductivity, or any additive to be automated. A range of disposable and reusable cells are available to optimize the measurement in terms of sample volume, concentration and flow measurement.		The Zetasizer Nano ZS is a high performance two angle particle, zeta-potential, and molecular size analyzer for the enhanced detection of aggregates and small particles.
GS 02/01	RSPU/ Science	11. Gas Chromatograph – 3900 With Autosampler and cooler		Features: • CP-1177 Split/Split less injector with optimized flow profile. • Auro-sampler for reliable automated injection. • Flame ionization (FID) detector with ceramic flame tip for ultimate sensitivity. Applications: • General hydrocarbons analysis (qualitative analysis). • Studies of hydrocarbons in oil, crude oil, soil and gases.		• General hydrocarbons analysis (qualitative analysis). • Studies of hydrocarbons in oil, crude oil, soil and gases.
GS 02/01	RSPU/ Science	12. Gas Chromatograph With headspace Headspace–	Perkin Elmer Clarus 590	Features: • GC system with different detectors, Flame ionization (FID) detector, and TCD detector. • Auro-sampler for reliable automated injection. Applications: • General hydrocarbons analysis (qualitative analysis). • Studies of hydrocarbons in oil, crude oil, soil and gases.		• hydrocarbons analysis (qualitative analysis). • Studies of hydrocarbons in oil, crude oil, soil and gases.
GS 02/01	RSPU/ Science	13. Atomic Absorption Spectrometer –	Perkin Elmer Pinnacle	Features: • Quantization of up to 8 single elements sequentially using HCL/EDL lamps. • Improved detection limits using fiber optics. • Segmented solid-state wide range detector. • Wide wavelength range: 184-900 nm. • Workflow based auto-sampler. Applications: • Metal and mineral analysis of samples at ppm level. • Can be used for the analysis of water and waste water, biological and geological samples or chemical wastes. • Analysis of food and pharmaceutical products.		• Metal and mineral analysis of samples at ppm level. • Can be used for the analysis of water and waste water, biological and geological samples or chemical wastes. • Analysis of food and pharmaceutical products.
GS 02/01	RSPU/ Science	14. Ion chromatograph Mass Spectrometer –	Metrohm ICMS 850	Features: • Conductivity detector for anions and cation. • Sequential suppression (chemical and CO) possible. • Reduces background conductivity to an absolute minimum. • Suitable for processing chemicals and flammable samples. • 886 Professional Thermostat/Reactor for temperature control. • 887 Professional UV/Visible detector for organic acids. • MSQ Plus (Thermo Scientific) mass spectrometer detector for trace bromate levels. Applications: • Determines concentrations of the following ions in samples: - Anions: Inorganic and small organic anions with chemical suppression. - Anions A (A5 column): F-, Cl-, NO2-, Br -, NO3-, PO4 3- and SO4 2- . - Anions B (A7 column): F-, BrO3 -, Cl-, NO2 -, Br -, ClO3 -, NO3 -, PO4 3- and SO4 2-. - Cations (C4 column): Li+, Na+, NH4 +, K+, Ca2+ and Mg2+. - Organic acids (Organic acids column): Formic acid, acetic acid and tartaric acid. • Trace bromate using A16 column and MS.		• Determines concentrations of the following ions in samples: - Anions: Inorganic and small organic anions with chemical suppression. - Anions A (A5 column): F-, Cl-, NO2-, Br -, NO3-, PO4 3- and SO4 2- . - Anions B (A7 column): F-, BrO3 -, Cl-, NO2 -, Br -, ClO3 -, NO3 -, PO4 3- and SO4 2-. - Cations (C4 column): Li+, Na+, NH4 +, K+, Ca2+ and Mg2+. - Organic acids (Organic acids column): Formic acid, acetic acid and tartaric acid. • Trace bromate using A16 column and MS.
GS 02/01	RSPU/ Science	15. Atomic Emission Spectrometer –	Agilent 4100 MP-AES	Features: • Suitable for sequential multi-elemental determinations using Czerny-Turner design monochromator, with a solid state CCD detector. • Wide wavelength range 178–780 nm. • Magnetically excited microwave plasma source for handling high solid matrices. • Efficient and accurate correction options for background or spectral interferences. • PC-controlled peristaltic pump with variable speed, and three channels for sample, drain and internal standard. Applications: • Suitable for multi-element quantitation of metals (ppm level) in large number of samples at different wavelengths. • Quantitative mineral analysis in geological, environmental and industrial samples. • Analysis of chemical, petrochemical and biological products.		• Suitable for multi-element quantitation of metals (ppm level) in large number of samples at different wavelengths. • Quantitative mineral analysis in geological, environmental and industrial samples. • Analysis of chemical, petrochemical and biological products.
GS 02/01	RSPU/ Science	16. Differential Scanning Calorimeter -	Netzsch DSC 204 F1 Phoenix	Features: • Temperature range: -160°C to + 600°C. • Cooling devices: LN2, GN2, IC (-85°C), air. • Cooling rate: 0.001-200 K/min automatically controlled liquid nitrogen cooling. • Heating rate: 0.001-200 K/min. • Sensor: Tau-sensor. • Indium Response Ratio: ≥100 mW/K. • Gas control: 2 sample gases and 1 protective gas through integrated mass flow and software controlled. Applications: • Analysis of Glass transition and percent crystallinity. • Melting points determination. • Compositional analysis. • Measurement of heat capacity and heats of cure.		• Analysis of Glass transition and percent crystallinity. • Melting points determination. • Compositional analysis. • Measurement of heat capacity and heats of cure.
