SHRIRAM

Shriram Institute for Industrial Research - Delhi

19, University Road, Delhi-110007, India

Where Science Is A Passion

FOUNDER

Sir Shriram (1884-1963)

SRI was founded over 70 years ago by Sir Shriram, a leading industrialist of his time dedicated to the development and progress of Indian Industry, who valued human resources as the core of any successful venture.

SRI commenced its activities in 1950 and has over the years built an enviable reputation as a leading Institute of its kind.

VISION

- To maintain its stature as an independent premier Research Institute for product and process development
- To orient its research towards progress of Industries and Society
- To provide its services using state-of-the-art facilities
- To offer best analytical and R&D services to assist industry attain highest standards of product quality
- To provide technical support to Industry for conserving natural resources and for environment protection

SRI is committed to

- Uncompromising commitment to excellence
- Adhering to the highest standards of scientific work
- Maintaining the highest level of integrity, reliability and ethical practices

ABOUT US

Shriram Institute for Industrial Research (or SRI) is one of the most respected institutions of its kind in India, engaged in a wide range of R&D, analytical and related activities, covering material sciences, life sciences and bio sciences. Over the last six decades of its existence, SRI has built a formidable reputation for quality and reliability, and is a well known name across industries.

Key Services Offered by SRI :-

- **R&D :** SRI has been active in innovations in various areas of research including product/process development and process upscaling, as well as modification of materials (e.g. polymers through radiation).
- **QC / QA :** SRI provides services for quality control and quality assurances conforming to latest relevant national and international guidelines, maintaining stringent norms.
- **Analytical Services :** Complete chemical, physical and metallurgical studies and analytical work in the fields of plastics, rubber, composites, textiles, adhesives, paper, leather, paints & inks, inorganic chemicals, infrastructure, fuel / petroleum products, metals & minerals, electrical items, food items, drugs and pharmaceuticals, agro chemicals, contaminants, etc.
- **Toxicological Studies :** To establish safety levels for chemicals, agro chemicals, cosmetics and herbal products.
- **Microbiological Studies :** For assessment of key pathogens in food, water, cosmetics, herbal products, drugs and pharmaceuticals and analysis of pesticide residues in food, textile and consumer products. Work is also undertaken for assessing packaging compatibility and shelf life.
- **Environment Protection :** Generation of primary data, supplemented with professional analysis, scientific interpretation and modeling for impact analysis and prediction and preparing Management plans for offsetting / minimising negative impact and enhancing positive impact.
- **Calibration / Validation :** Of instruments and equipment.
- **Gamma Irradiation Processing :** Such as sterilization of medical products, disinfestation of spices and herbal products, shelf life enhancement of fruits and vegetables.
- **Technology Business Incubator :** Equipments and services are offered for incubating ideas of entrepreneurship into successful business ventures in areas of plastics, rubbers, speciality chemicals and waste management.
- **Other Services :** Conducting seminars, conferences and training programmes.

Besides state-of-the-art equipment for research and analytical work, SRI's core strength is a large pool of well qualified and experienced personnel that number over three hundred.


MSD
R&D
Contract Research
Rubber & Plastics
Textiles & Paper
Surface Coatings
SRI-TBI
Infrastructural Support
Project Detailing
Prototype Development
Fund Liaisoning
BIO
Toxicology
Microbiology
Molecular Biology
Drugs & Pharmaceuticals
Food & Farm
Agrochemicals
SHRIRAM
Industry
Regulatory Agency
Consumer
SARC
Gamma Irradiation
Sterilization
Research
ASD
Infrastructure & Soil
Metals & Minerals
Petroleum & Fuels
Electrical
Calibration
EPD
Effluent
Energy
Air
Water
Radiation

Calibration Glass & Ceramics Metal & Alloys
Infrastructure & Soil Metals & Minerals
Petroleum & Fuels Electrical Calibration
Method Development Inorganic & Fertilizers
Physico Concrete Mix Designs. Thermo

ASD

Analytical Science Division

The Analytical Science Division provides support to Industry for analysis and evaluation of quality and product improvement in various sectors.

- Infrastructure
- Soil
- Metal & Alloys
- Glass & Ceramics
- Abrasives & Refractories
- Fertilizers & Inorganic Chemicals
- Petroleum & Fuels
- Electricals
- Calibration

Studies Undertaken

- Compositional Analysis of Mineral & Ores and Glass & Ceramics.
- Characterization of Raw Materials, Semi Processed Products and Finished Products.
- Product Identification, Product Differentiation and Material Compatibility.
- Physico-Chemical Characterization of Abrasives & Refractories.
- Thermo-Mechanical Properties of Insulating Materials.
- Characterization of Various Chemicals, Fertilizers & Construction Materials (Soil, Building and Road Works)
- Compositional analysis of Scale/Depositions.
- Method Development.
- Failure Analysis & Corrosion Studies.
- Concrete Mix Designs.
- Non-Destructive Evaluation
- Studies on Liquid Fuels, Fuel Additives, Engine Oil, Insulating and Industrial Oil, Bituminous Oil, etc.
- Electrical Testing for Wires & Cables, Luminaries & Lamps, Domestic Appliances, Insulating Materials, Batteries, etc.
- Calibration Services in Thermal, Electro-Technical, Fluid Flow and Mechanical Fields Including on-site Calibration.
- Chemical, Physico-Mechanical, Mettalographic Studies of Metals and Alloys.
- Coating Thickness Studies

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Analytical Science Division

Shriram Institute for Industrial Research

ANALYTICAL SUPPORT : BUILDING MATERIALS

CORE COMPETENCE:

- Quality Evaluation of Raw Materials & Finished Products
- Mix Designs for Concrete Structures
- Durability Studies for Concrete
- Performance Studies on Precast Concrete Members
- Independent/Third Party Agency for Quality Control
- Consultancy for obtaining NABL Accreditation and ISO Certification
- Imparting Training/Awareness Programmes (National/International)

TYPICAL PRODUCTS EVALUATED / STUDIED:

Cement , Concrete (Cubes, Beams, Cylinders), Sand (Fine & Coarse), Aggregates, Bricks (Masonry, Fly Ash, Sewer, Refractory), Tiles (Terrazo, Ceramic, Concrete), Stones (Granite, Sandstone, Marble), Lime, Pipes (RCC, SW, MS, CI, DI), Fly Ash, Blocks (AAC, CLC, Concrete), Gypsum (Plaster, Board), POP, Asbestos, Pavers, Water Proofing Compound, Coating Materials, Admixtures, Microsilica, Bentonite, Sanitary Wares, Water, Steel, Wood, Soil, Resin, Grout, Filter Media etc.

STUDIES UNDERTAKEN:

- Chemical & Physical analysis of Cement (OPC, PPC, PSC, WPC, SRC, HAC) as per ISS & ASTM standards including Heat of Hydration, Degree of Whiteness
- Chemical & Physical analysis of White Cement as per European Standards
- Concrete Mix Designing (M-10 to M-80 for CC & RCC with and without Admixture, Fly Ash, Steel fibers, Microsilica, Fume Silica & other emerging additives)
- Designing of Self Compacting Concrete, High Performance Concrete, Roller Compacted Concrete, Dry Lean Concrete, Pavement Quality Concrete
- Durability Studies of Concrete (Permeability, RCPT, ISAT, Drying Shrinkage)
- Coarse & Fine Aggregates for Physico-Chemical Properties including Alkali Aggregate Reactivity by Chemical and Mortar Bar Method, Alkali Silica Reactivity, Alkali Carbonate Reactivity, Petrography, Sand Equivalent Value
- Building Bricks & Other Type of Bricks for Physico-Mechanical Properties
- Refractory Material for Physico-Mechanical and Chemical Properties including Pyrometric Cone Equivalent, Linear Change, Density, Compressive Strength
- Stones for Physico-Mechanical & Chemical Properties including Freezing & Thawing, Strength, Abrasion, Hardness, Water Absorption, Density & Durability
- Tiles for Physico-Mechanical Properties including Surface Abrasion, PIE Rating, Resistance to Wear, Strength, Hardness, Water Absorption
- Pozzolanic Materials for various Physico-Chemical Properties including Lime Reactivity, Soundness, Compressive Strength, Fineness
- Sanitary wares for Physico-Chemical Properties including Performance, Endurance, Resistance to Different Materials, Identification of polymer
- Blocks, Pavers, Kerbs, Channels for Strength, Drying Shrinkage, Density
- Concrete Cubes, Cylinders, Beams for Compressive Strength, Permeability, Moisture Movement, Thermal Conductivity, Accelerated Aged Studies
- Precast Concrete Members (Manhole Covers, Drain Covers & other Building Components) for Load Test
- Pipes for Hydrostatic Pressure, Water Absorption & other Physico-Mechanical Properties

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- Admixtures/Accelerators for Physico-Chemical Parameters including Uniformity Tests, Strength, Shrinkage, Air Content, Slump as per ISS & ASTM
- Gypsum Plaster / POP/ Asbestos for Physico-Chemical Properties including Transverse Strength, Setting Time, Expansion, on Setting Soundness, Frost Resistance
- Construction Chemicals (WPC, Sealant, Curing Compounds, Epoxy, Grouts, Resin, Protective Coatings) for Physico-Chemical Properties including Bond Strength, Working Time, Strength, Permeability, Corrosion Resistance
- Drilling Mud for Marsh Cone Viscosity, Density, pH
- Filter Media Sand for Uniformity Coefficient & Chemical Analysis

MAJOR INSTRUMENTS:

- Compressive Strength Machines Upto 3000kN
- Flexural Strength Machine
- Rapid Chloride Permeability Test Unit
- Tile Flexural, Impact & Abrasion Units
- PIE Rating Unit for Ceramic Tiles
- Pyrometric Cone Equivalent Unit
- Thermal Conductivity Unit
- Moh's Hardness Kit
- Self Compacting Concrete Designing
- Vee-Bee Consistometer
- Vibration Machines
- Needle Vibrators & Slump Cones
- Autoclaves-Soundness Test
- Accelerated Curing Water Bath
- Curing Baths with Temperature Control
- Heat of Hydration Unit
- Humidity Cabinets
- Freezing & Thawing Unit
- Jolting Apparatus Paddle Mixer
- Le-chatlier Apparatus
- Vicat Apparatus
- Aggregate Impact, Crushing & Abrasion Value Units
- Elongation & Flakiness Gauges
- Air Content Unit
- Ball Mills, Jaw Crushers & Pulverizer
- Hydrostatic Pressure Test Equipments for Pipes

STANDARDS/ SPECIFICATIONS:

- Indian Standard Specifications (ISS)
- British Standard Specifications (BS)
- American Society for Testing & Materials (ASTM)
- European Standards (EN)
- German Standards (DIN)
- Japanese Standards (JIS)
- Canadian Standards (CSA)
- International Organisation for Standardization (ISO)
- Saudi Arabian Standards (SASO)
- Indian Road Congress (IRC)
- CPWD Specifications
- MOST/MORTH Specifications
- Defence Specifications (DRDO)

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ANALYTICAL SUPPORT: PETROLEUM & FUEL

CORE COMPETENCE :

- Quality Evaluation of Liquid & Solid Fuels
- Study of Insulating Oils for their Suitability in Electrical Equipment
- Suitability Studies with Proposed Remedies for Transformer Oils
- Assessment of Fuel Additives for their Performance & Optimizing Doses
- Adulteration in Petroleum Oils
- Studies on used Engine Oil from Aircraft
- Imparting Training for Fuel Analysis

TYPICAL MATERIALS EVALUATED / STUDIED :

Liquid Fuels : Diesel (HSD & LDO) , Bio Diesel, Petrol, Kerosene, Transformer Oil, Furnace Oil, Engine Oil, Turbine Oil, Hydraulic Oil, Quenching Oil, Cutting Oil, ATF, RPO, Antifreeze Coolant, FRHF

Solid Fuels : Coal, Coke, Bagasse, Rice Husk, Paddy Husk, Saw Dust

Lubricants : Lube Oil, Grease, Wax, Jellies, Polishes

Bitumen & Related Materials : Bitumen, CRMB, PMB, Anti-Stripping Agent, Charcoal, Activated Carbon, Carbon Black

Miscellaneous Products : Transformer Oils, Grease, Wax, Jellies, Polishes

MAJOR PARAMETERS :

Viscosity & Viscosity Index	Air Release Value
Pour Point	Cloud Point
Aniline Point	Congealing Point
Flash & Fire Point	Sediments
ASTM Color	Interfacial Tension
Foaming Tendency / Stability	Flash Point (PMCC, ABEL, COC)
Ash Fusion Temperature	Weld Load & Scar Diameter
Dissolved Gas Analysis (DGA)	FURAN Compounds
Conradson Carbon Residue	Ramsbottom Carbon Residue
Reid Vapour Pressure	Calculated Cetane Index
Rust Preventive Characteristics	Emulsion Characteristics
Frothing Characteristics	Cold Filter Plugging Point
Oxidation Stability	Particle Charge
Copper Strip Corrosion	Silver Strip Corrosion
Distillation Range	Trace/Wear/Additive Metals
Total Base Number	Total Acid Number
Softening Point	Penetration
Frass Breaking Point	Ductility
Equilibrated Moisture	Water/Moisture Content
Electric Strength (BDV)	Dielectric Dissipation Factor
Hard Groove Grindability Index	Specific Resistance
Proximate Analysis	Ultimate Analysis
Volatile Matter	Swelling Number
Gross Calorific Value	Net Calorific Value
Caking Index	Useful Heat Value
Burning Quality	Smoke Point

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INSTRUMENTS :

