



Shri Pragya Mahavidyalaya

Post Graduate College of Science, Technology, Management, Arts & Commerce

Pragya Road, Bijainagar - 305624 Distt.-Ajmer, Rajasthan, India

Email : info@pragyacollege.com, Website : www.pragyacollege.com

Ph. : 091-1462-230101, 9587888125, 126

NOTICE

Add On Course

Exploring Transition Metal Chemistry: From Bonding to Properties

Explore the dynamics of transition metal complexes in this course. Learn reaction mechanisms, metal-ligand bonding, electronic spectra, and magnetic properties in concise modules.

Course Details

Date – 1st December 2022 to 15th January 2023

Timings – 14:00 PM to 15:00 PM

Course Coordinator – Suresh Kumar Joshi

Venue – Room No. 111, Shri Pragya Mahavidyalaya, Pragya Road, Bijainagar (Ajmer)

Enrol now in our comprehensive course on transition metal chemistry to deepen your understanding of complex reactions and properties."



Director

Shri Pragya Mahavidyalaya
Bijainagar-305624

Director

Copy to: -

1. President and Secretary, Shri Pragya Jain Smarak Samiti
2. President and Secretary, Shri Pragya Mahavidyalaya
3. All Head of the Department's
4. IQAC



Director

Shri Pragya Mahavidyalaya
Bijainagar-305624



Shri Pragya Mahavidyalaya



Add On Course - "Exploring Transition Metal Chemistry: From Bonding to Properties"

Explore the fascinating realm of transition metal chemistry in this comprehensive course covering reaction mechanisms, metal-ligand bonding, electronic spectra, and magnetic properties. Delve into the intricacies of transition metal complex formation and transformation, learn about the fundamental principles of metal-ligand bonding, decipher the electronic spectra responsible for vibrant colors, and unravel the magnetic properties exhibited by these compounds. Gain a deep understanding of the diverse reactivity and properties of transition metal complexes, preparing you to analyze and manipulate these compounds with precision and insight.

Learning Outcomes

- Understand the fundamental reaction mechanisms involved in the formation and transformation of transition metal complexes, including ligand substitution, oxidative addition, and reductive elimination reactions.
- Analyze the intricate metal-ligand bonding interactions in transition metal complexes, exploring coordination number, ligand field theory, and the influence of ligand geometry on reactivity.
- Interpret electronic spectra of transition metal complexes through ligand field theory and crystal field theory, gaining insight into the origins of their vibrant colors.
- Explore the magnetic properties of transition metal complexes, including spin states, magnetic susceptibility, and factors influencing magnetic interactions within coordination compounds.
- Develop the skills to apply theoretical principles to practical scenarios, enabling the analysis and manipulation of transition metal complexes with precision and insight.

For UG and PG Students (Science Stream)

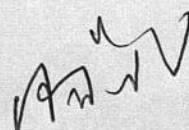
**Classes will commence from 1st December 2022 to 15 January 2023
at:**

Room No 111

Shri Pragya Mahavidyalaya

Pragya Road, Bijainagar

Course Coordinator - Suresh Kumar Joshi


Director

**Shri Pragya Mahavidyalaya
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Report on Certification Course- "*Exploring Transition Metal Chemistry: From Bonding to Properties*"

Duration: 30 Hours

Date: 1st December 2022 – 15th January 2023

Timings: 14:00 PM to 15:00 PM

Instructor: Suresh Kumar Joshi

Institution: Shri Pragya Mahavidyalaya

Introduction

A comprehensive certification course titled "*Exploring Transition Metal Chemistry: From Bonding to Properties*" was conducted at Shri Pragya Mahavidyalaya from 1st December 2022 to 15th January 2023. The course was designed to provide students with a deep understanding of critical concepts in inorganic chemistry, particularly focusing on the reaction mechanisms and electronic spectra of transition metal complexes.

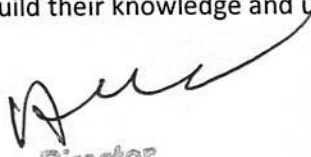
The course was delivered by Assistant Professor **Suresh Kumar Joshi**, an esteemed faculty member known for his expertise in inorganic chemistry. His contributions to the course were instrumental in ensuring a high level of academic rigor and practical relevance.

Course Structure

The course was divided into two main blocks, each focusing on essential aspects of transition metal chemistry:

- 1. Block I: Reaction Mechanism**
 - **Week 1 (6 hours):** Introduction to Reaction Mechanisms of Transition Metal Complexes
 - **Week 2 (6 hours):** Advanced Reaction Mechanisms of Transition Metal Complexes
- 2. Block II: Electronic Spectra**
 - **Week 3 (6 hours):** Metal-Ligand Bonding
 - **Week 4 (6 hours):** Electronic Spectra of Transition Metal Complexes
 - **Week 5 (6 hours):** Magnetic Properties of Transition Metal Complexes

The course was structured to be completed over 30 hours, with each week dedicated to a specific unit. This structure allowed students to progressively build their knowledge and understanding of the subject matter.


Director
Shri Pragya Mahavidyalaya
Bijainagar-305624

Permitted
A.M.J.



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Course Content and Delivery

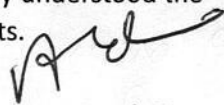
Under the expert guidance of Assistant Professor Suresh Kumar Joshi, the course covered the following key topics:

- **Week 1:** An introduction to reaction mechanisms in transition metal complexes, focusing on associative and dissociative pathways and their roles in various chemical reactions.
- **Week 2:** Exploration of advanced mechanisms, including ligand substitution reactions, electron transfer processes, and factors influencing the reactivity of transition metal complexes.
- **Week 3:** A detailed study of metal-ligand bonding, including crystal field theory, ligand field theory, and the impact of different types of ligands on bonding.
- **Week 4:** Analysis of electronic spectra, with emphasis on the interpretation of d-d transitions, selection rules, and the influence of ligand field strength on spectral characteristics.
- **Week 5:** Examination of the magnetic properties of transition metal complexes, covering calculations of magnetic moments, spin states, and the magnetic behaviour of various complexes.