GS 02/01	RSPU/ Science	17. UV-Vis Spectrometer –	Agilent Cary 5000	Features: • Measuring range: 180-3300 nm using a PbSmart NIR detector. • Variable slit widths down to 0.01nm for optimum control over data resolution. • Resolution: <0.045 nm (UV VIS), < 0. 18 nm (NIR). • Wavelength accuracy: ± 0.08 nm (UV-VIS) and ± 0. 3 nm (NIR). • Separate nitrogen purging for sample and monochromator compartments. • Lock down mechanism for quick changes and positioning for different accessories. • Accessories available: optic fiber probe, dual cell peltier, temperature probe, diffuse and specular reflectance. Applications: • Qualitative and quantitative analytical tasks. • Stoichiometry of coordination compounds. • Optical characterization of thin films. • Reaction-rate determination. • Characterization of chromophores. • Multi-component determinations.		Qualitative and quantitative analytical tasks. • Stoichiometry of coordination compounds. • Optical characterization of thin films. • Reaction-rate determination. • Characterization of chromophores. • Multi-component determinations.

GS 02/01	RSPU/ Science	18. Mini Uv Agilent Cary 60		Reduce time-consuming and expensive lamp replacements, and minimize instrument revalidation costs with the unique Agilent xenon source lamp. Safely measure life-science samples without sample photodegradation and be sure that you get the correct answer every time with the Cary 60 UV-Vis spectrophotometer. Get reliable UV-Vis spectrophotometer performance with fiberoptic measurement probes. Why use cuvettes when you can bring the UV-Vis instrument to the sample and get accurate results in a fraction of the time? Measure small volumes and precious samples accurately and reproducibly with a highly focused beam image. Scan the entire wavelength range (190 to 1100 nm) in under three seconds and collect data from single or multiple wavelengths at 80 data points per second. Take advantage of the Cary 60 UV-Vis spectrophotometer's comprehensive range of accessories to accurately characterize the widest variety of liquid and solid samples. Tailor the Cary WinUV software to suit your analytical requirements. From classroom to research laboratories through R&D and regulated QA/QC environments, simplify your UV-Vis spectroscopy measurements and get more done in less time. Choose sustainability: The Cary 60 UV-Vis received My Green Lab's ACT (Accountability, Consistency, Transparency) label after independent audit for its environmental impact throughout the product lifecycle		• Qualitative and quantitative analytical tasks. • Reaction-rate determination. • Multi-component determinations.
GS 03/01	RSPU/ Science	19. XRD X-Ray Diffractometer D8 Advance		Features: • Data collection: angular range between 10° and 80°; 2θ scan step - 0.015° ; step time -0.2 second. • Radiation type: CuKα (λ = 1.5406 Å); voltage: 40 kV; current: 40 mA; detector: Lynxeye. • DIFFRAC plus (BRUKER AXS, INC., 2004) with ICDD library to identify the minerals. Applications: • Studies on geological samples, rocks, soils, minerals, ores, etc. • Identification of crystalline structures. • Particle sizing of powders. • Determination of unit cell parameters of solid lattices. • High temperature powder diffractometry.		• Studies on geological samples, rocks, soils, minerals, ores, etc. • Identification of crystalline structures. • Particle sizing of powders. • Determination of unit cell parameters of solid lattices. • High temperature powder diffractometry.
GS 03/01	RSPU/ Science	20. XRF X-Ray Florescence Spectrometer S8 Tiger	Bruker	Features: • Automatic collimator changer (up to 4). • Automatic mask changer (up to 3); additional high precision masks available. • Automatic crystal changer (up to 8) included: XS-55, PET, LiF (200); optional: XS-B, XS-C, XS-N, XS-PET-C, XS-CEM, XS-Ge-C, LiF (220), LiF (420), ADP, Ge, TlAP, InSb. • Intuitive touchscreen interface. • Linear intensity range more than 10 million cps. Applications: • Analyses all elements from beryllium to uranium in a wide variety of sample types. • Used in the areas of mining, geosciences, chemistry, environmental protection, agriculture and food. • Semiconductors, steel, brass and aluminum industry, petroleum and polymer. • Geological materials like rocks, solids, fly ashes, filter cakes, minerals, ores or cement.		• Analyses all elements from beryllium to uranium in a wide variety of sample types. • Used in the areas of mining, geosciences, chemistry, environmental protection, agriculture and food. • Semiconductors, steel, brass and aluminum industry, petroleum and polymer. • Geological materials like rocks, solids, fly ashes, filter cakes, minerals, ores or cement.
