

# Pulse radiolysis as a tool for studying azobenzene derivatives isomerization initiated by ionizing radiation

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In our study, we explore the use of azobenzene as a platform for the synthesis of theranostic prodrugs. The therapeutic efficacy of these prodrugs is primarily attributed to the differential toxicity between trans and cis isomers. Notably, the trans form, which is thermodynamically more stable, exhibits greater toxicity and can be induced from the less toxic cis form via ionizing radiation, which opens perspectives to improve radiotherapy outcomes.[1]

Despite its potential, the detailed mechanism of azobenzene isomerization upon exposure to ionizing radiation has only begun to be unraveled. Our preliminary findings have illuminated the impact of  $\bullet\text{OH}$  radicals and proposed a chain reaction mechanism, yet these hypotheses have not been experimentally verified. Our current understanding, largely based on electrochemical studies, [2] and the limited insights from radiation chemistry, [3] underscore the necessity for a comprehensive exploration of this mechanism. In particular, there is a critical need to identify and understand the roles of intermediate radical species and how structural modifications could enhance activation of this types of prodrugs under radiation.

Addressing this knowledge gap, our research employs the pulse radiolysis technique, utilizing an 8 MeV, 10 ps electron beam, to investigate the transient radicals of azobenzene derivatives under various conditions to decipher mechanism of isomerization.

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