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Editorial Note on Photo Chemistry

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EDITIORIAL

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EDITIORIAL

Photochemistry is a discipline of chemistry that studies the chemical effects of light. The absorption of UV (wavelengths between 100 and 400 nm), visible light (400–750 nm), or infrared radiation (750–2500 nm) radiation causes a chemical reaction. Photochemistry is crucial in nature since it is required for photosynthesis, eyesight and the production of vitamin D from sunshine. How photochemical reactions work differs from how temperature-driven reactions work. Photochemical routes get access to high-energy intermediates that cannot be created thermally, allowing reactions that would normally be inaccessible by thermal processes to overcome major activation barriers quickly. Photochemical breakdown of polymers is a good example of how dangerous photochemistry can be.

The field of synthetic chemistry is being conquered by photochemistry. Okay, that's a stretch. Photochemistry is fascinating and helpful for creating essential and novel molecules in ways that are easier, safer, or impossible to achieve using typical thermal techniques. That's a lot better. For our purposes, we're talking about visible light photoredox catalysis, which refers to catalytic processes that are triggered by visible light in some way. It's difficult to read a chemical publication these days without coming across many new methods that use visible light as the primary reagent in a chemical reaction. Perhaps you thought it was a fad, like microwaves (we joke), or perhaps you just like your oil bath (weird). You are, however, missing out if you have never slipped on a pair of trendy orange spectacles, switched on a bright blue LED and directed it at a reaction flask. Photochemistry will provide you with hours of pleasure as well as millions of dollars (most likely not). In all seriousness, this three-part course is designed to familiarise you with the fundamentals of photochemistry and give you with all you need to get started.

The heat produced in thermal processes is spread evenly across all molecules. Heat causes an increase in the number of collisions between reactant molecules and container walls. As a result, molecular vibrations increase. Rotational, vibrational and electronic energy levels exist in molecules. Only vibrational and rotational levels are excited by this absorbed heat energy. Because the energy levels of the electronic levels are so far apart (as seen in the diagram below), thermal energy doesn't usually cause electronic excitation. Heat causes an increase in the number of collisions between reactant molecules and container walls.

The word "photochemistry" refers to the study of reactions triggered by infrared, visible and ultraviolet light. Radiation chemistry is concerned with a wide range of reactions caused by high-energy radiations such as,,,, cyclotron, X-rays, or corpuscular beams such as neutrons, protons, or -particles, among others.

Photochemistry is a subset of radiation chemistry that deals with low-energy radiation in the ultraviolet, visible and infrared ranges. We will only address reactions that employ UV, visible, or infrared light to transform reactants to products in our talks on photochemistry.