GS 03/01	RSPU/ Science	21.Spectroflurometer Fluromax4-	Horiba	Features: • High sensitivity: 3000 : 1 peak to peak (S/N). • High selectivity: bandpass selectable from 0 nm to 29.4 nm. • 150 Watts Xenon Lamp. • TCSPC (Time Correlated Single Photon Counting): For fluorescence lifetime measurements into the nanosecond range quickly and accurately. • Possible to monitor the variation of signal with time, temperature, concentration or polarization. Applications: • Qualitative and quantitative determination of compounds exhibiting luminescence. • Important characterization technique in photochemistry and analytical chemistry. • Useful in pharmaceuticals and medicine; food science and agriculture. • Cell biology and environmental science.		• Qualitative and quantitative determination of compounds exhibiting luminescence. • Important characterization technique in photochemistry and analytical chemistry. • Useful in pharmaceuticals and medicine; food science and agriculture. • Cell biology and environmental science.
GS 03/01	RSPU/ Science	22.HPLC Shimadzu	SHIMADZUSPD-M40	Features: • Lamp: Deuterium. • Detector: PDA & Fluorescence (RF) • Column operating temperature: 4-150°C. • Wavelength range: 190 to 700 nm. • Injection volume: 0.1 to 50µl. • Fully automated ultra-fast analysis. Applications: • Qualitative and quantitative analysis • Identification of active ingredient in drugs and formulations.		• Qualitative and quantitative analysis of different kind of samples. • Separation of isomers. • Identification of active ingredient in drugs and formulations.
GS 03/01	RSPU/ Science	23.LASER Nd: YAG Laser Sirah laser-		These instruments are used to Laser studies. Some major applications are Laser induced emission studies and Nonlinear optical studies		• Spectroscopic studies mainly shift & broadening of Rydberg spectral lines. • Nonlinear spectroscopy. • Fluorescence lifetime measurements and Raman spectroscopy. • In material processing and laser ablation of samples.
GS 03/01	RSPU/ Science	24.Dye LASER Minilite I - Continuum Minilite II -				
GS 03/01	RSPU/ Science	25. Liquid Nitrogen Plant – Stirling MNP	Sterilin-1	To generate the required Liquid Nitrogen for the facility as well as for the departments dealing with cryogenic experiments.		A liquid nitrogen generator is a device that helps you procure your nitrogen supply on-site. The Liquid Nitrogen can be used to preserve cells, microbes etc. It can be used as cryogenic refrigerant for various purposes including reducing boil off rate of Helium in NMR machines, etc.
GS 03/01	RSPU/ Science	26. Conductivity meter – Metrohm	Metrohm	Features:Conductivity measuring module as supplement to an existing Titrando system or "stand-alone" in combination with a 900 Touch Control. With the 856 Conductivity Module, not only conductivity and temperature can be determined, but also TDS and salinity. It supports state-of-the-art conductivity measuring cells, i.e. 5-ring measuring cells. The Conductivity Module is equipped with two USB interfaces for connecting printers, barcode readers, or sample changers and four MSB interfaces for stirrers or Dosinos. For use with OMNIS Software, tiamo software, or Touch Control unit. Compliance with GMP/GLP and FDA regulations such as 21 CFR Part 11, if required		Conductivity meter allows us to measure the level of conductivity in solutions

GS 03/01	RSPU/ Science	27. Portable pH Meter with Titrator	Metrohm	The 781 pH/Ion Meter is a high end ph/Ion meter with a wide range of capabilities. In addition to the general pH, ion, potential and temperature measuring functions, the 781 pH Meter is equipped with automatic stirrer control, multipoint calibration with up to 9 buffers (pH mode),		The instruments are capable of measuring • pH, • ion, • voltage, • temperature.
GS 01/02	RSPU/ Science	28.ABI Genetic Analyzer - Applied Bio Systems 3130xl		Features: • 16 array automated fluorescent capillary electrophoresis system. • Multiple array (80 cm, 50 cm, 36 cm, and 22 cm) and polymer (POP-7, POP-6, POP-4) configurations enable users to enhance performance for their sequencing and fragment analysis applications. • Continuous, fully automated 24-hour operation for polymer delivery, sample injection, separation, detection and data analysis. Applications: • Sequencing: - De-novo sequencing. - Re-sequencing. - Mutation identification. - SNP validation. • Fragment Analysis: - Microsatellite analysis. - AFLP/RFLP analysis. - VNTR/RAPD analysis. - Forensic identification or STR genotyping.		• Sequencing: - De-novo sequencing. - Re-sequencing. - Mutation identification. - SNP validation. • Fragment Analysis: - Microsatellite analysis. - AFLP/RFLP analysis. - VNTR/RAPD analysis. - Forensic identification or STR genotyping.