- Automatic Distillation Unit
- Automatic Bomb Calorimeter
- Automatic CHNS-O Analyzer
- Cold Filter Plugging Point (CFPP)
- Automatic Softening Point
- Coal ASTM Air Flow Oven
- Coal ASTM Vertical Tube Furnace
- GC, GC-MS/MS & LC-MS
- TGA & DTA
- GC with TOGA for DGA in Transformer Oils
- IR Spectrophotometer
- Atomic Absorption Spectrophotometer
- Four Ball Test Equipment
- Air Release Value Unit
- Silver Strip Corrosion Unit
- Frass Breaking Point
- Emulsion Stability Unit (for 1000 hours)
- Rust Preventive Characteristics Unit
- COC Flash Point Unit
- Breakdown Voltage Unit
- Ductilometer
- Density Meter
- Reid Vapour Pressure
- Hard Groove Grindability Unit
- Ramsbottom Carbon Residue
- Automatic Flash Point Tester
- Automatic Interfacial Tensiometer
- Ash Fusion Temperature Unit
- Coulometric Karl Fischer
- Automatic Penetrometer
- Coal ASTM Volatile Matter Furnace
- ASTM Colour Unit
- HPLC
- ICP-OES/ICP MS
- Refractometer
- Flame Photometer
- Brookfield Viscometer
- Oxidtion Stability of Oils & Greases
- Foaming Stability Unit
- Copper Strip Corrosion Unit
- Tar Viscometer
- Dean & Stark Unit
- Ford Cup Viscometer
- Pour Point Unit
- Tan Delta Resistivity Unit
- Kinematic Viscosity Unit
- Corrosion Properties Unit
- Existent Gum in Gasoline
- Melting Point of Wax
- Conradson Carbon Residue

SPECIALIZED STUDIES :

- Ash Fusion Temperature in Coal
- Four Ball Test for Lubricants
- Cold Filter Plugging Point (CFPP) in Diesel Oils.
- SOAP Analysis in Fresh & Used Engine Oils for Various Airlines.
- Study on the Engine Flush Products & Radiator Flush Products for their Performance and Efficiency
- Studies on the Efficacy of Radiator Coolant
- Studies on Various Solid Fuels to Ascertain their Fuel Efficiency
- Emulsion Stability of Fire Resistant Hydraulic Fluids for 1000 hours at 27±2°C
- Performance Studies of Automotive Fuel Additives

STANDARDS / SPECIFICATIONS :

- Indian Standard Specification (ISS)
- British Standard Specification (BS)
- American Society for Testing & Materials (ASTM)
- European Standard (EN)
- German Standard (DIN)
- International Organisation for Standardization (ISO)
- Institute of Petroleum (IP)
- Japanese Standard (JIS)

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ANALYTICAL SUPPORT: ROADWORKS

CORE COMPETENCE:

- Assessment of Flexible Pavements
- Job Mix Formula for Flexible Pavements
- Traffic Density Survey
- Road Failure Studies
- Designing of Roads
- Post Construction Assessment of Roads
- Consultancy for Obtaining Accreditation for NABL/ISO Certification for Laboratories
- Imparting Training/Awareness Programs (National and International)

TYPICAL PRODUCTS EVALUATED / STUDIES:

Raw Materials : Bitumen, Emulsion, CRMB, Subgrade, Granular Sub Base, Wet Mix Macadam, Water Bound Macadam, Anti-stripping Agent, Coarse Aggregates , Stone Dust, Lime.

Finished Products : Bituminous Mix (BM), SDBC, Mastic Asphalt, Premix Carpet, BUSG.

Survey Studies : Topography, Benkelman Beam Deflection, Roughness Survey, Levels by Total Station & Auto Level, Traffic Survey, Distometer, GPS.

Site Testing : Core Cutting for Binder, Density & Thickness of individual Layers.

MAJOR PARAMETERS:

- All Physico-Chemical Parameters as per MORTH/IRC/ISS for: Aggregates, Sub Grade, Stone Dust, Bitumen, Emulsion, WBM, WMM, GSB
- Job Mix Formula Preparation for GSB, WMM, BM & BC
- Stone Polishing Value for Aggregates
- Petrography for Aggregates
- Hardness Number of Mastic Asphalt
- Marshal Stability of Bituminous Materials
- Retained Tensile Strength

INSTRUMENTS:

- Bump Integrator
- Benkelman Beam Unit
- Total Station
- Automatic Compactors
- Automatic Mixer
- Buoyancy Balance
- Skid Resistance Tester
- Stone Polishing Value Unit
- Marshal Unit
- Hardness Number Unit
- Automatic Asphalt Furnaces
- Bitumen Extractor
- Automatic Softening Point Unit
- Automatic Penetrometer
- Ductility Unit
- TFOT Air Oven
- Kinematic Viscosity Unit
- Absolute Viscosity Unit
- Flash Point Unit
- Loss Angeles Abrasion Machine
- Aggregate Impact Value Machine
- Compressive Strength Machine

STANDARDS/ SPECIFICATIONS:

- Indian Standard Specification (ISS)
- British Standard Specification (BS)
- American Society for Testing & Materials (ASTM)
- AASHTO
- European Standard (EN)
- German Standard (DIN)
- International Organisation for Standardization (ISO)
- Indian Road Congress (IRC)
- CPWD Specifications
- MOST/MORTH Specifications

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ANALYTICAL SUPPORT : CONCRETE NON DESTRUCTIVE EVALUATION (NDE)

Non Destructive Evaluation (NDE) enables one to assess the condition and quality of the concrete structures without damaging their future usefulness.

CORE COMPETENCE :

- Assessment of Quality of in-situ Concrete through NDT
- Assessment of Structural Soundness
- Investigation for Restoration & Rehabilitation of Structures
- Assessment of Structures Damaged by Fire or other Calamities
- Evaluation of TG Decks in Thermal Power Stations
- Evaluation of Bridges for Strength & Discontinuities
- Assessment of Quality of Concrete used for Railway Sleepers
- Establishing Correlation between NDT & Semi NDT Techniques for Assessment of Concrete Grade

NON DESTRUCTIVE EVALUATION STUDIES :

Assessment of Concrete Structure for :

- Compressive Strength after Core Extraction (dia 50 to 150 mm)
- Surface Strength of Concrete Structure using Rebound Hammer
- Ultrasound Pulse Velocity Measurement through Concrete Structure for Checking the Compaction, Discontinuities, Homogeneities and Health of Concrete
- Extent of Corrosion in the Rebars through Half Cell Potential Meter
- Rebar Scanning of Structure for Number, Dia and Spacing of Bars using Ferro Scanning System
- Cover Depth through Elcometer
- Extent of Carbonation in Cover Concrete
- Detection of Reinforcement during Core Extraction

INSTRUMENTS :

- Rebound Hammer (PROCEQ : Silver Schmidt "N" Digital, PROCEQ N-34, PROCEQ N-10, CNS Farnell)
- Ultrasonic Pulse Velocity Units (PROCEQ TICO, PUNDIT PLUS, CONTROLS)
- Ferro Scanning System (HILTI PS 200)
- Ferro Detectors (HILTI)
- Half Cell Potential (ELCOMETER)
- Cover Meter (HILTI PS 35)
- Core Cutting Systems (HILTI : DD 120, DD 160, DD 200)
- Core Cutting Systems (Rothenberger: Eurodema , F 202)
- Core Cutting Systems (Hakken SPJ SAX – C)

STANDARDS/ SPECIFICATIONS :

- Indian Standard Specifications (ISS)
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- American Society for Testing & Materials (ASTM)
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ANALYTICAL SUPPORT : WOOD & WOODEN PRODUCTS

CORE COMPETENCE :

- Physico-Mechanical Properties of Wood & Wooden Products
- Identification of Declared Wood
- Study of Bamboo Match Sticks for Physico-Mechanical Properties & Performance
- Performance & Workmanship Evaluation of Wooden Door & Window Frame vis-a-vis Concrete Door & Window Frames
- Wood Shutter Doors Performance Testing
- Bench Marking of Wooden Furniture

Activity Area :

Ply wood : General Purpose, Maine, Fire Retardant, Concrete Shuttering

Boards : Wood Particle Board, Veneered Particle Board, Block Board

Timber : Wood

Flush Door Shutter : Doors

TYPICAL MATERIALS EVALUATED / STUDIED :

Wood	Flush Door Shutter	Plywood	Boards
Density	Screw Withdrawal	Glue Shear Strength	General Flatness
Nail Holding	Knife Test	Adhesion of Plies	Local Plainness
Screw Withdrawal	Glue Adhesion	Water Resistance	Abrasion Test
Dimensions	End Immersion	Mycological Test	Screw Withdrawal
Squareness	Dimensions	Moisture Content	Density
Modulus of Rupture	Impact Indentation	Tensile Strength (Along & Across the Grain)	Resistance to Stain, Crack, Cigarette Burn & Steam
Modulus of Elasticity	Flexure Test	Modulus of Rupture	Mycological Test
Tensile Strength	Edge Loading	Modulus of Elasticity	Moisture Content
Identification of Declared Wood	Shock Resistance	Preservative Treatment (Cu, Cr, B & Total Retention)	Dimensions & Dimensional Changes
Moisture Content	Buckling Test	Dimensions	Tensile Strength
Compression	Slamming Test	Squareness	MOR & MOE
Shear Strength	Misuse Test	Fire Retardancy	Resistance to Water
Hardness	Varying Humidity Test		Adhesion of Plies

INSTRUMENTS :

Ultimate Tensile Strength Machines (UTM)	Stout Table
Wood Identification Kit	Abrasion Resistance Unit
Atomic Absorption Spectrophotometer (AAS)	ICP-OES/MS
Straight Edge	Right Angle
Controlled Temperature Water Bath	Boiling Water Bath
Micrometers & Screw Gauge	Vernier Callipers
Compressometer	Varying Humidity Chamber
Air Ovens	Fire Retardant Apparatus
Wood Shutter Door Assembly	Different Type of Fixtures
Facility for Mycological Test	

STANDARDS/ SPECIFICATIONS:

- Indian Standard Specifications (ISS)
- British Standard Specifications (BS)
- American Society for Testing & Materials (ASTM)
- CPWD Specifications
- Field Books for Identification of Wood

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ANALYTICAL SUPPORT: FERTILIZERS & RAW MATERIALS

CORE COMPETENCE:
- Quality Evaluation of Fertilizers
- Raw Materials Evaluation

Evaluation of Fertilizers

Various fertilizers are evaluated for their macro & micro nutrients using conventional volumetric, gravimetric as well as sophisticated instrumental techniques mainly Inductively Coupled Plasma or Atomic Absorption Spectrophotometer for their chemical properties . Other physical properties are checked by using suitable related equipment.

Raw Materials Evaluation

Raw materials used in the manufacture of fertilizers e.g. rock phosphate, ammonia, gypsum, sulphuric acid, phosphoric acid etc. are being analyzed at SRI for their purity and impurity profile along with their physical characteristics, e.g. grain size, specific gravity, solubility, density, hydroscopicity etc. Based on this data, manufacturers can use the raw material in proper quantities and ratios for the production of fertilizers.

TYPICAL MATERIALS EVALUATED / STUDIED:
- Straight Nitrogenous Fertilizers
- Straight Phosphatic Fertlizers
- Straight Potassic Fertilizers
- Straight Sulphur Fertilizers
- Complex Fertilizers
- Fortified Fertilizers
- Micro Nutrients
- Water Soluble Complex Fertilizers

PARAMETERS:
- Purity of Chemicals
- Impurity Profile for Chemicals
- Micronutrients
- Macronutrients
- Moisture Content
- Total Nitrogen
- Total Phosphate
- Total Potash
- Citric Acid Soluble Phosphate
- Neutral ACS Phosphate
- Water Soluble Phosphate
- Water Soluble Potash
- Free Phosphoric Acid
- Ammonical Nitrogen
- Urea Nitrogen
- Nitrate Nitrogen
- Calcium Nitrate
- Free Acidity
- Particle Size
- Sulphur
- Biuret
- Acid Soluble Matter
- Heavy Metal

INSTRUMENTS:

Atomic Absorption Spectrophotometer (AAS)	UV-visible Spectrophotometer (UV-vis)
Flame Photometer	Inductively Coupled Plasma-OES
Air Circulating Ovens	Selective Ion Analyzer
pH Meter	Conductivity Meter
Turbidity Meter	Muffle Furnaces

STANDARDS/ SPECIFICATIONS:
- Indian Standard Specifications (ISS)
- American Society for Testing & Materials (ASTM)
- International Organistaion for Standardization (ISO)
- Fertilizer Control Order (FCO)

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ANALYTICAL SUPPORT: INORGANIC CHEMICALS, MINERALS & ORES

CORE COMPETENCE:

- Chemical Composition of Mineral & Ores
- Chemical Analysis of all type of Cements
- Chemical Analysis of Building Materials
- Mineralogical Composition of Materials
- Physico-chemical properties of Thermal Insulation Materials
- Physico -chemical Properties of Refractories
- Chemical Composition of Glass & Ceramics
- Physico-chemical Properties of Activated Alumina
- Physico-chemical Properties of Activated Carbon
- Chemical Composition of Rock Phosphate & Sulphur
- Chemical Composition of Scale Deposits
- Analysis of Raw Materials of Cement for Quarry Selection
- Method Development for New Products
- Training Programs for Testing & Awareness System.

