

TRAINING AGENDA Advanced Characterization Techniques: Hands-on XRD and NMR Spectroscopy

Organized by: Mahatma Gandhi Ayurvigyan Vidyapeeth, Nagpur

Day 1: Fundamentals & Theoretical Background

- **09:30 AM – 10:30 AM:** Registration and Inauguration
- **10:30 AM – 11:30 AM:** Introduction to X-Ray Diffraction (XRD): Basic Principles and Applications
- **11:30 AM – 11:45 AM:** Tea Break
- **11:45 AM – 01:00 PM:** Introduction to Nuclear Magnetic Resonance (NMR) Spectroscopy
- **01:00 PM – 02:00 PM:** Lunch Break
- **02:00 PM – 04:00 PM:** Laboratory Safety Protocols: Radiation Safety & Cryogen Handling

Day 2: Sample Preparation Protocols

- **10:00 AM – 11:30 AM:** Best Practices for XRD Sample Preparation (Solid, Powder, and Thin Films)
- **11:30 AM – 11:45 AM:** Tea Break
- **11:45 AM – 01:00 PM:** Practical Demonstration: Preparing XRD Samples
- **01:00 PM – 02:00 PM:** Lunch Break
- **02:00 PM – 04:00 PM:** NMR Sample Preparation Techniques (Liquid and Solid State) and Tube Sealing

Day 3: Hands-on XRD Operation

- **10:00 AM – 11:30 AM:** XRD Instrument Setup, Optics Alignment, and Calibration
- **11:30 AM – 11:45 AM:** Tea Break
- **11:45 AM – 01:00 PM:** Hands-on Data Acquisition & Phase Identification
- **01:00 PM – 02:00 PM:** Lunch Break
- **02:00 PM – 04:00 PM:** Crystal Structure Analysis and Powder Diffraction Measurements

Day 4: Hands-on NMR Spectroscopy

- **10:00 AM – 11:30 AM:** NMR Instrument Setup, Tuning, and Matching
- **11:30 AM – 11:45 AM:** Tea Break
- **11:45 AM – 01:00 PM:** Hands-on: 1D NMR (¹H, ¹³C) Spectra Acquisition
- **01:00 PM – 02:00 PM:** Lunch Break
- **02:00 PM – 04:00 PM:** Advanced Techniques: 2D NMR and Pulse Sequence Optimization

Day 5: Data Analysis & Valedictory

- **10:00 AM – 11:30 AM:** Data Processing & Spectral Analysis (Peak fitting, Software Handling)
- **11:30 AM – 11:45 AM:** Tea Break

- **11:45 AM – 01:00 PM:** Case Studies, Troubleshooting, and Q&A Session
- **01:00 PM – 02:00 PM:** Lunch Break
- **02:00 PM – 03:30 PM:** Feedback, Valedictory Session, and Certificate Distribution