GS 01/02	RSPU/ Science	29. ABI Fast Real Time PCR - Applied Bio Systems ViiA	Applied Bio	Features: • Optics: 6 emission filter (500-720 nm), 6 excitation filters (450-670 nm), OptiFlextm System (enhanced flourescence detection). • Temperature Range & Uniformity: 4-100°C, ±0.5°C, within 30 sec of reaching temprature set point. • Data Collection: Multiple ramp method detection formats provide more flexibilty for collecting dat during a ramp stage. • Dynamic Range: Up to 9 logs of linear dynamic range. • Detection Method: Primer - Probe Detection, SYBR. • Precise Quantification: Detect changes as small as 1.5-fold in target quantities in singleplex reactions. • Run Time: About 35 min. (Varies depending on reagents and other factors). Applications: • Absolute quantitation (standard curve). • Relative quatitation (ΔΔCt or Comparativve Ct). • SYBR green assay. • Allelic discrimination (SNP Genotyping). • Plus Minus Assay (Presence/ Absence). • Qualitative Analysis. • High Resolution Melting (HRM) analysis.		ABI ViiA 7 Real-Time PCR System • Relative quantitation (ΔΔCt or Comparative Ct) • Absolute quantitation (standard curve) • Allelic discrimination (SNP Genotyping) • SYBR green assay • Plus Minus Assay (Presence/Absence) • Qualitative Analysis • High Resolution Melting (HRM) analysis
GS 01/02	RSPU/ Science	30.ABI Genetic Analyzer – Applied Bio Systems 3500	Applied Bio	Features: • 8-capillary system. • Single-line 505 nm solid-state long-life laser utilizes a standard power supply; requires no heat removal. • Primary analysis software provides real-time assessment of data quality and autoanalysis of sample files for base-scaling and fragment sizing. • Radio Frequency Identification (RFID) technology tracks key consumables data and records administrative information. Applications: • De novo sequencing. • Targeted DNA sequencing. • Next-generation sequencing validation. • Microbial sequencing. • Heterozygote detection & re-sequencing (SNP-based). • Fragment length polymorphism (AFLP & RFLP). • Large fragment analysis - (BAC fingerprinting & VNTR). • Microsatellite genotyping/ analysis for forensics (HID). • SNP Genotyping-SNaPshot® or SNPlex™ systems.		• De novo sequencing. • Targeted DNA sequencing. • Next-generation sequencing validation. • Microbial sequencing. • Heterozygote detection & re-sequencing (SNP-based). • Fragment length polymorphism (AFLP & RFLP). • Large fragment analysis - (BAC fingerprinting & VNTR). • Microsatellite genotyping/ analysis for forensics (HID). • SNP Genotyping-SNaPshot® or SNPlex™ systems.
GS 01/02	RSPU/ Science	31. Integrated Microarray System for Whole Genome Analysis- Affymatrix	Affymatrix	Features: • GeneChip autoloader supports complete walk-away scanning of up to 48 arrays at a time. • Scan time is 5–45 minutes per cartridge, depending on GeneChip array type. • GeneChip designed with millions of probes, gives higher accuracy. • GeneChip probes, designed in sets to provide multiple, independent measurements for each transcript or SNP, results in increased data reliability. Applications: • Wide genotyping for human disease research. • Targeted genotyping analysis for human disease research. • Copy number analysis. • DMET plus solution. • Resequencing analysis. • 3' IVT expression analysis. • Gene regulation analysis. • miRNA analysis. • Whole transcript expression analysis & profiling.		• Wide genotyping for human disease research. • Targeted genotyping analysis for human disease research. • Copy number analysis. • DMET plus solution. • Resequencing analysis. • 3' IVT expression analysis. • Gene regulation analysis. • miRNA analysis. • Whole transcript expression analysis & profiling.
GS 01/02	RSPU/ Science	32. Next Generation Sequencer for whole Genome Analysis -	Applied Bio Systems	Features: • Digital sequencing data. • Fast NGS sequencer. • Read lengths of 200bp and 400bp. • No optics involved thereby affordable and overall lower cost of sequencing per base pair. • Sequencing up to microbial genomes. Applications: • Cancer genomics research-variant detection and quantitative gene expression. • Genetic disorders: Variant detection, quantitative gene expression and small RNA analysis. • Pre-implantation genomic research-aneuploidy detection. • Microbial genomics: Discovery, metagenomics, bacterial typing and viral typing.		• Cancer genomics research-variant detection and quantitative gene expression. • Genetic disorders: Variant detection, quantitative gene expression and small RNA analysis. • Pre-implantation genomic research-aneuploidy detection. • Microbial genomics: Discovery, metagenomics, bacterial typing and viral typing.
GS 01/03	RSPU/ Science	33. GCMS Thermo DFS	ThermoScientific	Features: • Ionization modes available: EI, CI, FAB and LIFDI. • Mass Range: 2 - 4000 Da. • Resolution: 60,000 @ 10% valley. • Water cooled DI probe and DCI probe. • XcaliburTM software with NIST MS database. Applications: • Determination of molar mass and exact mass (HRMS). • Separation, identification and quantification of different components through GC technique. • Determination of isotopic abundance in compounds. • Fragmentation of a molecular species followed by structural elucidation.		Determination of molar mass and exact mass (HRMS). • Separation, identification and quantification of different components through GC technique. • Determination of isotopic abundance in compounds. • Fragmentation of a molecular species followed by structural elucidation.

GS 01/03	RSPU/ Science	34. LCMS Thermo		Features: • Ionization modes: ESI and APCI. • Mass Range: m/z 50 – 4000; Resolution: 0.3 FWHM. • Automatic Gain Control (AGC™) and Fast polarity switching. • PDA detector accessory. Applications: • Determination of molar mass of liquid/dissolved species by MS, MS/MS and MSn techniques. • Component separation of mixtures followed by identification and quantification.		Determination of molar mass of liquid/dissolved species by MS, MS/MS and MSn techniques. • Component separation of mixtures followed by identification and quantification.