TYPICAL PRODUCTS EVALUATED / STUDIED

Ores & Minerals: Limestone, Dolomite, Bauxite, Chromite, Fluorspar, Iron Ore, Manganese Ore, Magnesium Ore, Nickel Ore, Titanium Ore, Zirconium Ore, Lead Ore, Zinc Ore, Copper Ore, Molybednum Ore, Quartz, Gypsum, Barite, Biotite, Feldspar, Graphite, China Clay, Soapstone, Rock Phosphate, Asbestos, Lime, Coal, Mica, Bentonite, Asbestos, Emery Grains

Building Materials: Cement, Aggregates, Sand, Admixture, Water Proofing Compound, Clay, Soil, Concrete, Stones

Glass & Ceramics: Glass Sheets, Glass Bottles, Glass Powder, Ceramics

Thermal Insulations: Mineral Wool, Glass Wool, Insulation Blanket

Refractories : Fire Bricks, Calcium Silicate, Zircon, Castable.

Other Materials : Silica Gel, Activated Alumina, Sulphur, Scale Deposits

MAJOR PARAMETERS:

- Loss on Ignition
- Iron Oxide
- Calcium Oxide
- Sodium Oxide
- Potassium Oxide
- Barium Oxide
- Boron
- Cobalt
- Arsenic
- Mercury
- Nitrogen
- Total Moisture
- Free Moisture
- Combined Water
- Solid Content
- Free Lime
- Dead Burnt Lime
- Whiteness
- Oil Absorption
- Acidity
- Adsorption Capacity
- Silica
- Magnesia
- Chlorides
- Phosphates
- Manganese
- Lead
- Zirconium
- Fluorine
- Selenium
- Heavy Metals
- Acid Solubles
- Acid Insolubles
- Water solubles
- Sieve analysis
- Free Silica
- Bulk Density
- Apparent Porosity
- Alkalinity
- Attrition Loss
- Swelling Power
- Boil Test
- Dimensions
- Thermal Shock
- Alumina
- Titania
- Sulphates
- Copper
- Chromium
- Zinc
- Nickel
- Molybdenum
- Tellurium
- Carbon
- Water Insolubles
- pH Value
- Volatile Matter
- Moh's Hardness
- Available Lime
- Carbonates
- Specific Gravity
- Ash Content
- Oil Content
- Friability
- Gel Formation
- Fragmentation
- Defects in Glass
- Thermal Conductivity

INSTRUMENTATION FACILTITY FOR MINERAL ORES :

- AAS with VGA & GTA
- ICP- OES, ICP-MS
- UV-visible Spectrophotometer
- Selective Ion Analyzer
- Flame Photometer
- Thermogravemetric Analyzer
- Lazer Particle Analyzer
- CHNS-O Analyzer
- IR- Spectrophotometer
- Lovibond Refractometer
- Thermal Conductivity
- Electro Analyzer
- Dean & Stark
- Turbidity Meter
- Karl Fischer
- Conductivity Meter
- Adsorption Capacity
- Moh's Hardness Kit
- Strohelin Unit and CO_2 Assembly
- Soxhlet Apparatus
- Nitrogen Assembly

STANDARDS/ SPECIFICATIONS:

- Indian Standard Specifications (ISS)
- American Society for Testing & Materials (ASTM)
- British Standard Specifications (BS)
- International Organisation for Standardization (ISO)

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ASD
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ANALYTICAL SUPPORT : METAL AND ALLOYS

The Metal Alloy Laboratory in Shriram Institute for Industrial Research undertakes analytical studies listed below on copper alloys, ferrous alloys, aluminum alloys, aluminum-magnesium alloys, nickel alloys, solder alloys, tin alloys as per National, International and product specific standards.

Mechanical Studies - Yield Strength, Ultimate Tensile Strength, Elongation, Hardness, Fractography, Impact Energy, Compressive Strength, Flexural Strength using UTM, Hardness Testers (Rockwell, Brinnel), Microhardness Tester, Impact Tester (Charpy Holder).

Metallographic Studies- Phase Analysis, Grain Size, Inclusion Rating, Case Depth, Decarb Depth and Graphite Type.

Spectrochemical and Wet Analysis- The Laboratory is well equipped to carry out Spectrochemical and Wet Testing of Metal Alloys using AAS (VGA & GTA), ICP-OES.

Non Destructive Analysis- The laboratory carries out Non-Destructive Analysis on Metal, Alloys and Welded Metal Joints using Ultrasonic, Radiography, MPI, DPI for Identifying Cast & Process Induced Internal Defects and Welding Defects in Above-Mentioned Metal Alloys.

Analysis of Coatings- Chemical Composition, Thickness, Adhesive Strength on Galvanized, Anodized, Nickel, Silver, Gold, Electroless Nickel, Copper, Ceramic, Palladium, Rhodium, Platinum and Powder Coatings on Metal and Non-Metal Surfaces.

Specialized Studies- Structure-Property Correlations, Consultancy Research Projects, Failure Analysis, Corrosion, Tribology.

Corrosion - The Lab has Facility for carrying out Corrosion Studies (Corrosion Penetration Rate, Identifying Type of Corrosion), on Metal Alloys and Coatings.

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ANALYTICAL SUPPORT: HOME APPLIANCES AND BATTERIES

SRI Electrical Section is equipped with the State-of-the-Art Facilities to Undertake Assignments of Various Electrical Studies (Safety and Performance) for Electric Home Appliances & Batteries and Has Qualified & Trained Scientists for its Operations Including Calculation of Measurement Uncertainty (MU) and Imparting Training to Various Organizations.

Prompt, Precise and Accurate Analytical Services, in the field of Electrical Studies are offered to the Satisfaction of Wide Spectrum of National and International Agencies for the Following Products :

ELECTRIC HOME APPLIANCES :

- Electric Ceiling Type Fan- IS: 374
- Electric Table Type Fan- IS: 555
- Electric Pedestal Type Fan- IS: 1169
- Propeller Type AC Ventilating Fan- IS: 2312
- Railway Carriage Fan- IS: 6680
- Mineral Filled Sheathed Heating Element- IS: 4159
- Electric Immersion Water Heater- IS: 368
- Stationary Storage Type Electric Water Heater- IS: 2082
- Electric Instantaneous Water Heater- IS: 8978
- Domestic Electric Food Mixer- IS: 4250
- Domestic Electric Clothes Washing Machine for Household Use- IS: 14155
- Ingress Protection

BATTERIES :

- Lead Acid Storage Batteries for Motor Vehicles- IS: 7372
- Lead Acid Storage Batteries for Motor Vehicles with Light Weight & High Cranking Performance- IS: 14257
- Lead Acid Batteries Electric Road Vehicles- IS: 13514
- Stationary Lead Acid Batteries (with Tubular Positive Plates) in Mono-Block Container- IS: 13369
- Stationary Cells & Batteries Lead Acid Type (with Tubular Positive Plates)- IS: 1651
- Stationary Valve Regulated Lead Acid Batteries- IS: 15549
- Lead Acid Starter Batteries- IEC: 60095-1

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ANALYTICAL SUPPORT : ELECTRICAL INSTALLATIONS

SRI offers Prompt, Precise and Accurate Analytical Services, in the Field of Electrical Installations, to the Satisfaction of Wide Spectrum of National and International Agencies in the Following Fields of Electrical Installations.

Electrical Section is Equipped with the State-of-the-Art Facilities to Undertake Assignments for Testing/Studies of Various Electrical Installations Including Fittings by Qualified and Trained Personnel. The Services Include Calculation of Measurement Uncertainty (MU) and Imparting Training to Various Organizations.

Aluminium Conductors for Overhead Transmission Purpose

- Aluminium Stranded Conductors- IS: 398 (Part 1)
- Aluminium Conductors, Galvanized Steel-Reinforced- IS: 398 (Part 2)
- Aluminium Conductors, Aluminized Steel-Reinforced- IS: 398 (Part 3)
- Aluminium Alloy Stranded Conductors [Al.-Magnesium-Silicon Type] - IS: 398 (Part 4)
- Aluminium Conductors - Galvanized Steel-Reinforced for Extra High Voltage (400 kV and above)- IS: 398 (Part 5)

Cables & Accessories

- PVC Insulated Cable upto 1100 V- IS: 694
- PVC Insulated (Heavy Duty) Cables upto 1100 V- IS: 1554 (Part 1)
- PVC Insulated (Heavy Duty) Cables from 3.3 kV to 11 kV- IS: 1554 (Part 2)
- XLPE Insulated PVC Sheathed Cables upto 1100 V- IS: 7098 (Part 1)
- XLPE Insulated PVC Sheathed Cables from 3.3 kV to 33 kV- IS: 7098 (Part 2)
- XLPE Insulated Thermoplastic Sheathed Cables from 66 kV to 220 kV- IS: 7098 (Part 3)
- Elastomer Insulated Cable upto 1100 V-IS: 9968 (Part 1)
- Elastomer Insulated Cable from 3.3 kV to 33 kV- IS: 9968 (Part 2)
- Cables for Motor Vehicles- IS: 2465, JASO D 611, DIN 72551 (Part.5), JIS C 3406 & ISO 6722
- Welding Cables- IS: 9857
- Arial Bunched Cable for Working Voltage upto 1100 V- IS: 14255
- Cables Required to Maintain Circuit Integrity under Fire Conditions- BS: 6387
- Cables for Rated Voltages of 1 kV- IEC: 60502-1
- Cables for Rated Voltages from 6 kV- IEC: 60502-2

Lamps, Luminaries and Accessories

- Self Ballasted Lamps for General Lighting Services- IS: 15111 (Part 1)
- Self Ballasted Lamps for General Lighting Services- IS: 15111 (Part 2)
- High Pressure Sodium Vapour Lamp- IS: 9974
- Luminaires for Road & Street Lighting-IS: 10322 (Part 5/Sec. 3)
- Ingress Protection as per Various Specifications

Wiring Accessories

- Conduit for Electrical Installation of Insulating Material- IS: 9537 (Part 3)
- Metallic Conduit for Electrical Installation- IS: 9537 (Part2)
- Plug & Socket Outlet of Rated Voltage upto & Including 250 V & Rated Current upto & including 16 A- IS: 1293
- Switches for Domestic & Similar Purposes- IS: 3854

Insulating Materials

- Pressure Sensitive Adhesive Insulating Tapes for Electrical Purposes- IS: 7809 (Part 3/Sec.1)
- Pressure Sensitive Adhesive Insulating Tapes for Electrical Purposes- IS: 7809 (Part 1)
- Electrical Insulating Mat- IEC: 61111
- Insulating Mat for Electrical Purposes-IS: 15652

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ANALYTICAL SUPPORT: CALIBRATION SERVICES

We offer Prompt, Precise and Accurate Calibration Services to the Satisfaction of a Wide Spectrum of National and International Agencies.

SRI Calibration Laboratory is Equipped with the State-of-the-Art Facility to Undertake Calibration Assignments of Various Parameters by Well Qualified and Trained Scientists for its Operations Including Calculation of Measurement Uncertainty (MU) and Imparting/Providing Training to Various Organisations.

MECHANICAL:

Mass:

- Weights: 1 mg to 20 kg
- Balances: upto 50 kg

Volume:

- Pipette, Burette, Cylinder, Flask, Micropipette, Syringe, etc. :10 µl to 1000 ml
- Butyrometer: upto 100 %

Density (Hydrometer, Lactometer, Alcoholmeter):

0.650 to 1.800 g/cm^3

Acoustic (Sound Level Meter):

94, 104 & 114 dB

Speed (Non Contact):

Tachometer & Centrifuge Machine: 1100 to 15000 RPM

Torque Wrench [(Type I, Class B, C) & (Type II, Class A, B) : upto 100 Nm

Pressure:

- Pressure Gauge (Pneumatic): Upto 20 kg/cm^2
- Pressure Gauge (Hydraulic): 3.2 to 700 kg/cm^2
- Vacuum Gauge: (-)0.87 to 0 kg/cm^2

THERMAL (RANGE: -70 °C to 1000 °C):

- Thermometer
- RTD and PRT
- Thermocouple
- Temperature Indicator / Controller/Recorder/ Pyrometer Along with Sensors

ELECTRO-TECHNICAL :

- Source (Voltmeter, Ammeter, Multimeter, Resistance Meter, Frequency Meter)

DC Voltage: 1 mV to 1000 V

DC Current: 10 µA to 19 A

DC Resistance: 100 µΩ, 500 µΩ, 1000 µΩ, 1900 µΩ, 10 mΩ, 100 mΩ, 1 Ω; 1 Ω to 100 MΩ; 200 MΩ & 2 GΩ

AC Voltage: • At 50 Hz to 100 kHz: 10 mV to 100 V

• At 10 kHz: 100 V to 1000 V

AC Current: • At 50 Hz to 5 kHz: 100 µA to 10 A

• At 1 kHz: 10 A to 19 A

Frequency: 50 Hz to 10 MHZ

Temperature Simulation (Temperature indicator/ controller): • RTD/PRT: -80 °C to 650 °C

- Thermocouple (Types B, E, J, K, N, R, S, T & C): 0 °C to 1200 °C

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DIMENSION:

- Vernier Caliper: upto 600 mm
- Micrometer: upto 150 mm
- Thickness Gauge: upto 100 mm
- Slip Gauges: 0.5 to 100 mm
- Glass Scale: upto 100 mm
- Test Sieves: upto 125 mm
- Length Bar: upto 600 mm
- Dial Test Indicator: upto 25 mm
- Feeler Gauge: upto 2 mm
- Plain Plug Gauge: upto 75 mm
- Snap Gauge: upto 100 mm
- Height Gauge: upto 600 mm
- Measuring Pin: upto 25 mm
- Thread Pitch Gauge: upto 2 mm
- Radius Gauge: upto 25 mm

FLUID FLOW :

Reverse flow viscometer: 0.001 to 1 mm^2/s^2

Direct flow viscometer: 0.001 to 18 mm^2/s^2

CALIBRATION AT SITE :

Thermal: Temperature Controller/ Indicator with Sensor as Fitted in any Thermal Equipment for the Range –70 °C to 1000 °C

Mass: Balances upto 50 kg

Length: Profile Projector - Linear: 25 mm, Magnification: upto 50X

Speed: 1100 to 15000 RPM

Pressure: (-)0.87 kg/cm^2 to 20 kg/cm^2

Parameters/ Equipments Other Than Those Mentioned Above

Force & Pressure Devices	:	Compound Gauge, Manometer, Proving Ring, Tensile Testing Machine, Dead Weight Tester
Viscometer	:	Saybolt (Universal & Furol), Brookfield
Humidity Measurements	:	Hair Hygrometer (Dial Type), Hygrometer (Dry & Wet Bulb Type)
Time	:	Stop Watch & Timer
Electro –Technical	:	Tong Tester/Clamp Meter
Textile Equipments	:	Tear Tester, UTM, Abrasion Tester, Perspiration Tester, Crockmeter, Laundrometer
Rubber/ Plastic/ Paint Equipments	:	Shore Hardness, Melt Flow Index, Pour Point Apparatus
Analytical Equipments/Apparatus	:	Spectrophotometer, Refractometer, Moisture Meter, Turbidity Meter, Conductivity Meter, Flash Point Apparatus, Bomb Calorimeter, Autoclave, Conditioning Chamber, Neutral Density Filters.

