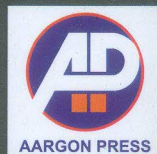


Environmental and Medicinal Chemistry

Experimental Design and Applications

Part II

Abdul Rahman Khan, Firoj Hassan
Darakshan Bano, Nafees Ahmad
Minaxi Bsant Lohani



Environmental and Medicinal Chemistry
Experimental Design and Applications
(Part-II)

Editors

Abdul Rahman Khan

Firoj Hassan

Darakshan Bano

Nafees Ahmad

Minaxi Bsant Lohani

Integral University, Lucknow (U.P) INDIA



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Abdul Rahman Khan, Firoj Hassan, Darakshan Bano, Nafees Ahmad and Minaxi Bsant Lohani

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NUTRITIONAL ANALYSIS OF DIFFERENT FLOURS

Kaushal Mishra, Mohammad Azam, Minaxi B. Lohani*

Department of Chemistry, Integral University, Lucknow

* minaxi@iul.ac.in

ABSTRACT

A nutrient is a food component that an organisms use to survive and grow. There are seven major classes of nutrients; carbohydrates, dietary fiber, fats, mineral, protein, vitamins, and water. The aim of work over here was to determine the percentage of carbohydrate content, fat content, protein content along with moisture and ash content of wheat flour, gram flour (Besan), fine wheat flour (Maida), millet flour and rice flour. From the percentage of food constituents the energy values of the flours have been calculated.

Keywords: Nutrient, flour, content, percentage, energy value

INTRODUCTION

Nutrition

Nutrition is the provision to cells and organism of the material necessary as food to support life. Healthy diet helps in prevention of many health problems. The diet of an organism is something edible which is largely determined by the availability, the processing and palatability of foods [1]. A healthy diet includes preparation, processing of food and storage methods that preserve nutrients from oxidation, heat or leaching, and that diminish risk of food borne illness [2].

Nutrients

A nutrient is a food component that an organism uses to survive and grow. There are seven major classes of nutrients; carbohydrates, dietary fiber, fats, mineral, protein, vitamins and water. These nutrient classes can be categorized as either macronutrient which provides the bulk energy an organism's metabolic system needs to function and the micronutrients provide the necessary cofactors for metabolic activities [3]. Carbohydrates and proteins provide 4 kcal/g each and fats provide 9kcal/g though the net energy form either depends on such factors as absorption and digestive effort, which vary substantially from instance to instance [4].

ISATIN-AZOLE AS POTENTIAL ANTI-INFECTIVE AGENTS

Malik Nasibullah*, Alina Fatima Shaik

Department of Chemistry, Integral University, Lucknow-226026 INDIA

*malik@iul.ac.in

ABSTRACT

The adaptational behaviour of drug-resistance in bacteria is putting a grave threat to human life, arousing the urgent need to develop novel and potent antibacterial drug candidates with elevated effectiveness. A potential weapon applied to tackle the drug resistance can be hybridization of different pharmacophores from multiple bioactive substances into a single molecule as this strategy can provide new leads with complimentary activities and various pharmacological targets. During the course of past few years, various isatin derivatives have been screened for their pharmacological properties and occupy a prominent place in the development of novel drugs. Indole/isatin- containing hybrids are privileged scaffolds for the discovery of novel antibacterial candidates as they are proven to be effective against a panel of clinically significant Gram- positive and Gram- negative bacteria. This review shelters the recent advances of isatin derivatives which serve as potential anti-bacterial agents including isatin-azole, isatin-quinoline/quinolone, isatin-furan/coumarin, isatin-hydrazone/(thio)semicarbazone, isatin dimers and isatin-indole hybrids. The enhanced structure-activity relationship (SAR) may pave the way for further rational advancement of isatin derivatives with wider spectrum, higher potency, lower toxicity and several mechanisms of action.

Keywords: isatin/indole, hybrid compounds, antibacterial, drug resistance, structure-activity relationship (SAR)

INTRODUCTION

Bacterial infections account for the majority of community-acquired and hospital acquired infections. Gram-positive (such as *Staphylococcus aureus/S.aureus*, *Staphylococcus epidermidis/S. epidermidis*, *Streptococcus pneumoniae/S.pneumoniae*, *Bacillus subtilis/B. subtilis*, *Enterococcus faecalis/E. faecalis* and *Enterococcus faecium/E. faecium*) and Gram-negative (such as *Escherichia coli/E.coli* and *Pseudomonas aeruginosa/P. aeruginosa*) pathogens[1-2], responsible for the bacterial infections cause diseases such as lower respiratory tract infections, urinary tract infections, some skin, bone and soft tissue infections,

ASSESSMENT OF PARTICULATE CONTAMINATION IN THE SELECTED EDUCATIONAL INSTITUTION

Naseem Ahamd, Tahmeena Khan, Zaid Rais, Abdul Rahman Khan

Department of Chemistry, Integral University, Lucknow, 226026, India

*naseem@iul.ac.in

ABSTRACT

Seven million people are killed every year by Air pollution around the world. The data of World Health Organization (WHO) shows that nine out of ten people inhale air which contains high level of pollutants. WHO works with other countries to detect air pollution and enhance air quality; the smog in the cities or the smoke due to household work causes a major warning to health and climate. Indoor air contamination has become progressively clear and demonstrates that the openness to debased indoor air may not exclusively be undesirable, yet can have genuine unfriendly wellbeing impacts on all humankind. It is very important to know the quality of the air we breathe in our indoor settings, like classrooms, offices. In this present study, the PM₁₀ and PM_{2.5} concentrations were monitored in a university campus both in indoor and outdoor environment. The concentrations were compared with standard limits to know their impact on the health and well being of the students.