GS 01/03	RSPU/ Science	35. NMR 600 -	Bruker	Features: • Magnetic field: 14.1 Tesla / 600 MHz; bore size: standard bore 54 mm. • Sensitivity: 1H: 1000:1 (S/N) 0.1% EB; 13C: 280:1 S/N ASTM Sample. • Available nuclei: 1H, 13C, 31P, 15N, 17O, 33S, 87Rb; software: Topspin 3.1. • Triple channel spectrometer with AVANCE II electronics platform. • 5mm PABBI 1H/D-BB Z-GRD - probe for 2D experiments. • 5mm PABBO BB-1H/D Z-GRD - probe for X-nuclei. • 4mm MAS BB/1H CP/MAS - probe for solid NMR (cross polarization/magic angle spinning). • 5mm PATXI 1H/D -13C/15N Z-GRD - triple resonance probes for bio-molecular research. • 1.7 mm PATXI 1H/13C -15N/DZ-GRD - triple resonance microprobe for bio NMR when sample quantity is small. Applications: • Determination of molecular structure & molecular conformations. • Studies on thermodynamics and kinetics of reactions. • Determination of relaxation constants and diffusion studies. • Studying the solid state properties and biomolecules. • 1D NMR: techniques available: 1H, 2H, 13C, 19F, 31P, 15N, 87Rb, 33S, 17O, APT, DEPT45, DEPT90, DEPT135. • 2D NMR: techniques available: COSY, TOCSY, NOESY, ROESY (HOMOnuclear) HSQC, HMBC (HETERO nuclear). • Variable temperature. • Solid State NMR: 29Si, 13C, 15N, 19F and diffusion NMR.		• Determination of molecular structure & molecular conformations. • Studies on thermodynamics and kinetics of reactions. • Determination of relaxation constants and diffusion studies. • Studying the solid state properties and biomolecules. • 1D NMR: techniques available: 1H, 2H, 13C, 19F, 31P, 15N, 87Rb, 33S, 17O, APT, DEPT45, DEPT90, DEPT135. • 2D NMR: techniques available: COSY, TOCSY, NOESY, ROESY (HOMOnuclear) HSQC, HMBC (HETERO nuclear). • Variable temperature. • Solid State NMR: 29Si, 13C, 15N, 19F and diffusion NMR. • 3D NMR.
GS 01/03	RSPU/ Science	36. Acquity iclass UPLC QToF-	Waters	Features: • TOF mass range: m/z 20 - 100,000 Da. • The quadrupole mass range: 20 to 16,000 in non-resolving mode and m/z 20 to 4000 in resolving mode. • High mass quadrupole mass range: Up to m/z 100,000 in non-resolving mode and m/z 32,000 in resolving mode. • Scan speeds: Continuously variable from 0.1 to 10,000 sec/decade. • Ionization modes (full range) available: ESI, APCI, ESCi, ASAP ion probe. • Resolving power: > 32,500 FWHM. • Acquisition modes: MS scanning and MS/MS product ion scanning. • UPLC/Fast DDA (rapid, automated MS to MS/MS scan function switching). Applications: • Structural confirmation and fragmentation mechanisms of analytes. • High resolution mass spectroscopy and MS/MS studies. • Toxicology and metabolites screening. • Pesticide residue analysis. • Protein studies.		• Structural confirmation and fragmentation mechanisms of analytes. • High resolution mass spectroscopy and MS/MS studies. • Toxicology and metabolites screening. • Pesticide residue analysis. • Protein studies.
GS 01/03	RSPU/ Science	37. UFLC	Shimadzu	Features: • Lamp: Deuterium. • Detector: UV. • Column operating temperature: 4-150°C. • Wavelength range: 190 to 700 nm. • Injection volume: 0.1 to 50µl. • Fully automated ultra fast analysis. Applications: • Qualitative and quantitative analysis of pesticide residues in water, amino acids, flavonoids, polyphenols, fatty acids and vitamins. • Separation of isomers. • Identification of active ingredient in drugs and formulations.		• Reverse phase or normal phase separation followed by analysis of vitamins, polyphenols, fatty acids, amino acids and other synthetic compounds. • Qualitative and quantitative separation of complex mixtures. • Semi-preparative scale purification by fraction collection. • Separation of isomers by chiral columns.
GS 01/03	RSPU/ Science	38. Prep HPLC –	Shimadzu Prominence LC	Features: • Flow-rate setting range: 0.01 to 150.0 mL/min. • Detector: PDA. • Mode: Isocratic or Binary gradient. • Automated fraction collection. Applications: • Reverse phase or normal phase separation followed by analysis of vitamins, polyphenols, fatty acids, amino acids and other synthetic compounds. • Qualitative and quantitative separation of complex mixtures. • Semi-preparative scale purification by fraction collection. • Separation of isomers by chiral columns.		• Qualitative and quantitative analysis of pesticide residues in water, amino acids, flavonoids, polyphenols, fatty acids and vitamins. • Separation of isomers. • Identification of active ingredient in drugs and formulations.