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BIO

Bio Science Division

Agrochemicals & Petrochemicals Inspection and Certification
Toxicology Microbiology Drugs & Pharmaceuticals
Food & Farm Herbal Formulations & Ayurvedic Drugs
Efficacy & Bio-safety Agrochemicals Shelf-life
Quality Evaluation & Certification
Molecular Biology

Toxicology

A wide range of toxicological studies are being undertaken as per National and International guidelines.

Studies Undertaken

- Agrochemicals & Petrochemicals
- Drugs and Pharmaceuticals
- Herbal Formulations & Ayurvedic Drugs
- Cosmetics & Personal Care Products
- Packaging Materials
- Medical Devices & Contraceptives
- Dyes and Dye Intermediates

Drugs & Pharmaceuticals

Studies Undertaken

- Quality evaluation, identification & analysis of materials
- Microbial contamination & Preclinical studies
- Analytical Method development & validation
- Validation of reference materials
- Shelf life/stability studies

Food & Farm

Studies Undertaken

- Quality Evaluation of Raw & Processed Food Products, Food Additives & Packaging
- Method Development and Validation
- Microbial Contamination Studies
- Shelf life / Stability Studies
- Inspection and Certification

Pesticides

Studies Undertaken

- Quality Evaluation & Certification
- Process Development & Validation
- Profiling & Identification of Impurities for Five-Batch Analysis
- Efficacy & Bio-Safety
- Shelf-Life Studies

Residue Analysis

Residue analysis is undertaken in a well equipped laboratory with state-of-the-art instruments like GC-MS, GC with thermal desorption, GC-MS/MS, LC-MS/MS, ICP-MS etc. for analysis of various contaminants, adulterants, toxicants, elements and nutrients present in trace amounts e.g. residues of pesticides, drugs, toxic metals, mycotoxins, environmental pollutants, vitamins, macro as well as micro-nutrients etc.

Studies Undertaken

- Hydrophilic and Lipophilic Balance of Organic Molecule
- Suitability Study of Packaging Material
- REACH, RoHS parameters/ VOCs Estimation
- Physico-Chemical Parameters of Refrigerants
- Identification of Unknown Chemicals

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TOXICOLOGY

A wide range of toxicological studies are undertaken as per National and International guidelines. All studies conducted at SRI are in accordance with the regulatory requirements of OECD, Schedule Y, EU, EPA, ICH, OPPTS, ISO & CIB guidelines etc. SRI has been recommended by US FDA for 510K registration for testing of medical devices.

Major Thrust Areas

- Agrochemicals and Petrochemicals
- Drugs and Pharmaceuticals
- Herbal Formulations and Ayurvedic Drugs
- Cosmetics & Personal Care Products
- Packaging Materials for Drugs, Food and Farm Product.
- Medical Devices & Contraceptives
- Genetically Modified Crops & Organisms
- Dyes and Dye Intermediates
- Toys

STUDIES UNDERTAKEN

1) **Acute / Single Dose Toxicity Study :**
   - Oral • Dermal • Inhalation
   - Intravenous • Intraperitoneal
   - Other Protocol Specified Route
2) **Irritation Study :**
   - Irritation to Mucous Membrane
   - Primary Skin Irritation/Acute Dermal/ Corrosion
   - Acute Eye / Vaginal / Penile / Rectal Irritation/ Photo Irritation / Photo Toxicity
3) **Skin Sensitization /Allergenicity/ Hypersensitivity Studies**
   - Buehler's Method •Maximization Method
4) **Sub chronic/ Sub acute / Repeated dose Toxicity Study :**
   - Oral • Dermal • Inhalation
   - Intravenous • Intraperitoneal
   - Other Protocol Specified Route
5) **Chronic Toxicity Studies**
   - Oral • Dermal • Inhalation
   - Intravenous • Intraperitoneal
   - Other Protocol Specified Route
6) **Reproductive Toxicity:**
   a) Reproduction/Developmental Toxicity Study
   b) Prenatal Developmental Toxicity Study
   c) One/ Two Generation Studies
7) **Carcinogenicity**
8) **Mutagenicity/ Genotoxicity**
   - In-Vitro Method : Ame's Test (Bacterial Reverse Mutation Assay)
   - In-Vivo Method : Mammalian Erythrocyte Micronucleus Study
   - In-Vivo Method : Mammalian Bone Marrow Chromosomal Aberration Study
9) **Biocompatibility Study :**
   - In-Vivo method : Systemic/Intracutaneous Toxicity/Implantation/Sensitization/ Intraperitoneal/Sub Chronic/ Genotoxicity/Haemocompatibility.
   - In- Vitro Method : Cytotoxicity
10) **Ecotoxicology Studies**
    - Bee • Fish • Daphnia
    - Earthworms
    - Birds (Chicken, Pigeon & Quails)
11) **Supplementary toxicity Studies**
    - Neurotoxicity Studies on Egg Laying Hens & Rodents
    - Synergism & Potentiation Studies (Combined Effects of Various Chemicals)
12) **Skin Irritation & Sensitization Tests on Human Volunteers**

ANIMAL HOUSE :

To cater to the needs of industries for regulatory toxicology an animal house facility has been maintained which houses :

- Mice – Rats • Rabbits • Guinea Pigs
- Chicken • Pigeon • Quails

INSTRUMENTS :

For various Biochemical, Histopathological and Haematological parameters the toxicology division houses a variety of instruments like :

- Haematology Analyzer - Biochemistry Analyzer
- Various microscopes including Inverted Microscope
- Urine Analyzer
- Inhalation Instrument (Nose only)
- CO2 Incubator
- Automatic Tissue Processor
- Deep Freezer
- Microtome

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BIO
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ANALYTICAL SUPPORT : DRUGS, PHARMACEUTICALS, HEALTHCARE & HERBAL PRODUCTS

Deals With • Allopathic • Ayurvedic • Homeopathic • Unani, Siddha & Traditional Medicines

Raw Materials

Finished Products

Quality Evaluation as per the Various Pharmacopoeias
- Indian, United States, British, European, Japanese, Martindales British Herbal, Ayurvedic, Unani,.etc.
- Drugs & Cosmetic Act, BIS, ISO, WHO Guidelines.
- In House Validated Methods, Sponsor's Specifications

• Oral Solids	:	Tablets, Capsules, Powders
• Oral Liquids	:	Syrups, Suspensions, Emulsions
• Topical Semi Solids	:	Creams, Gels, Pastes, Ointments
• Ophthalmic	:	Ointments, Liquids, Gels
• Parentral Products	:	Injections, Implantation
• Aerosols	:	Sprays, Foams
• Surgical Items	:	Dressings, Gauges, Sutures, Adhesive Tapes, Syringes & Needles
• Mechanical Contraceptives	:	Condoms, Copper-T, Tubal Rings
• Cosmetic & Personal Care Products	:	Diapers, Hair Oils, Skin Creams, Skin Powders, Hair Dyes, Shampoo, Lipstick, Nail Polish etc.

Major Parameters studied for quality evaluation

Physical:
- Description, Dimensions, Absorbency
- Adhesion & Tensile Strength,
- Scouring Loss, Fracture & Friction Force
- Burst Volume & Burst Pressure
- Pouch Burst & Pouch Integrity;
- Disintegration Time

Microbiological/Pharmacological:
- Microbiological Assays, Sterility
- Microbial Limit Test for Pathogenic Organisms, Lactic Acid Bacillus
- Pyrogen/Bacterial Endotoxins/LAL test
- Undue/Abnormal Toxicity, Oxytocic Activity

Chemical/Instrumental:
- Identification, Uniformity of Content, Assay
- Uniformity of Weight/Mass/Volume/Fill
- Dissolution Behaviour
- Related Substances, Residual Solvents
- Organic Volatile Impurities
- Presence of Steroids, Heavy Metals
- Phytochemicals Profiling
- Particle Size, Fatty Acids & Esters
- Acid Value, Peroxide Value
- Saponification Value, Iodine Value
- Optical Rotation, Refractive Index

Thrust Areas of Drugs & Pharmaceuticals

- Bio-availability Studies for Active Ingredients in Clinical Specimens
- Process Validation for Manufacturing of Herbal & Healthcare products
- Stability Studies & Shelf-life Studies as per the ICH Guidelines under Accelerated Conditions of Temperature, Humidity & Light
- New Analytical Method Development and Validation as per International Standards
- Identification of Impurities of unknown Compounds in Various Matrices
- Identification and Quantitation of Degradation Products
- Method Standardization & Chemical Fingerprinting of Herbal & Healthcare Products
- Studies on Packaging Materials for Drugs & Healthcare Products
- Quality Evaluation & Certification of Products for Various Parameters

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ANALYTICAL SUPPORT : MICROBIOLOGY CENTRE

The centralized facility is equipped with HVAC system as per class 10,000 meeting the requirements under ISO 14644. SRI undertakes various studies for the detection, enumeration and identification of pathogenic organisms including the pathogens as per various regulatory directives.

ACTIVITY AREA:

- Pathogenic Microbial Identification
- Handling Food and Water Borne Pathogens
- Sterility Assurance
- Efficacy Studies of Cleaners, Disinfectants Sanitizers & Antimicrobial Preservative
- Bacterial Endotoxin test & Bioburden Studies
- Shelf Life Studies
- Antibiotic Resistant Studies
- Vitamins Studies
- Organizing International Training Programmes
- Environmental Monitoring
- Preclinical Studies
- Preservation and Maintenance of Reference Cultures
- Method Validation for Microbiological Methods
- Microbiological Consultancy
- Initiation and Participation in Interlab Comparison Programmes (ILC)
- Detection of Mycotoxins & Vitamins through ELISA Method

FOCUS AREAS :

- Facilities for Bacterial Efficacy Studies of Water Purifiers, Disinfectants, Sanitizers and Antiseptics
- Clinical Research Studies on Human Volunteers for Handwash Products
- Minimum Inhibitory Concentration (MIC) and Preservative Efficacy Studies of Disinfectants
- Bioefficacy Studies of Sanitizers and Disinfectants
- Pathogenic Micro-organism's Detection Studies in Different Milk Products
- Method Verification and Validation Studies of Salmonella, E.coli, Listeria and Staphylococcus Aureus
- Stability Studies on Nanotechnology Based Anticancer Drugs
- Anibacterial Efficacy Study of Silver Nanowashing Machine, Refrigerators & Mobile Phone Screen Guards.
- Method Validation Studies on Bioburden of Medical Devices
- Quality Evaluation of Ganga Water for its Entire Stretch in India
- Studies for Enhancement in the Shelf Life of Food Grade Products

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ANALYTICAL SUPPORT: MOLECULAR BIOLOGY

Molecular Biology laboratory is at the forefront of innovation in life sciences research, technology development & transfer and provides outstanding services to the society. Molecular Biology laboratory employs modern biological techniques for detection and quantification of various parameters at the molecular level. Laboratory provides services in DNA/RNA level analysis as well as protein based analysis.