Teaching Contributions by Suresh Kumar Joshi

Suresh Kumar Joshi's contributions to this course were invaluable. His extensive knowledge and experience in inorganic chemistry provided students with a solid foundation in both theoretical and practical aspects of the subject. Suresh Kumar Joshi was highly praised for his:

- **Clear and Concise Explanations:** Students appreciated Suresh Kumar Joshi's ability to break down complex concepts into understandable components, making the learning process more effective.
- **Engagement with Students:** Suresh Kumar Joshi encouraged active participation, fostering an interactive learning environment where students felt comfortable asking questions and discussing topics in depth.
- **Commitment to Student Success:** Suresh Kumar Joshi's dedication to his students was evident in the time and effort he invested in ensuring that each student fully understood the material. His approachable nature made him a favourite among the students.


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Student Feedback

The feedback from students who participated in the course was overwhelmingly positive. Key highlights from their feedback include:

- **Comprehensive Curriculum:** Students found the course content to be thorough and well-structured, providing a balanced mix of theory and practical application.
- **Effective Teaching:** Suresh Kumar Joshi's teaching style was highly regarded, with students praising his ability to make complex topics accessible and engaging.
- **Practical Relevance:** The course's focus on real-world applications of theoretical concepts was particularly appreciated, as it helped students see the relevance of their studies to future academic and professional pursuits.

Conclusion

The certification course on was a significant success, owing much to the expertise and dedication of Suresh Kumar Joshi. The course not only met but exceeded its objective of equipping students with a deep understanding of key concepts in inorganic chemistry.

We extend our sincere thanks to Suresh Kumar Joshi for his exceptional contribution to this course and look forward to more such enriching educational offerings at Shri Pragma Mahavidyalaya.

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Syllabus-

Exploring Transition Metal Chemistry: From Bonding to Properties

Week 1:

- Unit 1: Introduction to reaction mechanisms of transition metal complexes
- Basic concepts: coordination number, ligands, metal oxidation states
- Mechanistic pathways: associative, dissociative, interchange, inner-sphere, outer-sphere mechanisms

Week 2:

- Unit 2: Advanced reaction mechanisms of transition metal complexes
- Ligand substitution reactions: associative and dissociative mechanisms
- Electron transfer processes: outer-sphere and inner-sphere mechanisms
- Labile and inert complexes: factors influencing reaction mechanisms

Week 3:

- Unit 3: Understanding metal-ligand bonding in transition metal complexes
- Types of ligands: σ -donors, π -donors, σ -acceptors
- Crystal field theory: splitting of d-orbitals in octahedral, tetrahedral, and square planar complexes
- Ligand field theory: covalent and ionic contributions to metal-ligand bonding

Week 4:

- Unit 4: Exploring electronic spectra of transition metal complexes
- Absorption spectroscopy: UV-Vis spectra of d-d transitions
- Selection rules: Laporte and spin selection rules
- Interpretation of spectra: ligand field strength, metal oxidation state, coordination geometry

Week 5:

- Unit 5: Investigating magnetic properties of transition metal complexes
- Magnetic moment: calculation and interpretation using spin-only formula
- Spin states: high-spin, low-spin configurations
- Magnetic susceptibility: diamagnetic, paramagnetic, and ferromagnetic behaviours

Note:- Every Week Consists of 6 Hours of Learning and Course will be of 5 Weeks.


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Reference No. 145-A

Date: 15-November-2022

To,
The Director,
Shri Pragya Mahavidyalaya,

Subject: Request for Approval to Initiate a Certification Course in the Chemistry Department

Respected Sir,

I am writing to request your formal approval for the introduction of a new 30-hour course titled "*Exploring Transition Metal Chemistry: From Bonding to Properties*" within the Chemistry Department at Shri Pragya Mahavidyalaya. This course is intended to provide students with an advanced understanding of the reaction mechanisms and electronic spectra associated with transition metal complexes.

The course is structured to cover key topics over five weeks, with a total of 30 instructional hours. This format is designed to offer a balanced and thorough exploration of the subject matter.

Course Structure:

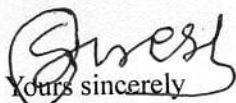
- **Week 1-** Reaction Mechanisms of Transition Metal Complexes - I (6 hours)
- **Week 2-** Reaction Mechanisms of Transition Metal Complexes - II (6 hours)
- **Week 3-** Metal-Ligand Bonding (6 hours)
- **Week 4-** Electronic Spectra of Transition Metal Complexes (6 hours)
- **Week 5-** Magnetic Properties of Transition Metal Complexes (6 hours)

The course is designed to be both comprehensive and engaging, ensuring that students acquire a solid foundation in the subject. It will include lectures, discussions, and practical examples to enhance understanding.

I believe this course will be a significant addition to our chemistry curriculum and will greatly benefit our students by broadening their knowledge and analytical skills.

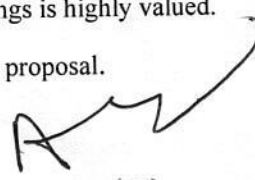
I kindly request your approval to commence this course in the upcoming month of December. Your support in expanding our academic offerings is highly valued.

Thank you for considering this proposal.


Yours sincerely

Suresh Kumar Joshi
Assistant professor

Department of Chemistry


Director
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