GS 01/05	RSPU/ Science	40. Elemental Analyzer –	Elementar UniCube	Features: • Analysis mode: CHNS, CNS, CN, N, S and O. • Detector: Thermal conductivity TCD (CHN) and infrared (S). • Measuring range: 0.01-100%. • Sample weight and analysis duration: 13-15min at 2mg sample weight. • Calibration: linear and non-linear. • Data storage and output: Storage on disk, CD, output to screen, printer and LIMS. Applications: • Determination of C, H, N, S and O content in compounds. • Determination of sulfur and nitrogen in fertilizers. • Evaluation of TOC in soils and sediments. • In Pharmaceutical science.	 	• Determination of C, H, N, S and O content in compounds. • Determination of sulfur and nitrogen in fertilizers. • Evaluation of TOC in soils and sediments. • In Pharmaceutical science.
GS 01/05	RSPU/ Science	41. FTIR Spectrum 3	PerkinElmer	Specifications * 21 CFR Part 11 Compatible * Wave Length Range: 11,000 - 30 cm-1 Application: Pharmaceuticals and Nutraceuticals Chemicals & materials & Polymers & Academia		Infrared spectroscopy is an analytical technique applied to the characterization of molecules. The PerkinElmer Spectrum 3 FT-IR spectrometer provides the sampling flexibility and performance in mid, near, and far infrared ranges.
GS 01/05	RSPU/ Science	42. FTIR Spectrum TwoN	PerkinElmer	Specifications: * 21 CFR Part 11 Compatible * Depth:30.0 cm * Detector Type:LiTaO3 * Height:21.0 cm * Operating Range: 5 - 45 °C * Portable:Yes * Weight:13.0 kg * Width: 45.0 cm Application: Pharmaceuticals and Nutraceuticals Chemicals & materials & Polymers & Academia		The Spectrum Two is a Fourier transform infrared (FTIR) spectrometer with attenuated total reflectance (ATR), transmission, specular and diffuse reflectance accessories. • Universal ATR enables fast analysis of micron-scale thin films, opaque solids, liquids and powders from 450-4000 cm-1 (22 µm to 2.5 µm). • Transmission accessory enables measurement of thin films (<100microns) on substrates that transmit mid-infrared or powders (mixed with KBr) from 400-4000cm-1 (25 µm to 2.5 µm).

GS 01/05	RSPU/ Science	43. UV/VIS - NANOCOLOR	Agilent	Specifications Optical System: Monochromator Display: 10.1" HD display, anti-reflective cover glass with projective-capacitive touch screen (PCAP) and background LED lighting Photometric accuracy: 0.005 E at 0.0 - 0.5 E; 1 % at 0.5 - 2.0 E Wavelength range NANOCOLOR® VIS II: NANOCOLOR® UV/VIS II: 320 - 1100 nm 190 - 1100 nm Wellenlängengenauigkeit: ±1 nm Lichtquelle: Halogen lamp Speicher: 16 GB Micro SDHC card, 5000 measured data sets / spectra, GLP conform Schnittstellen: LAN, 2 x USB (Host), 1 x USB (Function) and RS 232 Netzanschluss NANOCOLOR® VIS II NANOCOLOR® UV/VIS II 12 V DC 3A 110 13240 V, ~50/60 Hz		NANOCOLOR UV/VIS II is a high-precision instrument applicable in all areas of water and wastewater analysis. • Halogen lamp (visible range), Deuterium lamp (UV range) • Optical system- Monochromator • Wavelength - 190–1100 nm • Wavelength accuracy - ± 1 nm • Wavelength resolution - 0.1 nm • Wavelength reproducibility - <0.5 nm
GS 01/05	RSPU/ Science	44. Esca Lab 250xi –	Thermo Scientific	Features: • XPS, UPS, ISS and imaging techniques. • Depth profile, in situ reduction experiments (high pressure gas cell) and heating experiments up to 500°C. • Monochromated Al Kα - X ray source with a spot size ranging from 200 - 850 µm. • Twin anode (Al and Mg) non-monochromated X ray source. Applications: • Characterization of solid state materials. • XPS: Possible to detect all elements except hydrogen and helium. Provides composition, approximate chemical formula, electronic and chemical state, binding energy, etc. • UPS: Used to study the valence region of constituent elements, electronic states in the band gap, density of states near Fermi level etc. • ISS: Detect elements on the surface (less than 1 nm).		• Characterization of solid state materials. • XPS: Possible to detect all elements except hydrogen and helium. Provides composition, approximate chemical formula, electronic and chemical state, binding energy, etc. • UPS: Used to study the valence region of constituent elements, electronic states in the band gap, density of states near Fermi level etc. • ISS: Detect elements on the surface (less than 1 nm).
