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HETEROCYCLIC COMPOUNDS

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ABSTRACT

A heterocyclic compound or ring structure is a cyclic compound that has atoms of at least two different elements as members of its rings. Heterocyclic chemistry is the branch of organic chemistry dealing with the synthesis, properties, and applications of these heterocycles. I have selected 5 compounds for this reasearch purpose. Heterocyclic compounds & it's importance shortly introduced.
Key words: *Synthesis ,Indole,Isoindole, Quinoline: Isoquinoline,Benzofuran etc.*

INTRODUCTION

The proposed research work attempts to Synthsis of Heterocyclic compounds & it's biological activity. A heterocyclic compound or ring structure is a cyclic compound that has atoms of at least two different elements as members of its rings. Heterocyclic chemistry is the branch organic chemistry dealing with the synthesis, properties, and applications of these heterocycles. Examples of heterocyclic compounds include all of the nucleic acids, the majority of drugs, most biomass (cellulose and related materials), and many natural and synthetic dyes. More than half of known compounds are heterocycles.59% of US FDA-approved drugs contain nitrogen heterocycles. Heterocyclic compounds are pervasive in many areas of life sciences and technology. Many drugs are heterocyclic compounds.

They may be cyclic or non cyclic in nature. Heterocyclic compounds have a wide range of application. They are predominantly used as pharmaceuticals, as agrochemicals and as veterinary products. They also find applications as sanitizers, developers, antioxidants, as corrosion inhibitors, as copolymers, dye stuff.

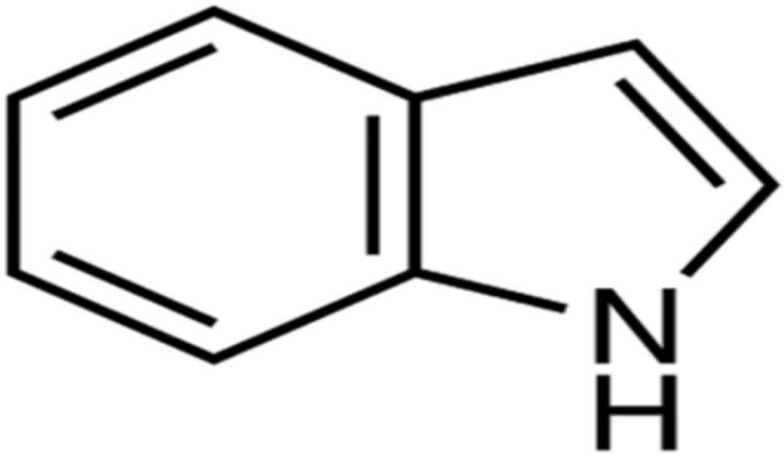
The average number of nitrogen atoms per drug, being around 2.3, while in those containing a nitrogen heterocycle an increase to 3.1 nitrogen atoms per drug is evidenced. Ultimately, the structure dynamics involved in nitrogen-based heterocycles (and other classes of heterocycles), alongside with fundamental aspects such as ring size and aromaticity, translates into a vast array of chemical structures by which their molecular mechanisms of action can vary significantly [2,5,14]. Indoles and indole derivatives for instance comprehend one of the most versatile and common nitrogen-based heterocyclic like fragments that are frequently used in the synthesis of fundamental FDA approved drugs for common pathological conditions, ranking in the ninth position of the top 25 most frequent nitrogen heterocycles among the U.S. FDA approved drugs .

The transformations of organic compounds belong to one of the following two broad categories: car-bon–carbon bond-forming reactions and redox processes. Over the years, remarkable progress has been achieved in design and applications of novel metal-based complexes in oxidation chemistry. The metal center of such a catalyst is surrounded by a ligand, which resembles and emulates the function of the enzyme active site. This strategy is known to adequately address the issues of regio-, chemo-, and stereo selectivity in a number of synthetic transformations. The use of nitrogen-based oxidants allows for oxidation-driven nitrogen transfer, which is unprecedented in Nature. Because of the fundamental role of electron transfer in redox processes, we recently became interested in developing an electro-chemical understanding of oxidative atom-transfer reactions.
The ultimate goal is to find general and practical electrochemical solutions to the selective functionalization of hydrocarbons. Development of such understanding may lead to optimal processes with regard to the nature of stoichiometric oxidants. Understanding ways of electrochemical generation of highly reactive atom-transfer species would be of particular interest.

1. Indole:

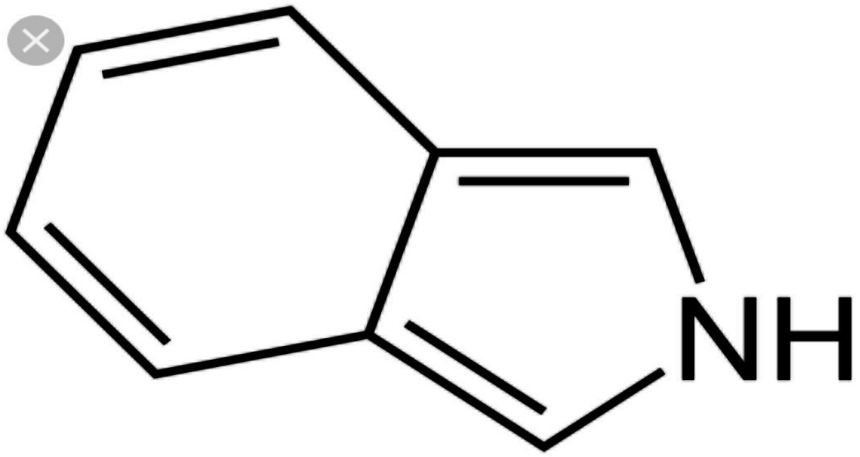
Indole is an aromatic heterocyclic organic compound with formula C8H7N. It has a bicyclic structure, consisting of a six-membered benzene ring fused to a five-membered pyrrole ring. Indole is widely distributed in the natural environment and can be produced by a variety of bacteria. As an intercellular signal molecule, indole regulates various aspects of bacterial physiology, including spore formation, plasmid stability, resistance to drugs, biofilm formation, and virulence. The amino acid tryptophan is an indole derivative and the precursor of the neurotransmitter serotonin.

