

## Introduction to Dynamic Spin Chemistry:Magnetic Field Effects on Chemical and Biochemical Reactions: 8 (World Scientific Lecture and Course Notes in Chemistry)

Hisaharu Hayashi

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This book presents a detailed account of one of the most mysterious problems in science — whether ordinary magnetic fields can exert an appreciable influence on chemical and biochemical reactions. The first aim of the book is to introduce this research, through theoretical and dynamic spin chemistry, to graduate students and researchers, by means of detailed theoretical and experimental descriptions. The second aim is to review typical recent investigations, which will stimulate new interest and applications in the 21st century. Because dynamic spin chemistry is based on established science, it is expected to provide a guide for all situations in which radicals, radical pairs, and higher spin species occur, including the effects of environmental electromagnetic fields on the human body.

#### **Contents:**

- Magnetic Properties of Electron and Nuclear Spins
- Introduction to Electron Spin Resonance and Nuclear Magnetic Resonance
- The Radical Pair Mechanism
- Chemically Induced Dynamic Nuclear Polarization (CIDNP)
- Chemically Induced Dynamic Electron Polarization (CIDEP)
- Magnetic Field Effects Upon Chemical Reactions Due to the Radical Pair Mechanism (RPM)
- Magnetic Field Effects Due to the Relaxation Mechanism
- Magnetic Field Effects on Chemical Reactions through Biradicals
- Magnetic Isotope Effects (MIEs)
- Triplet Mechanism (TM)
- Theoretical Analysis with the Stochastic Liouville Equation
- Effects of Ultra-High Magnetic Fields Upon Chemical Reactions
- Effects of Magnetic Fields of High Spin Species
- Optical Detected ESR and Reaction Yield Detected ESR
- Magnetic Field Effects Upon Biochemical Reactions and Biological Processes

**Readership:** Graduate students, researchers and industrialists in chemistry, physics and biology.



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