ACTIVITIES:

1. DNA/RNA Extraction, Quantification and Analysis
2. Relative and Absolute Quantification of DNA Using Real Time-PCR
3. Protein Detection, Quantification and Analysis by PAGE and Western Blotting
4. Molecular Diagnostic Testing
5. Detection of Viral Contamination by PCR and Real Time-PCR
6. Gene Expression Analysis & Allelic Discrimination Using Real Time–pcr
7. DNA Fingerprinting & Genotyping

FOCUS AREAS:

1. Detection of Genetically Modified Organisms (GMO) using PCR Based Method
2. Detection of Food Borne Pathogens using PCR Based Technique
3. PCR-Based Allergen Detection and Quantification in Food Matrices
4. Detection and Differentiation of Source Animal Species in Meat
5. Detection and Differentiation of Milk Adulteration (Cow/Buffalo)
6. Protein Based Detection for Allergen and Food Borne Pathogens
7. Varietal Identification of Basmati Rice and other Food/ Feed Crops
8. Differentiation of Basmati and Non-Basmati Variety Rice
9. Viral Detection in Food, Feed and Drinking Water
10. Isolation and Detection of Plant Pathogens using End Point PCR/ Real Time-PCR

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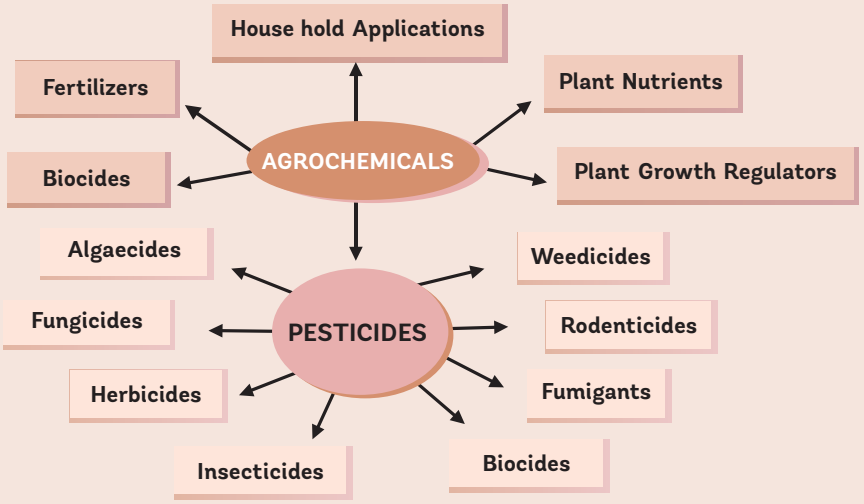
ANALYTICAL SUPPORT: CHEMICALS, PESTICIDES AND AGROCHEMICALS

With our extensive process knowledge and testing lab facilities we offer comprehensive analysis and testing of several agrochemicals:



Guidelines and Protocols for Pesticide Analysis

1. Analysis is done as per both National and International Standards with Following Major Protocols:
   - Bureau of Indian Standard Specifications
   - CIPAC Guidelines
   - WHO Specifications
   - FAO Specifications
   - AOAC Guidelines
   - OECD Specifications
2. In-house Validated Method and Procedure
3. Customer's Specification

Developmental Trends & Thrust Areas:

SRI undertakes research in agrochemical analytical technology, in the broadest and widest manner for advancing pesticide formulation research and development, thereby helping in public welfare and aiding the development of agrochemical industries. The major thrust areas are:

- Analyzing and certifying pesticides both technical grade and formulations for their safe use and conformity to various national or international specifications
- Replacing the existing classical methods with more accurate, precise and time saving latest instrumental methods of analysis.
- Impurity profiling of technical grade pesticides with complete profiling of the molecule including identifying and quantifying the impurities (process related and degradation by-products) along with the quantification of active ingredient.
- Undertaking studies for shelf life and enhancement of shelf life, container compatibility studies and persistence studies as per the CIB guidelines.
- Undertaking Five Batch Analyses, primarily on generic actives utilizing chromatography and mass spectrometry to separate, identify and quantify the impurities present apart from determination of active ingredients, physico-chemical tests and spectral analysis.
- Method development & validation of various agrochemical products for determination of active ingredients as per ICH guidelines.
- Persistence/ Residue studies of the pesticides in water, soil & different crop commodities.
- Providing solutions to customer-specific requirements for the development of different type of pesticides formulations.

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RESIDUAL ANALYSIS

Quality of any product is considered to be attributed due to its bulk properties. However in today's changing global scenario the quality of any is assessed on the basis of residual impurities present in it.

The lab is committed to conduct analysis as per various national as well as international protocols for not only various contaminants, adulterants, toxicants but also elements and nutrients present in trace amounts e.g. residues of pesticides, drugs, toxic metals, mycotoxins, environmental pollutants, vitamins, macro as well as micro-nutrients etc. in various matrices like water, raw and processed food products of plant origin (fruits and vegetables, cereal grains, oil seeds etc.), Raw and processed food products of animal origin (dairy, egg, meat, fishery products etc.), Biological samples (Blood, serum etc.), Cosmetics and personal care products (creams, lotion, powders etc.), Herbal medicines, soil, sludge, polymer, toys etc.

ACTIVITY AREA :

1. Suitability Study of Packaging Material as per EP/BP.
2. REACH, RoHS Parameters.
3. Physico-Chemical Parameters of Refrigerants.
4. Analysis of Different Matrices for Pentachlorophenol, Haloacetic Acids, Acrylamide,Trihalomethanes, Phthalates, Formaldehyde.
5. Acetaldehyde in Polymer (PET).
6. Identification of unknown Chemicals (Pesticide/Drugs/Organic Chemical).
7. Phthalates in Toys.
8. Bis Phenol-A in Feeding Bottle.
9. Migration of Certain Elements for Determination of Safety Requirements of Toys.
10. Pesticide, Drug Residues, Heavy Metals, Aflatoxins, Banned Dyes in Food Products.
11. Banned Drug Residues (Steroids) in Cosmetics and Food Supplements.
12. Compositional as well as Impurity Analysis in Fuel Gases.
13. Profiling of Crude Oil for its Composition.
14. Melamine in Milk and Dairy Products.
15. Molecular Weight Determination by GPC.
16. Partition Coefficients and Dissociation Constant of API.
17. Formaldehyde in Textiles / Leather Goods.
18. Residue Ethylene Oxide, Ethylene Glycol & Ethylene Chlorohydrins in Medical Devices.
19. VOC in Paints and Coating Materials.
20. Persistence Study of Pesticides in Agri-produce, Environment (Water and Soil).
21. Extractable, Leachable (EN71) and Total Heavy Metals Content.

QUALITY NORMS/STANDARDS/PROTOCOLS FOLLOWED :

The analysis is carried out as per National as well as International standards as mentioned below:

BIS / FSSAI / PFA / AOAC / AOCS / ASTM / IP / ARI / Pharmacopeia Methods / FCC / USEPA / IS / APHA / PAM / OECD/Spice Board of India / DGHS Manual / In-house Validated Methods.

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BIO
Bio Science Division

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ANIMAL FEEDS

Phase	Focus Area	Services Offered
Raw Materials	▸ Quality ▸ Residue	▸ Analysis of Animal Feeds for Chemical and Microbiological Parameters ▸ Residue Analysis (Aflatoxins, Pesticides, PCBs, PAHs, Heavy Metals)
Formulation	▸ Nutrition	▸ Nutritional Profiling of Animal Feeds ▸ Recommendation for Fortification or Deletion of Antinutrients Containing Materials
Finished Product	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements, Quality Certification for Microbial Load and Chemical Parameters ▸ Residue Analysis, Quality Certification
Packaging	▸ Quality	▸ Quality Evaluation and Suitability of Packaging Materials

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International.

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EGGS & POULTRY PRODUCTS

Phase	Focus Area	Services Offered
Slaughtering	▸ Hygiene of Slaughter House	▸ Swab Test
Raw Chicken/ Egg	▸ Quality ▸ Residue	▸ Analysis of Egg and Chicken for Chemical and Microbiological Parameters. ▸ Residue Analysis (Pesticides, Antibiotics, Hormones, Aflatoxins, API, Heavy Metals) ▸ Quality Certification
Processing	▸ Efficacy	▸ Monitoring Efficacy of Processing Equipments through Analysis of Chicken Products ▸ Post-processing Contamination Analysis
Processed Chicken/ Egg Powder	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Quality Certification for Microbial Load and Nutritional Parameters ▸ Residue Analysis
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Chicken or Egg Powder

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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MEAT AND MEAT PRODUCTS

Phase	Focus Area	Services Offered
Slaughtering	▸ Hygiene of Slaughter House	▸ Swab Test
Raw Meat	▸ Quality ▸ Residue	▸ Analysis of Meat for Chemical and Microbiological Parameters ▸ Residue Analysis (Pesticides, Antibiotics, Hormones, Aflatoxins, Pharmacological Active Substances, Heavy Metals)
Processing	▸ Efficacy	▸ Monitoring Efficacy of Processing Equipments through Analysis of Meat Products ▸ Post-processing Contamination Analysis
Processed Meat	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Product Certification for Microbial Load, Nutritional Parameters and Residue Analysis
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Meat Products

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International

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FISH/MARINE PRODUCTS

Phase	Focus Area	Services Offered
Raw Fish/ Marine Products	▸ Quality Residue	▸ Analysis of Fish for Chemical and Microbiological Parameters ▸ Residue Analysis (Pesticides, Toxins, Heavy Metals)
Processing	▸ Efficacy	▸ Monitoring Efficacy of Processing Equipments through Analysis of Fish Products ▸ Post-processing Contamination Analysis
Processed Fish	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Quality Certification for Microbial Load and Nutritional Parameters
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Fish/Marine Products

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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AGRICULTURAL PRODUCTS

Phase	Focus Area	Services Offered
Seeds	▸ Preservation ▸ Fumigation	▸ Evaluation of Quality of Seeds ▸ Recommendation for Treatments to Seeds ▸ Irradiation of Seeds for Quality Improvement
Agriculture	▸ Agrochemicals ▸ Organic	▸ Residue Analysis (Pesticides, Heavy Metals) ▸ Organic Certification of Products
Harvesting	▸ Contaminants ▸ Stone ▸ Straw	▸ Residual Contaminant Analysis ▸ Methods for Monitoring the Level of Contaminants
Packaging	▸ Packaging Material	▸ Quality Evaluation Suitability of Packaging Material
Storage	▸ Mycotoxins ▸ Fumigants ▸ Insect Infestation ▸ Stones ▸ Filth	▸ Analysis of Mycotoxins (Aflatoxins, Ochratoxins, Patulin, Zearalenone, Plant Toxins) ▸ Determination of Insect Infestation, Fumigants and Agrochemicals used for Storage
Shelf-life	▸ Biochemical Reactions ▸ Preservation ▸ Micro-organisms	▸ Shelf-life Determination ▸ Measurement of Efficacy of Preservation ▸ Shelf-life Enhancement by Irradiation Processing ▸ Analysis for Micro-organisms, Degradation Products

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, AACC methods, FSSR.

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HORTICULTURAL PRODUCTS

Phase	Focus Area	Services Offered
Harvesting	▸ Contamination	▸ Residual Contaminant Analysis (Pesticides, Heavy Metals, Mycotoxins etc.) ▸ Quality Evaluation of Horticultural Produce for Nutritional Parameters
Packaging	▸ Packaging Material	▸ Quality Evaluation and Suitability of Packaging Material ▸ Residual Contaminants of Fumigants etc.
Storage	▸ Mycotoxins ▸ Fumigants ▸ Insect Infestation ▸ Stones ▸ Filth	▸ Analysis of Pesticides, Heavy Metals, Mycotoxins, Fumigants etc. ▸ Determination of Insect Infestation and Agrochemical used During Storage
Shelf-life	▸ Biochemical reactions ▸ Preservation ▸ Micro-organisms	▸ Shelf-life Determination at Ambient and Different Storage Conditions ▸ Measurement of Efficacy of Preservation ▸ Shelf-life Enhancement ▸ Analysis for Micro-organisms, Preservatives, and Degradation Products

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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SUGAR AND CONFECTIONERY

Phase	Focus Area	Services Offered
Raw Sugar	▸ Quality ▸ Residue	▸ Analysis for Chemical and Microbiological Parameters ▸ Residue Analysis (Pesticides, Heavy Metals) ▸ Quality Certification
Processing	▸ Efficacy	▸ Assurance of Quality During Process.
Refined Sugar/ Confectionery	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Quality Certification for Microbial Load and Nutritional Parameters ▸ Residue Analysis (Pesticides, Heavy Metals)
Packaging	▸ Quality ▸ Shelf-life	▸ quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Sugar/ Confectionery Products

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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APICULTURAL PRODUCTS

Phase	Focus Area	Services Offered
Extraction	▸ Contamination	▸ Residual Contaminant of Antibiotics, Pesticides, Heavy Metals, Micro-organism etc. ▸ Quality Evaluation of Apicultural Produce
Processing	▸ Contamination	▸ Residual Ontamination from Processing Equipment. ▸ Leachability & Migration Study
Packaging	▸ Packaging Material	▸ Quality Evaluation and Suitability of Packaging Material. ▸ Leachability & Migration Study
Storage	▸ Micro-organisms	▸ Analysis of Micro-organisms
Shelf-life	▸ Biochemical Reactions ▸ Preservation ▸ Micro-organisms	▸ Shelf-life Determination at Ambient and Different Storage Conditions ▸ Measurement of Efficacy of Preservation ▸ Shelf-life Enhancement ▸ Analysis for Micro-organisms, Preservatives, and Degradation Products ▸ Residual Contaminant of Antibiotics, Pesticides, Heavy Metals, Micro-organism etc. ▸ Quality Evaluation of Apicultural Produce

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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VEGETABLE OILS AND FATS

Phase	Focus Area	Services Offered
Deoiling / Defatting	▸ Efficiency	▸ Efficiency of Oil Extractor
Crude Oil	▸ Quality	▸ Analysis of Crude Oil for Quality Evaluation
Processing	▸ Fractionation ▸ Solvent Extraction ▸ Refining ▸ Bleaching ▸ Deodorizing	▸ Characterization of Oil ▸ Bleaching Efficiency ▸ Residual Solvent
Refined Oil	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Adulteration and Quality Certification Residual Pesticides and Metals ▸ Fatty Acid Profiling Including MUFA, PUFA, SFA, Trans Fat
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Fresh and used Oil

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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MILK AND MILK PRODUCTS

Phase	Focus Area	Services Offered
Milking	▸ Hygiene	▸ Swab Test ▸ Mastitis ▸ Recommendation for Treatment of Animal
Milk	▸ Adulteration ▸ Residue ▸ Quality	▸ Analysis of Adulterants ▸ Residue Analysis (Pesticides, Antibiotics, Hormones, Aflatoxins, Pharamocological Active Substances, Heavy Metals) ▸ Checking of Milk for Suitability for Processing, Quality Certification
Processing	▸ Efficacy (Pasteurization, Sterilization, Homogenization, etc.)	▸ Monitoring Efficacy of Processing Equipments through Analysis of Milk or its Products ▸ Post-processing Contamination Analysis
Processed Milk	▸ Quality ▸ Residues	▸ Quality as per Legal Requirements ▸ Analysis for Microbial Load ▸ Residue Analysis ▸ Nutritional Profiling
Dairy Products	▸ Quality ▸ Residues	▸ Rheological, Chemical and Microbiological and Nutritional Facts of Dairy Products ▸ Residue Analysis
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Milk or Dairy Products ▸ Microbiological Evaluation

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, American Dairy Products Institute, FSSR.