Indole can be synthesized, however, using the Fischer indole synthesis by reacting phenyl hydrazine with pyruvic acid followed by decarboxylation of the formed indole-2-carboxylic acid. This has also been accomplished in a one-pot synthesis using microwave irradiation.



2. Isoindole:

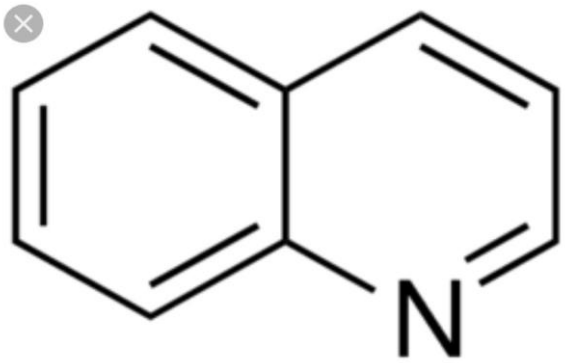
Isoindole in heterocyclic chemistry is a benzo-fused pyrrole. The compound is an isomer of indole. Its reduced form is isoindoline. The parent isoindole is a rarely encountered in the technical literature, but substituted derivatives are useful commercially and occur naturally. Isoindoles units occur in phthalocyanines, an important family of dyes. Some alkaloids containing isoindole have been isolated and characterized. The parent isoindole was prepared by flash vacuum pyrolysis of an N-substituted isoindoline. N-Substituted isoindoles, which are easier to handle, can be prepared by dehydration of isoindoline-N-oxides. They also arise



by myriad other methods, e.g., starting from xylylene dibromide (C6H4(CH2Br)

3. **Quinoline:**

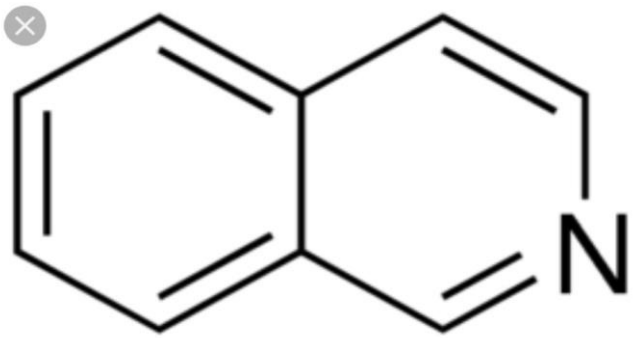
Quinoline discovered by Friedlieb Ferdinand Runge in (1834) .The Skraup synthesis is a chemical reaction used to synthesize quinolines. It is named after the Czech chemist Zdenko Hans Skraup (1850-1910). In the archetypal Skraup reaction, aniline is heated with sulfuric



acid, glycerol, and an oxidizing agent such as nitrobenzene to yield quinoline

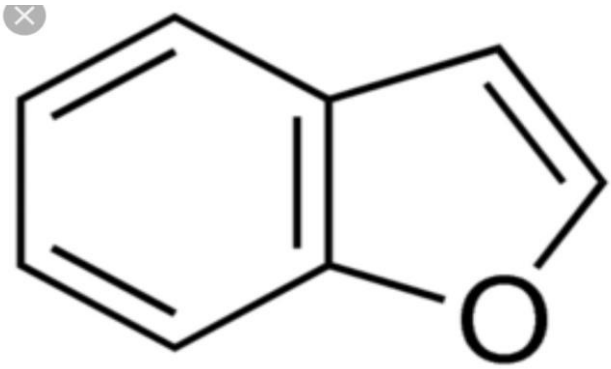
4. Isoquinoline:

Isoquinoline is a heterocyclic aromatic organic compound. It is a structural isomer of quinoline. Isoquinoline and quinoline are benzopyridines, which are composed of a benzene ring fused to a pyridine ring. In a broader sense, the term isoquinoline is used to make reference to isoquinoline derivatives. 1-Benzylisoquinoline is the structural backbone in naturally occurring alkaloids including papaverine. The isoquinoline ring in these natural compound derives from the aromatic amino acid tyrosine.



5. Benzofuran:

Benzofuran is the heterocyclic compound consisting of fused benzene and furan rings. This colourless liquid is a component of coal tar. Benzofuran is the "parent" of many related compounds with more complex structures. For example, psoralen is a benzofuran derivative that occurs in several plants.



CONCLUSION:

Heterocycles are chemically more flexible and structurally more rigid to respond to the many demands of biochemical systems. Analogies to the roles of other classes of organic compounds are easily found. In fact, dyes, luminophores, pesticides and drugs do not have to be heterocyclic in structure.

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