GS 01/05	RSPU/ Science	45. ICP-MS NexIon 2000P	PerkinElmer	Features: • Analyzing quadrupole. • Benchtop design with no rear connections. • Triple cone interface. • Quadrupole ion deflector. • Simultaneous dual mode detector. • Measurement Levels: ppb and sub-ppb level. • Dynamic bandpass tuning. • Large, open, easily accessible sample introduction. • Low liquid uptake nebulizer. • Free-runing RF plasma generator. • Fully automated X, Y, Z torch positioning. • Universal cell technology. • Full color plasma view. Applications: • Nanoparticle detection. • Nanomaterial research. • Qualitative and quantitative estimations of metal concentrations in aqueous, organic samples and solids (after digestion). • Application areas: Environmental, food, biological, geochemical, geological, semiconductor, bio-monitoring, petrochemicals.	#VALUE!	• Nanoparticle detection. • Nanomaterial research. • Qualitative and quantitative estimations of metal concentrations in aqueous, organic samples and solids (after digestion). • Application areas: Environmental, food, biological, geochemical, geological, semiconductor, bio-monitoring, petrochemicals.
GS 01/08	RSPU/ Science	46. Femto second laser - Tsunami/Spitfire	Utlra Fast	Features: • Tsunami femtosecond oscillator working at a centre wavelength of 800 nm with output power 3 W. • 'Spitfire Pro' femtosecond amplifier with centre wavelength 800 nm and output power 4 W. • Frequency: 80 MHz mode locked for Tsunami and 1 KHz for Spitfire Pro. • Pulse width: 80 - 109 fs; bandwidth: 12 nm. • TOPAS prime optical parametric amplifier tunable from 240 nm -2600 nm in femtosecond durations. • Universal streak camera for 3 dimensional spectroscopy offering a temporal resolution up to 1 ps. Applications: • Multiphoton absorption & imaging. • Fluorescence lifetime measurements. • Laser ablation & plasma diagnostics. • Transient absorption measurements. • Nonlinear spectroscopy & material processing. • Time of Flight measurements. • Pulsed laser deposition (PLD) studies. • Terahertz generation and detection. • Femtochemistry. • Two photon absorption measurements in non-fluorescent.		• Multiphoton absorption & imaging. • Fluorescence lifetime measurements. • Laser ablation & plasma diagnostics. • Transient absorption measurements. • Nonlinear spectroscopy & material processing. • Time of Flight measurements. • Pulsed laser deposition (PLD) studies. • Terahertz generation and detection. • Femtochemistry. • Two photon absorption measurements in non-fluorescent.
GS 01/08	RSPU/ Science	1) Spectra Physics Millennia eV	Spectra Physics			
GS 01/08	RSPU/ Science	2) Spectra Physics TSunami	Spectra Physics			
GS 01/08	RSPU/ Science	3) Spectra Physics Frequency Doubler	Spectra Physics			
GS 01/08	RSPU/ Science	4) Spectra Physics Empower	Spectra Physics			
GS 01/08	RSPU/ Science	5) Spectra Physics SpitFire	Spectra Physics			
GS 01/08	RSPU/ Science	6) Spectra Physics Topas	Spectra Physics			
GS 01/08	RSPU/ Science	7) Spectra Physics Streak Camera	Spectra Physics			
GS 03/08	RSPU/ Science	47. Single crystal XRD - Rigaku Rapid II	Rigaku	Features: • MicroMax™-007 HF rotating anode X-ray generator (Power : 1.2 kW, Anode type : Cu & Mo; Focal spot size : 70 µm diameter circle). • Partial-χ, 3-axis goniometer. • Curved large-area IP detector subtends a 2θ range of 204° at a single detector setting. • Softwares: CrystalClear™ (data collection); 'CrystalStructure' (refinement). Applications: • Structure elucidation of crystalline materials (organic, inorganic and organometallic compounds). • Studies on supramolecular crystals. • Investigation on packing pattern of molecules in crystal networks.		• Structure elucidation of crystalline materials (organic, inorganic and organometallic compounds). • Studies on supramolecular crystals. • Investigation on packing pattern of molecules in crystal networks.
GS 03/08	RSPU/ Science	48. Single crystal XRD -	Bruker X8 Prospector	Features: • 1µS micro-focus sealed-tube source (High X-ray intensity; power : 30 W; Anode : Cu). • Optimized multi-layer optics (QUAZAR MX) optics. • 4-circle goniometer (2θ, χ, ϕ, and Ω). • APEX II CCD detector perfect for capturing both weak and strong diffraction. Applications: • Determination of the molecular structure and conformation. • Elucidation of protein structure. • Determination of absolute configuration of chiral molecules. • Studies on packing patterns and supramolecular interactions within crystal networks.		• Determination of the molecular structure and conformation. • Elucidation of protein structure. • Determination of absolute configuration of chiral molecules. • Studies on packing patterns and supramolecular interactions within crystal networks.

GS 03/08	RSPU/ Science	49. Confocal Microscope -	Nikon A1	Applications of confocal microscopy in the biomedical sciences include the imaging of the spatial distribution of macromolecules in either fixed or living cells, the automated collection of 3D data, the imaging of multiple labeled specimens and the measurement of physiological events in living cells.		Nikon A1 is a laser scanning confocal microscope provide faster and sharper imaging in single and large view of biological samples. Nikon A1 confocal system equipped with a unique hybrid confocal scan head with highly sensitive PMT (4-fluorescences and 1-transmitted light) detectors. The system allows increased light detection efficiency and has a standard high-resolution confocal galvano mode.
