

**AMOLAKCHAND MAHAVIDYALAYA,
YAVATMAL**
**LUMINESCENT MATERIALS RESEARCH
LABORATORY**



Department of Physics – Central Instrumentation Facility
ANRF Sponsored Research Project
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LIST OF EQUIPMENTS & IT'S SPECIFICATIONS

High-Temperature Tube Furnace System (with N₂ & H₂ Generators)

1) High-Temperature Tube Furnace



Fig 1. High Temperature Tube Furnace

- **Equipment Name:** High-Temperature Tube Furnace
- **Manufacturer:** Ants Innovations Pvt. Ltd. / Ants Ceramics Pvt. Ltd.

- **Serial Number:** 2615 (Year 2026)
- **Maximum Working Temperature:** 1700⁰C
- **Electrical Specifications:** 3.5 kW, 230V AC, Single Phase, 15.0 A
- **Primary Applications:** High-Temperature solid-state synthesis, sintering, calcination, and controlled atmospheric thermal processing of materials.
- **Cost:** Rs. 10,03,000 /-

2) Nitrogen (N₂) Generator



Fig 2. Nitrogen Generator

- **Equipment Name:** High-Purity Nitrogen Generator
- **Manufacturer:** Ants Innovation Pvt. Ltd / Ants Ceramics Pvt. Ltd
- **Serial Number / Model:** 2615C (Year 2026)
- **Working Flow Rate:** 1.5 LPM (Liters Per Minute)
- **Electrical Specifications:** 230 W, 230 V AC, Single Phase, 1.0A
- **Primary Applications:** Continuous supply of inert nitrogen gas purge to prevent oxidation during high-temperature reactions.
- **Cost:** Rs. 2,11,220 /-

3) Hydrogen (H₂) Generator



Fig 3. Hydrogen Generator

- **Equipment Name:** High-Purity Hydrogen Generator
- **Manufacturer:** S T Instruments
- **Serial Number / Model:** 202602675
- **Working Flow Rate:** 300mL/min
- **Electrical Specifications:** 230 V AC
- **Primary Applications:** Continuous supply of Hydrogen gas to provide a reducing atmosphere for specialized material synthesis and reduction annealing.
- **Cost:** RS. 2,36,000 /-

4) Planetary Ball Mill



Fig 4. Planetary Ball Mill

- **Equipment Name:** Planetary Ball Mill
- **Manufacturer:** Ants Innovations Pvt. Ltd. / Ants Ceramic Pvt. Ltd.
- **Serial Number / Model:** 2615B (Year 2026)
- **Maximum Operational Speed:** 800 RPM
- **Grinding Capabilities & Achievable Particle Size:**
 - ❖ **Dry Milling:** Down to 100 nm – 500 nm (sub-micron to Nanoscale, using process control agents/intermittent grinding cycles)
 - ❖ **Wet / Colloidal Milling:** Down to < 100 nm (True Nanoparticle synthesis)
- **Electrical Specifications:** 0.75 kW (750 W), 230 V AC, Single Phase, 4.0 A
- **Control System:** Digital touchscreen interface with emergency safety stop button
- **Primary Applications:** High-energy mechanochemical synthesis, top-down nanomaterial synthesis, ultrafine particle size reduction, homogenous powder blending, and mechanochemical alloying.
- **Cost:** Rs. 8,49,600 /-

5) Laboratory Centrifuge



Fig 5. Centrifuge Machine

- **Equipment Name:** Benchtop Laboratory Centrifuge
- **Manufacturer:** REMI Elektrotechnik Limited
- **Model:** R-8C
- **Serial Number / Model:** ZLIN32803
- **Maximum Speed:** 5250 RPM
- **Electrical Specifications:** 230 V AC, 50 Hz, Single Phase, Max Current: 1.45 A
- **Control Features:** Digital speed indicator (RPM display), digital countdown timer, stepless speed regulator knob, and lid safety lock system.
- **Primary Applications:** Rapid liquid-solid separation, chemical precipitate collection, solvent washing of synthesized powders/nanomaterials, and clearing suspensions in chemical synthesis workflows.
- **Cost:** Rs. 39,837 /-

