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**IMPACT OF CATALYTIC ROUTES ON THE SYNTHESIS OF COMPLEX
NATURAL PRODUCTS**

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ABSTRACT

The impact of catalytic routes on the synthesis of complex natural products has revolutionized organic chemistry, particularly in drug discovery, material science, and agrochemical development. Catalysis, whether through transition metals, organocatalysts, or biocatalysts, offers selective, efficient, and sustainable pathways for constructing intricate molecular architectures that are often found in natural products. Complex natural products typically feature multiple stereocenters, functional groups, and structural motifs, which require precise control over reaction mechanisms. Catalytic routes enable chemists to achieve regioselectivity and stereoselectivity, allowing for the construction of highly specific configurations with minimal side reactions. This is crucial for synthesizing biologically active molecules, where even slight variations in stereochemistry can drastically alter the pharmacological properties. Moreover, catalytic processes often streamline multi-step reactions, reducing the number of intermediates and purifications needed, which is particularly beneficial for the synthesis of large, complex molecules. The use of green catalytic approaches also minimizes the environmental footprint by reducing waste and energy consumption.