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HERBAL PRODUCTS

Phase	Focus Area	Services Offered
Raw Materials	▸ Quality ▸ Residue	▸ Identification and Characterization of Herbs ▸ Analysis of Herbs for Chemical (Active Ingredients) and Microbiological Parameters ▸ Residue Analysis (Pesticides, PCBs, PAHs, Heavy Metals, Aflatoxins)
Extraction & Processing	▸ Extraction of Active Bio-components ▸ Biochemical Reactions	▸ Validation of Extraction Procedures and other Processing Parameters
Finished Product	▸ Quality ▸ Toxicity and Safety ▸ Bio-availability ▸ Residue ▸ Synergistic Effects ▸ Analytical Methods	▸ Quality Certification for Microbial Load and Physical and Chemical Parameters ▸ Residue Analysis for Contaminants ▸ Toxicity and Pharamacological Studies ▸ Analytical Method Development and Validation ▸ Label Claim
Packaging	▸ Quality	▸ Quality Evaluation and Suitability of Packaging Materials

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, Ayurveda Pharmacopoeia.

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ALCOHOLIC DRINKS/SOFT DRINKS

Phase	Focus Area	Services Offered
Raw Materials	▸ Quality ▸ Residue	▸ Analysis of Raw Materials for Chemical and Microbiological Parameters ▸ Residue Analysis (Pesticides, PCBs, PAHs, Heavy Metals)
Manufacturing	▸ Defects	▸ Checking of Defects in the Product Quality using Instrumental Analysis ▸ Post-processing Contamination Analysis
Finished Product	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Quality Certification for Microbial Load and Chemical Parameters ▸ Residue Analysis
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Beverages/Drinks

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, FSSR.

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SPICES AND CONDIMENTS

Phase	Focus Area	Services Offered
Raw	▸ Quality ▸ Residue	▸ Analysis for Chemical and Microbiological Parameters ▸ Residue Analysis (Pesticides, Heavy Metals, etc.) ▸ Quality Certification
Processing	▸ Efficacy	▸ Monitoring Efficacy of Processing Equipment through Analysis of Spices and Condiments ▸ Post-processing Contamination Analysis
Processed	▸ Quality ▸ Residue	▸ Quality as per Legal Requirements ▸ Quality Certification for Microbial Load and Nutritional Parameters ▸ Residue Analysis
Packaging	▸ Quality ▸ Shelf-life	▸ Quality Evaluation and Suitability of Packaging Materials ▸ Shelf-life Determination of Packaged Products, Irradiation of Spices and Condiments for Improvement of Shelf-life

Protocols/Specifications Followed for Product Certification:
BIS Specifications, ISO Specifications, AOAC International, Spice Board of India, FSSR.



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FOOD AND FARM

Shriram Institute for Industrial Research (SRI) supports regulatory bodies in mandatory certification of Food and Agri-products for export and import. SRI offers food testing service to the food industry for nutritional labeling, food quality and safety evaluations and shelf life studies.

PRODUCTS TESTED :

- Alcoholic and Non-alcoholic Drinks, Beverages, Animal and Pet Feeds
- Bakery & Confectionery
- Cereal, Pulses & other Agri-products
- Coffee, Tea & Cocoa Products
- Cooked & Processed Food Products
- Cosmetic & Toiletries
- Essential Oils
- Fish & Sea Foods
- Meat & Meat Products
- Egg & Egg Products
- Food Additives
- Fruit, Vegetable & Related Products
- Honey & Apiculture Produce
- Milk & Milk Products
- Infant Foods
- Oil, Fats & Related Products
- Soaps & Detergents
- Spices & Condiments
- Sugar & By-products
- Tobacco & Related Products
- Starch & Starch Products

PARAMETERS CONDUCTED :

- ✓ **Quality and Safety Parameters as per National and International Standards**
- ✓ **Proximate and Nutritional Facts**
- Water-Soluble and Oil-soluble Vitamins
- Amino Acid Profile
- Fatty Acid Profile
- Minerals
- Added Food Colour, Preservatives and
- Antioxidants

Contaminants

- Heavy Metals
- Naturally Occurring Toxic Substances
- Mycotoxins
- Pesticide Residues, Antibiotic and Drug Residues
- Phthalates, Bisphenol A, Histamine, Nitrosamines

Rheological Studies

Sensory Evaluation

Adulterants

- Melamine
- Banned Dyes
- Artificial Sweeteners

Migration Studies from Packaging Materials

Shelf-life Studies

Service Quality in Food Testing

SRI provides testing and inspection services with highly reliable results and fast turn-around-time of reporting with the help of experienced and qualified scientists. SRI has centralized state-of-the-art equipment facilities for food testing as follows:

- ➢ Brookfield Viscometer
- ➢ Digital Refractometer
- ➢ Digital Polarimeter
- ➢ UV-Vis Spectrophotometer
- ➢ Lovibond Tintometer
- ➢ Karl Fischer Titrator
- ➢ CHNS Analyzer
- ➢ Alveo-Consistograph
- ➢ Ph Meter
- ➢ Conductivity Meter
- ➢ Elisa Reader
- ➢ HPTLC, HPLC, LC-MS/MS
- ➢ GC, GC-MS
- ➢ Microwave Digester
- ➢ AAS, ICP-OES & ICP-MS
- ➢ Particle Size Analyzer
- ➢ Ion Chromatography
- ➢ Rheometer
- ➢ Specific Ion Meter
- ➢ FTIR

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EPD

Environment Protection Division

Environment Consultancy
Air & Emission Studies
Water & Waste Water
Effluent
Energy Air
Climate Change
Water
Radiation
Micro-materiology & Modeling
Soil
Solid Waste Management
Environment & Policy Research

The Environment Protection Division (EPD) provides services to Industries, Regulators, Health Sector etc. in multi-disciplinary areas. EPD generates primary data with high accuracy and reliability supplemented by professional data analysis, scientific interpretation, modeling for impact analysis, and prediction together with development of a management plan for off-setting/ minimizing negative impacts and ameliorating positive impacts.



Studies Undertaken

- **Environmental Consultancy:** EIA Studies & Development of EMP, Risk Assessment & Development of DMP and Environmental Audits.
- **Process Control Studies:** Process Control Audit of STPs, CETPs, Validation of Green Buildings and Adequacy Studies of Pollution Control Devices.
- **Environmental & Policy Research:** Bio-Magnifications of Pollutants, River Ecology, GIS Mapping of Contaminants, Flue Gas Emissions at High Temperatures and Impacts of Fuel Additives for Performance of Engines.
- **Climate Change:** Carbon Footprints, GHG Assessment at Municipal Solid Waste Dumping Sites, Climate Vulnerability Mapping, Waste Flue Gases for Energy Recovery and Energy Audits at STPs.
- **Rural Water Technologies:** Evaluation of Water Quality Field Test Kits, Water Purification Technologies, Fluorosis Control Programmes and Information Education & Communication (IEC).

State-of–the-art Facilities for

- **Air & Emission Studies**
  - Toxic Gas Analyzer & Potable Multi Gas Monitor
  - Noise & Vibration Monitoring Systems
  - THM Analyzer & HC Leak Detectors
  - Online CO Analyzer
  - Particulate Monitor (PM10 & PM2.5)
  - Ozone Analyzer
- **Water & Waste Water**
  - UV/Visible Spectrophotometer
  - Specific Ion Meter
  - Nephelometer
  - Global Positioning Systems & Laser Distometers
  - Ultrasonic Flow Meter (Doppler)
  - Current Meters
- **Micro-Materiology & Modeling**
  - Automatic Ultrasonic Weather Stations
  - Windrose Software
  - Rain Gauze
  - ISCST Model for Pollutant Dispersion



EPD
Environment Protection Division

Shriram Institute for Industrial Research

WATER QUALITY MAPPING AND WATER MANAGEMENT PLAN

Activities in the Water Sector Include:

- Assessment of Water Quality for Various End-Use Applications for Optimal Management of Water Resources:
  - Water for Human Consumption
    - Drinking Water Quality Analysis as per BIS Specification & WHO Guidelines
    - Bottled Mineral Water and Packaged Water Analysis
  - Water for Industrial Applications
    - Boiler Feed & Boiler Blow-Down Water
    - Cooling Water
    - Process Water for Various Industrial Operations
  - Water for Irrigation Purpose
  - Water for Construction Purpose
  - Water for Swimming Pool Purpose
- National Survey of Rural Water Quality & Mapping
- Capacity Building to Promote Community Based Water Quality Monitoring & Purification
- Capacity Building of Stakeholder for Water Mapping and Remediation
- Evaluation of Fluorosis and Arsenicosis Control Programme in Rural Areas
- GIS Mapping of Contaminants for Decision Support System
- Analysis of Policies and Notifications on Water Security and Safety and Development of Opinion Reports
- River Action Plan (Point & Non-point Pollution Sources)
- Process Control Studies of Sewage Treatment Plants and Common Effluent Treatment Plants
- Water Management Plan for Cities & Urban Agglomerations
- Adequacy Studies of Wastewater Treatment Systems
- Toxic Metals, Pesticide Residues, Persistent Organic Pollutants (POPs), VOCs and Semi-VOCs, PCB's & PAH's etc. in Environment Media (Water, Air, Soil, Food etc.) and their uptake by Progressive Food Chain

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AIR, EMISSION, MICRO-METEOROLOGY AND NOISE MONITORING

Major Activities Include:

- Air & Emission Study including Stationary, Mobile & Fugitive Emissions
- Ambient Air Quality and Indoor Air Quality
- Pollutant Dispersion and Diffusion Modeling
- Adequacy of Air Pollution Control Devices
- Ambient & Work Zone Noise Level Monitoring
- Acoustic Studies of Machines, Rooms, Buildings, DG Sets etc.
- Estimation of Heat Value of Waste Flue Gases of Coke Ovens & Blast Furnaces to Explore Potential of Energy
- Hydrocarbon Leaks Detection in Petroleum Refineries
- Micro-Meteorology including Wind Speed, Wind Direction, Relative Humidity, Rainfall and other Climatic Parameters and Development of Area Specific Windrose

CARBON FOOTPRINTS STUDIES, CARBON FINANCE AND CLEAN TECHNOLOGIES

Major Activities are as follows:

- Assessment & Validation of Carbon Footprints of Industrial Products
- Validation of Waste Flue Gases for Energy Recovery
- Assessment of Municipal Solid Waste Dumping Sites for Methane Potential and Carbon Finance Projects
- Validation of Green Buildings for Smoking and Non-smoking Rooms
- Analysis and Interpretations of National Green House Gas Inventories and Climate Change Reports
- Fuel Additive Performance for Emission Reductions for Fuel Saving

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SOIL INVESTIGATION

CORE COMPETENCE:

- Safe Bearing Capacity of Soil by Standard Penetration Test at Site
- Safe Bearing Capacity of Soil by Plate Load Test at Site
- Electrical Resistivity of Soil at Site
- Static Cone Penetration Test at Site
- Field California Bearing Ratio
- Field Compaction Test by Core Cutting and Sand Replacement Method (Dry Bulk Density)
- Investigations of Soil Quality &

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SOLID WASTE MANAGEMENT

Major areas in Solid Waste Management are:

- Characterization of Municipal Solid Waste
- Development of Solid Waste Management Plan
- Assessment of Solid Waste Dumping Sites for the Potential of Landfill Gas including Modeling.
- Comprehensive Characterization of Hazardous Waste
- Impact of Solid Wastes Dumping Sites on the Quality of Water in the Vicinity as well as Health Impacts on the Dwellers
- Consultancy for Recycling, Re-use and Value Added Products from Solid Waste
- Study of Leachate Potential of Flyash and Contaminant Transport Modeling

ENVIRONMENTAL IMPACT ASSESSMENT STUDIES

SRI is the Approved EIA Consultant by QCI/NABET (as per MoEF, Govt. of India Notification) for following Sectors:

- **Project Activities-7(c) as per EIA Notification (MoEF&CC, Govt. of India)**
  - Industrial Estates/Parks/Complexes/Areas
  - Export Processing Zones (EPZs)
  - Special Economic Zones (SEZs)
  - Biotech Parks
  - Leather Complexes
- **Project Activity-6 (a) as per EIA Notification (MoEF&CC, Govt. of India)**

  Oil & Gas Transportation Pipeline (Crude and Refinery/Petrochemical Products), Passing through National Parks /Sanctuaries/Coral Reefs /Ecologically Sensitive Areas including LNG Terminal.
- **Project Activity-6 (b) as per EIA Notification (MoEF&CC, Govt. of India) Project Activity-6 (b)**

  Isolated Storage & Handling of Hazardous Chemical (As per Threshold Planning Quantity indicated in Column 3 of Schedule 2 & 3 of MSIHC Rules 1989 Amended 2000).

