The Torch
Vol. 2 (25)

Fluorine: An emerging compound in medicinal chemistry

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Fluorine is considered a unique atom due to its small size as well as high electronegative property. In medicinal chemistry, these properties are advantageous as it was observed that on the introduction of fluorine to a biologically active compound, it alters the pharmacological effects of the compound. It functions by enhancing the metabolic stability, membrane permeability, intrinsic property and ionisation potential of the compound. Fluorinated drug molecules also help in increasing the binding affinity to target the proteins and thereby, the bioavailability and membrane permeation of the compound. Out of all isotopes of fluorine, 18F has been established as a useful positron, and is used as a radiolabelled tracer atom in nuclear medicine and various imaging techniques. The newly discovered fluorine substituted compounds alter the impact of the drug molecules depending on the positioning of the fluorine substituent. It may increase or decrease biotransformation depending on electrophilic or nucleophilic attack and inductive or resonance effect. The factors which increase or decrease the stability affect the medical strength of the target compounds. Many fluorinated compounds have been synthesised for use as anticancer agents, antidepressants and anti-inflammatory agents. Fluorine plays a significant role in drug design and development, hence it needs to be researched more extensively for the development of new synthetic compounds to treat diseases that are incurable.

Keywords: Fluorine, Medicinal chemistry, Pharmacology, Drug development, Metabolic stability

Citation:
Tavleen Kaur Maidh. Fluorine: An emerging compound in medicinal chemistry. The Torch. 2021. 2(25). Available from: https://www.styvalley.com/pub/magazines/torch/read/fluorine-an-emerging-compound-in-medicinal-chemistry.