GS 03/08	RSPU/ Science	50. Ultra centrifuge – Hitachi CR22N	Hitachi	Max. Speed22,000 rpm Max. RCF58,700 xg (R27A Fixed angle rotor) Max. Capacity1,500ml x 4 bottles (R9A2 Fixed angle rotor) Speed Control Rangefrom 300 to 22,000 rpm Temperature Control Rangefrom -20 to +40 °C Acceleration / Deceleration ModeAcceleration : 9 modes, Deceleration : 9 modes with free coasting (Deceleration mode changeable in decelerating to shift mode or free coasting) Program Function30 programs, with RCF / g • sec function Drive UnitInduction Motor (Inverter) RefrigeratorClosed Inverter Rotary Type (Refrigerant : R410A) Safety FunctionInterlock Door, Dual Over Speed Detection Non-contact Imbalance Detection, Abnormal Temp. Detection etc. Variable Deceleration SlopeYes (beside Deceleration mode, moderate deceleration or free coast is selectable.) User Lockout FunctionYes Data CommunicationUSB port (operating history can be output through USB port.) Operating Log ManagementLAN port : factory option or on-site modification PC and optional "himac LogManager Ver. 5.0 for Windows® (Network Edition)" is required. Supporting GLP / GMP Display *5.7 inch color touch-sensitive LCD panel KeypadPop-up keyboard and icons on the display Noise64dB(A) at 1m front (at 22,000 rpm) Economy ModeYes Continuous Flow RotorN/AYes		This general-purpose ultracentrifuges making them ideal for the wide range of separation tasks used in cell biology, biochemistry and ano-material ¬elds. • Max. Speed: 22,000 rpm • Max. RCF : 55,200 Xg • Speed Control Range : from 300 to 22,000 rpm • Temperature Control Range : from -20 to +40 °C
GS 03/08	RSPU/ Science	51. Tube Furnace Carbolite Gero Tsi-1200	Carbolite	Max temp 1200 °C Furnace Ø 60, 125, 200 mm Heated length(s) 150, 300, 450, 600, 800, 1000, 1200 mm Number of heated zones 1 zone or 3 zones. Typical applications of tube furnaces include the purification, coating, drying, hardening or ageing of samples. Among other uses, a tube furnace can also be used for annealing, brazing, calcination, degassing, sintering, soldering, sublimation, synthesis, and tempering. In a laboratory a tube furnace could be used for thermocouple calibration, in the testing of fuel cells, or in catalyst research.		Typical applications of tube furnaces include the purification, coating, drying, hardening. Tube furnace can also be used for annealing, calcination, degassing, sublimation, synthesis etc. Max temp 1200 °C Furnace Ø
GS 02/13	RSPU/ Science	52. Nanosecond, Femtosecond and Emission Spectrometers	Utlra Fast	Highly useful in research area which deals with electronic deactivation, intersystem crossing and Intra- and intermolecular electron transfer. • Find application in the Aeld of photophysics, photochemistry and photobiology.• In materials science and nanoscopy and cell biology. • In transient spectrometry. Studies on photo-excited states of variety of samples.• Highly useful in the research area comprising chemistry, physics and biology.• In materials science and nano-science.• Useful in the studies on electronic deactivation, energy and electron transfer.• Intersystem crossing and internal conversion studies.• Investigations in energy and electron transfer and vibrational relaxation.		
	RSPU/ Science	1) Solstice Femtosecond laser	Spectra Physics			
	RSPU/ Science	2) Topas prime	Spectra Physics			
	RSPU/ Science	3) Minilite nanosecond laser	Spectra Physics			
GS 02/13	RSPU/ Science	4)Helios fire		Features: • Advanced LabVIEW based software for instrument control and data acquisition. • 2-unit design with the optical bench isolated from the electronics and detectors. • Broad probe spectral range: 350-2400 nm. • 8 ns time window; resolution: 14 fs. • Time window extendable to milliseconds with the EOS add-on. • Fiber coupled high-speed spectrometers. Applications: The research areas where Helios is useful are: • Photochemistry and photophysics. • Photobiology and cell biology. • Material science and nanotechnology. • Supramolecular chemistry and non-linear optical studies. • Investigation on electronic properties of materials. • Studies on photo-induced electron transfer of chromaphores.		The research areas where Helios is useful are: • Photochemistry and photophysics. • Photobiology and cell biology. • Material science and nanotechnology. • Supramolecular chemistry and non-linear optical studies. • Investigation on electronic properties of materials. • Studies on photo-induced electron transfer of chromaphores.
GS 02/13	RSPU/ Science	5)Halcyone		Features: • Broad probe spectral range; resolution: 14 fs. • 8 ns time window; time window extendable to milliseconds with the TCSPC add-on. • CCD-based and PMT-based detectors. • LabVIEW based software. • Capable to produce 2 - D (Intensity-Time) or 3 - D (Wavelength-Intensity-Time) data matrix in the form of a.ufs file. Applications: • Studies on photo-excited states of variety of samples. • Highly useful in the research area comprising chemistry, physics and biology. • In materials science and nano-science. • Useful in the studies on electronic deactivation, energy and electron transfer. • Intersystem crossing and internal conversion studies. • Investigations in energy and electron transfer and vibrational relaxation.		