QUANTITATIVE RISK ASSESSMENT

SRI has Specialization in the following Areas:

- Quantitative Risk Assessment (QRA) for
  - Petroleum, Oil & Lubricants (POL) Storage Installation
  - LPG Bottling Plant
  - Petroleum Product Transportation Pipeline
  - Chemical Storage Installation
- Onsite Disaster Management Plan
- Preparation of Emergency Response and Disaster Management Plan (ERDMP) as per the Guidelines of Petroleum and Natural Gas Regulatory Board (PNGRB)

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Material Research
Trouble-shooting
Materials Characterized
Consultancy
R&D
Contract Research
Rubber & Plastics
Major Thrust Areas
Textiles & Paper
Surface Coatings
Core Competency
Compositional Analysis
Multi-layer Films
Chemical Analysis

MSD

Material Science Division

Material Science Division (MSD) undertakes Research & Development activities for processes, products & devices. Apart from development of materials with tailor-made properties, MSD also has state-of-the-art pilot plant for paints, rubber & polymers viz. compression molding, injection molding, extruder, reactors, mixers, 3-roll mill, ball mill, bead mill etc.

Main Activities

- Material Research
- Synthesis
- Product Development
- Opinion Report
- Consultancy
- Scale-up Studies
- Process Validation & Optimization
- Trouble-shooting
- Technology Commercialization

Research Areas

- Green Technologies
- Radiation Processing
- Waste Utilization
- Nanotechnology
- Adhesives & Coatings
- Formulations
- Fluoropolymers
- Healthcare Products
- Optical Polymers

Rubber & Plastics, Textiles, Paper and Paint sections are a part of Material Science Division of the Institute. The main activities of these sections is to provide technical services in characterization of raw materials, semi processed products and finished products.

Major Thrust Areas

- Compositional Analysis
- Failure Analysis
- Product Identification
- Product Differentiation
- Contaminant Identification
- Materials Compatibility

Core Competency

- Chemical Analysis
- Weathering/ Ageing Studies
- Fire/Flammability Studies
- Physico-Mechanical Studies
- Reverse Engineering
- Thermal/Optical Studies

Materials Characterized

- Composites & Blends
- Rubbers
- Specialty Polymers
- Multi -layer Films
- Textiles, Paper & Allied Products
- Thermosets & Thermoplastics
- High Performance Polymers
- Water-proofing Materials
- Paints & Coatings
- Adhesives & Sealants
- Geomembranes & Geogrids
- Cable Insulation

MSD
Material Science Division

Shriram Institute for Industrial Research

RESEARCH AND DEVELOPMENT

Material Science Division (MSD) undertakes R&D projects leading to development of processes, products & devices based on different kinds of materials. Apart from development of materials with tailor made properties, the activities include development of technologies with cradle-to-grave concept.

Research Expertise

SRI has developed a number of technologies in various research areas involving synthesis and modification of polymers and chemicals. SRI's expertise in these areas along with the scope of activities are given below:

Research Areas	Research Scope	Expertise in Synthesis
• Green Technologies • Strategic Polymers • Engineering Polymers • Smart Materials • Nanotechnology • Radiation Processing • Fluoropolymers • Biofuels & Energy • Waste Utilization • Optical Polymers • Biomedical Polymers • Packaging • Automobile & Transport • Paints & Inks • Adhesives • Oils, Lubricants & Greases • Textiles • Rubbers • Paper	• Process Development • Scale-up Studies • Synthesis • Polymer Modification • Process Optimization & Validation • Performance & Life Cycle • Data Generation • Application Development • Specialized Studies • Feasibility Studies • Structure – activity Correlation • Consultancy & Trouble Shooting	• Derivatisation • Crosslinking • Sulphonation • Sulphation • Thiolation • Phosphation • Alkylation • Etherification • Esterification • Hydroxyalkylation • Fluorination • Polymerization ▪ Anionic ▪ Cationic ▪ Free Radical ▪ Condensation ▪ Addition ▪ Grafting ▪ Substitution ▪ Radiation

Pilot Plant Facilities

MSD has state-of-the-art pilot plant facility for polymer processing, synthesis of chemicals and formulating coatings & adhesives. The facility includes:

• Compression Molding Machine • Extruders • Injection Molding Machines • Multi Layer Film Plant • Thermoforming	• Kneader cum Pelletizer • Rubber Kneader • High Speed Mixer • Two Roll Mill • Heavy Duty Grinders	• Three Roll Mill • Bead Mill • High Speed Disperser • Ball Mill • Glass Lined Reactor • Pressure Reactor

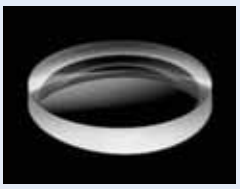
...continued

MSD
Material Science Division

Shriram Institute for Industrial Research

Technologies Developed by SRI

Nanotechnology
- Metal Containing Nanocomposites for Optical Application
- Nanophotocatalyst for Effluent Treatment
- Nanofluids for Improved Heat Transfer

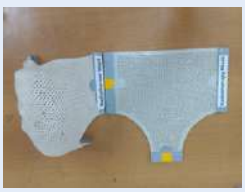


Radiation Processing
- Specialty Coatings for Wooden Handicrafts
- Cross-linked Polyamides
- Pressure Sensitive Adhesives
- Shelf Life Enhancement of Fruits & Vegetables
- Epoxy Composites
- Destruction of PCBs
- Optical Plastics

Utilization of Waste & Renewable Resources
- Recycled Rubber – Flyash Tiles
- Cellular Lightweight Concrete
- Process Engineered Fuel
- Low Cost Sanitary Napkins & Diapers
- Micronized Teflon
- Novel Green Composites

Strategic Polymers
- Bootings for Master Slave Manipulator
- Radiation Resistant Lip Seals
- Perfluorinated Lubricants
- Fluoroelastomers
- Centering & Driving Bands for Projectiles

Engineering Plastics
- Composites
- Smart Polymers
- Modified Polymer for High Mechanical & Thermal Properties



Biomedical Application
- Disposable Speculum
- Spectacle Lenses, Contact Lenses & Intraocular Lenses
- Wound Dressings from Textile Waste & Plant Fiber
- Personal Care Products
- Bio Absorbable Sutures
- Super Absorbent Polymers
- X-Ray Resistant Garments
- Dental Cement
- Antimicrobial Textiles
- PSA Tapes

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ANALYTICAL SUPPORT: PAINTS, INKS AND ALLIED PRODUCTS

Enamel Paint

- Synthetic: Exterior and Interior Purpose
- Epoxy Glossy Enamel (Two Components)
- Polyurethane Full Gloss Enamel

Ready Mixed Paint/Others

- For General Purpose
- For Railway Coaches
- Stoving Paints
- Brushing Bituminous Black, Lead-Free, Acid, Alkali & Heat Resistant
- Road Marking Paint
- Antifouling Paint for Ship Bottoms and Hulls
- Distemper (Dry/ Washable) & Cement Paint
- Plastic Emulsion Paint
- Aluminium Paint for General Purpose
- Heat Resistant Aluminium Paint
- Powder Coating

Primer

- Zinc Chromate Primer
- Red Oxide-Zinc Chromate Primer
- Epoxy-Zinc Phosphate Primer
- Polyurethane-Zinc Phosphate (Two Pack) Primer for Exterior Painting of Railway Coaches

Varnish

- Varnish Finishing Exterior Synthetic, Air Drying and General Purpose
- Varnish Medium for Aluminium Paint
- Black Japan (Type A,B,C)

Road Marking Material

- Thermoplastic Material
- Glass Bead
  - Type 1
  - Type 2 (Drop on)

Ink

- Fountain Pen Ink (Dye Based)
- Ferrogallotannate
- Stamp Pad Ink
- Indelible Ink

Allied Products

- Knifing Stopper for Railway Coaches
- Grey Fillers for Enamel Use over Primer
- Putty for Use in Window Frame
- Polyurethane based Knifing Fillers
- Aluminium Paste for Paint
- Sealing Wax

Raw material

- Pigments
- Drier

Analytical Parameters

❖ **Physical and Chemical**

- Drying Time
- Viscosity (Flow cup no.4)
- Finish
- Fineness of Grind
- Gloss (60°, 20° & 45°)
- Colour
- Water Content
- Wet Opacity
- Flexibility and Adhesion
- Flash Point
- Accelerated Storage Stability
- Dry Film Thickness
- Mass in kg/10 Lit.
- Composition : Volume Solids, Phthallic anhydride.
- Accelerated Tests: Resistance to
  - Suphuric Acid
  - Caustic Potash
  - Oil
  - Solvents
- Durability Test
- Colour Fastness to Light
- Washability & Cleanability
- Temperature Stability
- Ratio of Ethyl Acetate Extract to Iron Content
- Compatibility with Thinner
- Resistance to Wear
- Resistance to Bleeding
- Volume Solid
- Relative Consistency
- Resistance to Salt Spray

...continued

MSD
Material Science Division

Shriram Institute for Industrial Research

- Recoating Properties
- Outdoor Exposure
- Accelerated Weathering Test
- Protection against Corrosion under Condensation
- Volatile Matter
- Resistance to Water
- Resistance to Alkali
- Resistance to Acid
- Resistance to Chlorine
- Lead Free Material
- Heavy Metals
- Pot Life
- Pigment Composition
- Cracking Resistance at Low Temperatur
- Calciu
- Gr
- Freedom from
- **Ins**
- Wet Abr
- Flow C
- Wea
- Fl
- Metal
- Sal
- Centrif
- Sun T
- **Focus A**
- Development o
- **Pro**
- Bureau of Indianndards (BIS)
- American Society
- Inte
- Ministry

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MSD
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ANALYTICAL SUPPORT : PAPER, LEATHER AND ALLIED PRODUCTS

- Writing and Printing Paper
- Photocopier Paper
- Newsprint Paper
- Carbon Paper
- Kraft Paper
- Pleated Filter Paper
- Computer Paper
- Germination Paper
- Paper Board
- Solid Press Board
- Type Writer Ribbons
- Diaries
- Tissue Paper
- Blotting Paper
- Stencil Paper
- Coated and Art Paper
- Cover Paper
- Office Paste
- Corrugated Boxes / Cartons
- Exercise / Drawing Note Books
- Calendars
- File Covers
- Leather Cloth
- Footwear
- Upholstery
- Bags
- Belts
- Leather Goods
- Leather Garments
- Wallets
- Toys
- Shoe Sole
- Covers
- Gloves

Analytical Parameters

❖ **Physical and Mechanical**
- Dimensions / Size
- Thickness
- Weight/Mass/Substance / Grammage
- Bulk
- Tensile Strength/Tensile Index
- Elongation at Break
- Tear Strength (Elmendorf)
- Tear Index
- Bursting Strength (Mullen Type)
- Burst Factor/Burst Index
- Adhesive Strength
- Hardness
- Smoothness & Porosity
- Double Fold
- Bending Stiffness
- Edgewise Crush
- Flat Crush
- Pore Size (Mean & Maximum)
- Durability
- Recuperation
- Typed Work
- Resistance of Writing Paper to Feathering
- Grammage of Each Ply (Corrugated Box)
- Brightness
- Opacity
- Gloss
- Water Absorbency
- Cobb Test
- Fastness to Light
- Flexing Demattia
- UV Resistance
- Thermal Stability
- Ozone Resistance
- Durability Test
- Mildew Resistance
- Coefficient of Friction
- Abrasion Resistance
- Thermal Conductivity
- Flame Spread Test
- Smoke Density
- Toxicity Index

❖ **Chemical**
- Water Soluble Chloride
- Water Soluble Sulphate
- Ash Content
- Mass of Coating
- Heavy Metals (Cadmium, Mercury, Lead, Arsenic)
- Solid Content
- Surface pH
- pH of Aqueous Extract
- Matter Soluble in Ether
- Benzene Soluble Matter
- Moisture Content
- Volatile Content
- Water Soluble Matter
- Solvent Extractable Matter
- Nitrogen Content
- Chromium Content
- Aluminium Content
- Iron Content
- Copper Content
- Silica Content
- Total Chloride Content
- Formaldehyde Content
- Oil Content
- Hide Substance
- Degree of Tannage
- Sulphated Ash
- Water Insoluble Ash
- Water Soluble Organics
- Chromic Oxide
- Zirconium Content
- Water Soluble Magnesium Salt
- Sugar Content as Glucose
- Corrosion Resistance
- Phosphorus Content
- Chemical Resistance

❖ **Instruments**
- Universal Tensile Testing Machine
- Bursting Strength Apparatus (Mullen Type)
- Elmendorf Tear Tester
- Sun Tester CPS (+)
- Q Sun Weather-o-Meter
- Polarizing Microscope
- pH Meter
- Weighing Balance
- Atomic Absorption Spectrophotometer
- UV-Visible Spectrophotometer
- Gas Chromatographs

❖ **Protocols Followed**
- Bureau of Indian Standards (BIS)
- American Society for Testing and Materials (ASTM)
- British Standards (BS)
- International Organisation for Standardization (ISO)
- Customer/Sponsor Provided Specifications

❖ **Specialized Studies**
- Studies Related to Various Environmental Exposures:
- High Temperature
- Low Temperature
- Thermal Shock
- Relative Humidity
- Fungus Growth