6) Muffle Furnace



Fig 6. Muffle Furnace

- **Equipment Name:** High-Temperature Muffle Furnace
- **Manufacturer:** Amaze Instruments Private Limited
- **Chamber Dimensions:** 4" x 4" x 9" (Inner Working Volume)
- **Maximum Operating Temperature:** 1150⁰C
- **Power Rating:** 30kW
- **Temperature Controller:** Microprocessor-based PID Digital Temperature Controller
- **Control Features:** Mains ON/OFF rotary switch, LED Main & Load status indicators, and real-time process value (PV) / set value (SV) digital display.
- **Primary Applications:** High-Temperature calcination, solid-state reactions, thermal treatment, and air-sintering of materials precursors and ceramic powders.
- **Cost:** Rs. 40,180 /-

7) Ultrasonic Cleaner

- **Equipment Name:** Digital Ultrasonic Cleaner (Sonic Bath)
- **Manufacturer:** EDUTEK Instrumentation
- **Control Features:** Dual digital LED displays (Temperature & Timer), digital temperature control (set °C / Actual °C), precise digital timer (Minutes & Seconds), and independent ON/OFF toggles.
- **Construction:** Heavy-duty stainless-steel tank and body with removable lid.
- **Primary Applications:** Degassing precursor solutions, dispersing nano-powders/phosphors into liquid media, accelerating wet-chemical reactions, and deep cleaning precision laboratory glassware/crucibles.

8) Digital pH Meter

- **Equipment Name:** Benchtop Digital pH Meter
- **Manufacturer:** EDUTEK Instrumentation
- **Measurement Range:** 0 to 14.00 pH
- **Control Features:** 7-segment digital LED display, manual temperature compensation knob, calibration adjustment controls, function mode selector knob, and attached electrode stand holder.
- **Primary Applications:** Precise pH measurements of aqueous chemical solutions, monitoring buffer conditions during co-precipitation /sol-gel wet chemical synthesis.

9) Digital & Analog Magnetic Stirrer with Hot Plate

- **Equipment Name:** Magnetic Stirrer with Hot Plate (2 Units)
- **Manufacturer:** EDUTEK Instrumentation
- **Model 1 (Digital PID Controlled):**
 - Microprocessor-based PID temperature controller (i-therm Px-418e)
 - Real-time PV/SV digital display
 - Separate rotary knob for precise RPM speed adjustment
 - Mains & Heater LED status indicators

- **Model 2 (Analog Energy Controlled):**
 - Stepless analog heating energy regulator knob
 - Stepless magnetic stirring speed control knob
 - Illuminated rocker switch for heater operation
- **Primary Applications:** Homogeneous solution mixing, continuous thermal stirring during sol-gel and co-precipitation chemical synthesis, controlled evaporation, and dissolving chemical precursor salts.

10) Laboratory Heating Mantle

- **Equipment Name:** Electric Heating Mantle
- **Manufacturer:** EDUTEK Instrumentation
- **Capacity / Flask size:** 500 mL
- **Power Rating:** 200 W
- **Control Features:** Integrated stepless energy regulator dial with dedicated Mains power indicator light.
- **Heating Element:** Hand-knitted flexible glass-yarn net casing to ensure uniform heat transfer to round-bottom flasks without thermal shock.
- **Primary Applications:** Uniform heating and refluxing of liquid reaction mixtures in round-bottom flasks (RBF) for organic and inorganic wet chemical synthesis.

11) Analytical Balance

- **Equipment Name:** High-Precision Micro-Analytical Balance
- **Manufacturer:** Aczel
- **Model:** CY 124
- **Maximum Capacity:** 120 gm
- **Accuracy (d):** 0.0001 gm (0.1 mg / 4 decimal places)
- **Display & Features:** Digital LCD display, dedicated Tare function, one-touch calibration key (cal/Menu), and draft shield enclosure to prevent air draft interference during weighing.
- **Primary Applications:** High-precision stoichiometric precursor weighing for solid-state reactions, micro-doping calculations, chemicals reagent preparation, and analytical sample mass determination.