❖ **Other Services**
- Setting-up of New Laboratory
- Quality Assurance Services
- Third Party Inspection

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ANALYTICAL SUPPORT : TEXTILE AND ALLIED PRODUCTS

- Uniform Clothes
- Carpets
- HDPE/PP Bags
- Jute Bags
- Bitumen Felts
- Socks
- Jerseys/Sweaters
- Yarn/Threads
- Towels
- Geo-Textiles
- Bed Sheets
- Cotton Canvas
- Cotton Bandages
- Cotton Drill
- Tarpaulins
- Woolen Felts
- School Bags
- Cloth Bags
- Ropes/Twines
- Blankets
- Woolen Shawl
- Filter Cloth
- Inner Vest
- Binding Cloth
- Rain Coat
- High Efficiency Floorings
- Mosquito Nets
- Mesh Nets
- Webbing
- Flame Retardant Fabrics
- Woolen Serge
- Upholstery/Vinyl Coated Fabrics
- Cloth Shirting Angola

Analytical Parameters

❖ Physical & Mechanical
- Dimensions
- Thickness
- Weight/Mass
- Threads/Dm
- Twist Per Inch
- Count of Yarn
- Breaking/Tensile Strength
- Elongation at Break
- Tear Strength (Tongue/ Elmendorf)
- Peel Strength
- Bursting Strength (Mullen Type & Ball Bursting)
- Puncture Resistance
- Martindale Abrasion
- Pilling
- De-Mattia Flexing
- Crease Recovery Angle
- Storage Sticking Test
- Fibre Diameter/Fibre Fineness
- Type of Weave
- Pile Density
- Shorn Pile Weight
- Tuft Withdrawal Force
- Pile Height
- Pile Thickness
- Pressure Head Test
- Water Spray Test
- Cone Test
- Water Penetration Test

❖ Chemical
- Identification of Fibres & Blend
- Scouring Loss
- Water Soluble Matter
- Ether Soluble Matter
- Chloride Content
- Azo Dyes
- Dimensional Change to Water
- Dimensional Change to Washing
- Total Pile Weight
- Colour Fastness to Water
- Colour Fastness to Organic Solvents
- Colour Fastness to Sea Water
- Colour Fastness to Shampooing
- Sulphate Content
- DDT Content
- Oil Content
- pH of Aqueous Extract
- Heavy Metal Analysis (Mercury, Arsenic, Cadmium, Lead)
- PCP Content
- Benzidine Content
- Pile Composition
- Ash Content
- Moisture Content
- Colour Fastness to Artificial Light/ Day Light
- Colour Fastness to Washing
- Colour Fastness to Perspiration
- Colour Fastness to Hot Pressing
- Colour Fastness to Rubbing (Dry & Wet)
- Vertical Flammability
- Horizontal Flammability
- Tablet Test
- Limiting Oxygen Index
- Toxicity Index

❖ Instruments
- Universal Tensile Testing Machine
- Sun Test CPS (+)
- Q Sun Weather-o-Meter
- UV 2000 (Atlas)
- Polarizing Microscope
- Bursting Strength Apparatus (Mullen Type)
- Elmendorf Tear Tester
- Storage Sticking Apparatus
- Pressure Head Tester
- Crease Recovery Apparatus
- De-Mattia Flexing Test Apparatus
- Carpet Thickness Gauge
- pH Meter
- Weighing Balance
- Washing Machine
- Digi-Crock
- Digi-Pill
- Digi-Twist
- Digi-Wash
- Martindale Abrasion Tester
- Perspirometer
- Colour Matching Cabinet
- Atomic Absorption Spectrophotometer
- UV Visible Spectrophotometer
- Gas Chromatographs

❖ Protocols Followed
- Bureau of Indian Standards (BIS)
- American Society for Testing and Materials (ASTM)
- British Standards (BS)
- International Organisation for Standardization (ISO)
- Customer/Sponsor Provided Specification

❖ Specialized Studies
- Studies Related to Various Environmental Exposures:
  - High Temperature
  - Low Temperature
  - Salt Mist
  - Thermal Shock
  - Rain, Relative Humidity
  - Fungus Growth

❖ Other Services
- Setting-up of New Laboratory
- Quality Assurance Services
- Third Party Inspection

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ANALYTICAL SUPPORT : RUBBER, PLASTICS AND ALLIED PRODUCTS

- Black LDPE Films
- HDPE Films
- Multilayered Cross Laminated Films
- PVC/UPVC Pipes
- HDPE Pipes
- Tarpaulins
- Conveyor Belts
- Surgical Rubber Gloves
- V- Belts
- Cycle Tubes
- Tubal Rings
- Copper-T
- Latex Condoms
- PLB HDPE Ducts
- Non-percolating Fire Fighting Hose
- Decorative Thermosetting Laminate
- Rigid Cellular Foam
- Plywood Adhesives (Phenolic and Amino)
- Polymeric Bitumen Membrane
- PET Bottles
- HDPE Water Tanks
- Fiber-reinforced Composite Cylinders
- Reflective Road Stud
- Foot Rest
- Rubber Hose
- Rubber Grommet
- Geo-grid/Geo-membrane
- Polycarbonate Globe
- PVC Flooring
- Epoxy Flooring
- False Ceiling
- Water-proofing Membrane
- CPVC Sprinkler Pipe
- PPR Pipe
- FRP Pipe
- PTFE Products
- PVC Shoes
- Plastic Chairs

Analytical Parameters

❖ Physical and Mechanical

- Dimensions
- Thickness
- Density/Specific Gravity
- Bulk Density
- Resistance to Indentation
- Weight/Mass
- Tensile Strength
- Elongation at Break
- Flexural Strength
- Tear Strength (Tongue/ Elmendorf)
- Bursting Strength (Mullen Type)
- Peel Strength
- Bond Strength
- Intrinsic Viscosity
- Particle Size
- Puncture Resistance
- Adhesion Strength
- Hardness (Shore A , Shore D & IRHD)
- Indentation Hardness Index
- Melt Flow Index/Rate
- Flexing Test
- Compression Test
- Compression Set
- Izod Impact Test
- Dart Impact Test
- Abrasion (Taber)
- Heat Deflection Temperature (HDT)
- Vicat Softening Temperature (VST)
- Dimensional Stability
- Reversion
- Opacity of Pipes
- Vacuum Collapse Test
- Carbon Black Dispersion
- Thermal Conductivity
- Hydraulic Test on Pipes
- Pressure-head Test
- Water Penetration Test

❖ Chemical

- Identification of Polymers
- Chlorine Content
- Nitrogen Content
- Vinyl Chloride Monomer Content
- Moisture Content
- Volatile Content
- Ash Content and Analysis
- Sulphated Ash Content
- K-Value
- Ozone Resistance
- Water Absorption
- Plasticizer Content
- Thermo Gravimetric Analysis (TGA)
- Differential Scanning Calorimetry (DSC)
- Thermal Stability
- Carbon Black Content
- Moisture Vapor Transmission Rate (MVTR)
- Halogen Acid Gas Evaluation
- Titanium Dioxide Content
- Overall Migration
- Resistance to Chemicals
- Rubber Content
- Sulphur Content
- Heavy Metal Analysis
- Solvent Extractable Matter
- Biodegradability
- Photodegradability
- Weathering Exposure
- UV Exposure
- UL Flammability
- Limiting Oxygen Index
- Toxicity Index
- Smoke Density
- Oxidation Induction Time
- Vertical Flammability
- Horizontal Flammability

❖ Instruments

- Universal Tensile Testing Machine
- Q Sun Weather-o-Meter
- UV 2000 (Atlas)
- Sun Tester CPS (+)
- Climatic Chamber
- Toxicity Chamber
- Izod Impact Tester
- Melt Flow Indexer
- Indentation Hardness Tester
- Polarizing Microscope
- Bursting Strength Apparatus (Mullen Type)
- Elemendorf Tear Tester
- Brittleness Apparatus
- Dart Impact Tester
- Low Temperature Viscosity Bath
- Abrasion Tester
- Pressure Head Tester
- Thermal Conductivity Apparatus
- HCL Gas Generation Apparatus
- Carbon Black Content Apparatus
- Ozone Resistance Apparatus
- HDT/VST Apparatus
- Smoke Density Apparatus
- Limiting Oxygen Index Apparatus
- Oxygen Induction Time Apparatus
- Thermo Gravimetric Analyser
- Differential Scanning Calorimeter
- Flammability Apparatus (FMVS/UL)
- Impact Testers
- Atomic Absorption Spectrophotometer
- UV-Visible Spectrophotometer
- Gas Chromatographs

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SRI-TBI

Innovation Viability Competitiveness
Infrastrcutural Support Project Detailing
Prototype Development Fund Liaisoning
Specification Finalization Patentability
Process Development

Shriram Institute – Technology Business Incubator

Shriram Institute-Technology Business Incubator (SRI-TBI) has been promoted by the Department of Science & Technology (DST), Ministry of Science & Technology, Government of India to provide multi-dimensional services to entrepreneurs in the fields of Rubber & Plastics Processing, Manufacturing of Specialty Chemicals and Waste Utilization for making value added products.

SRI-TBI offers services by facilitating the process of converting knowledge-based and technology-driven innovative ideas of startup entrepreneurs into business through incubation. All types of technical assistance are provided to the incubatees during the incubation period for capability and capacity building in their areas of interest. Besides assisting new entrepreneurs, existing industries are also supported for improving their competitiveness in respect of product quality, price, output, energy input and process waste utilization.

SRI-TBI facility is equipped with state-of-the-art polymer processing equipment & analytical instruments. The services provided to the Incubatees are summarized below:

Technology Scrutiny

- Viability
- Innovation
- Competitiveness
- Patentability

Project Detailing

- Process Development.
- Specification Finalization.
- Designing and Identification of Plant and Machinery.
- Validation of Product/Process.
- Process/Product Optimization.

Prototype Development for Market Feedback

- Providing a Platform for Launching the product in the Market.
- Facilitating and Promoting the Product Through Liaisoning with Potential Buyers.
- Match Making or Facilitating Tie-ups with Prospective Partners.

Facilitating Project Funding by

- Ministry of Micro, Small & Medium Enterprises (MoMSME)
- Technology Information, Forecasting and Assessment Council (TIFAC)
- Department of Science & Technology (DST)
- Private/Public financial Institutions and Angel Investors

Infrastructural Support

- Fully Furnished Office with Dedicated Internet Facilities.
- Shared Resources like Discussion Room, Conferencing Facility, Engineering Workshop etc.
- Business Networking Support.
- Telecommunication.
- Administrative and Secretarial Support.
- Access to Pilot Scale Machinery/Equipment.

Medicines Granules Metallic Products Surgical Disposable
Gamma Irradiation Sterilisation Implants
Raw Material Ayurvedic/Herbal Research
Pharmaceuticals Needles Aluminium Caps
Containers Surgical Blades

SARC

Shriram Applied Radiation Centre

Shriram Applied Radiation Centre (SARC) was established in collaboration with Bhabha Atomic Research Centre (BARC), Board of Radiation & Isotope Technology (BRIT) and Department of Atomic Energy (DAE), Govt. of India, with the following objectives :

- To Develop, Demonstrate and Promote Gamma Radiation Processing Technology and its Diverse Applications Through Applied Research.
- For Gamma Irradiation of Surgical, Medical and Pharmaceutical Products for Sterilization.
- For Reduction of Microbial Load of Herbal/ Ayurvedic Medicines and their Ingredients.
- For Detection and Certification of Radiation Contamination of Various Commodities.

Services Available

- Sterilization of Surgical, Medical and Pharmaceutical Products.
- Irradiation of Ayurvedic Ingredients/Medicines to Reduce Bioburden.
- Irradiation of Precious and Semiprecious Stones for Enhancement of Aesthetics and Color.
- Irradiation of Various Products for Research Studies.
- Testing and Certification of Residual Radiation in Commodities.

All these services are undertaken strictly adhering to regulatory norms.

Products Commonly Processed with Gamma Radiation

Almost all medical products that are covered by the relevant drug and cosmetic regulations are commonly sterilized by gamma radiation.

- **Surgical Products:** Bandages, Dressings, Gauze Pads, Nappies, Delivery Kits etc. which are made of Cotton, Wool and Gauze. Sterilization of Surgical Sutures.
- **Metallic Products:** Surgical Blades, Needles, Implants, Aluminium Caps, Containers etc.
- **Plastic and Rubber Items:** Petri-dish, Centrifuge Tube, Blood Collection Sets, Scalp Vein Sets, Shunt Valves, Rubber Gloves, Contraceptive Devices, Gowns, Wraps, Covers, Sheets, etc.
- **Pharma Products:** Silver Sulphadiazene Cream, Gelatin Capsule, Bentonite, Charcoal, Ergot Powder, Absorbable Gelatin, Ophthalmic preparations in Paraffin Base and Oil Base, Skin Ointment in Polyethylene Glycol Base and API.
- **Ayurvedic/Herbal:** Raw Material, Medicines, Granules, Spices and Condiments.
- **Gem Stones:** Precious and Semi-precious Stones for Colour and Aesthetic Enhancement.

Gas Chromatography (GC) HS_ALS

Gas Chromatography (GC) MSMS

ICP-OES

Ion Chromatography

Particle Size Analyzer

High Performance Liquid Chromatography (HPLC)

TGA Analyzer

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ACCREDITATIONS

ISO / IEC 17025
NABET / QCI
GLP
CDSCO

CERTIFICATIONS

ISO : 9001
ISO : 13485
ISO : 11137
ISO : 14001
ISO : 45001

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