Keywords: Particulate matter, indoor, pollution

INTRODUCTION

In Compliance with the CPCB (Central Pollution Control Board), particulate matter (PM) is determined by estimating encompassing groupings of PM at checking destinations. As to the wellbeing impacts of air contamination, the dangers rely upon individual openness that is, the openings got by individuals in the different explicit spots, conceptualized as microenvironments, where they invest energy. Complete individual openness addresses the time-weighted normal of molecule focuses in the microenvironments where individuals invest their energy. Openings to particles created by open air sources happen outside as well as in indoor conditions where the particles infiltrate. Indoor molecule sources, for example, cigarette smoking, along these lines could contribute considerably to add up to individual openness to particles. Indoor air contamination has become progressively clear and shows that the openness to debased indoor air may not exclusively be horrendous, however can have

SYNTHESIS AND BIOLOGICAL ACTIVITY OF ISATIN-SCHIFF BASE

Firoj hassan^{1*}, Mohammad Faiz¹, Mohammad Hamza¹, Abdul Rahman Khan¹

Department of Chemistry, Integral University, Dasauli, kursi Road, Lucknow-226026

*firoz@iul.ac.in

INTRODUCTION

Heterocyclic compounds are an important class of organic compounds having varied biological and pharmacological properties. [1,2] Isatin (1H-indole-2,3-dione), also known as indenedione and indole quinone, is one such biologically active heterocyclic moiety. It has a nitrogen atom at position 1 and two carbonyl groups at positions 2 and 3. It comprises two cyclic rings, one of which is six-membered and the other is five-membered. Both the rings are planar. The six membered rings have aromatic character, whereas the five membered rings possess anti-aromatic character.

Isatin is a natural product found in plants of the genus *Isatis* [3] that was first obtained by Erdmann [4] and Laurent [5] in 1840 as a product from the oxidation of indigo dye by nitric acid and chromic acid. Substituted isatin analogues constitute valuable building blocks for potential pharmaceuticals with a wide range of biological properties such as antimicrobial,[6] antitumor, [7,10] antitubercular, [11,12] antimalaria,[13] anti-HIV,[14] and antibacterial.[15]

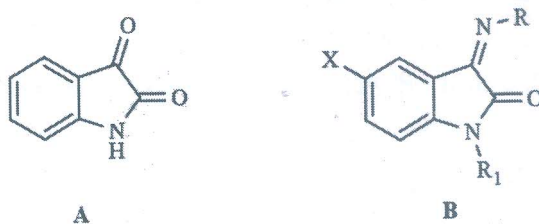


Figure 18. General structure of A. Isatin; B. Isatin-Schiff-base

Nowadays, the research field dealing with Schiff base coordination chemistry has expanded enormously. The importance of Schiff base complexes for bioinorganic chemistry, biomedical applications, supramolecular chemistry, catalysis and material science, separation and encapsulation processes, and formation of compounds with unusual properties and structures has been well recognized and reviewed. They also serve as a back bone for the synthesis of various heterocyclic compounds. Schiff bases have been utilized as synthons in the preparation of a number of industrial and biologically active compounds like formazans,

ANALYSIS OF GROUND WATER QUALITY IN FOUR DIFFERENT REGIONS OF LUCKNOW FOR DRINKING PURPOSE

Saimah Khan* and Shumaila Mumtaz Khan

Department of Chemistry, Integral University, Lucknow, India

*saimah@iul.ac.in

ABSTRACT

The two most important criteria for the healthy life of human being at this moment are the adequate supply of drinking water with safety in its quality because without water life is not sustainable on earth. Primarily the ground water was safe to drink but after the time was passed it became polluted due to huge discharge of untreated industrial effluent and other human activities. Polluted water is mostly responsible for diseases like hepatitis, jaundice, typhoid dysentery and diarrhoea etc. Surface water and Groundwater both are the source of drinking water in the Lucknow city, the capital of Uttar Pradesh. The aim of this study is to know the current situation of ground water quality of Lucknow city. In this study 4 stations at Lucknow city (two urban and two rural) have been selected for collecting groundwater samples and comprehensive physio-chemical analysis was conducted. Physico-chemical Parameters like temperature, turbidity, conductivity, TDS, chloride, fluoride, total hardness, alkalinity, nitrate and phosphate were measured according to the standard method. The results were compared with IS drinking water standard 1050 and observed that most of parameters at all sampling stations were found within acceptable limits while few parameters like TDS, total hardness and alkalinity were found higher than standard limit in some regions.

INTRODUCTION

In today's world, the main problem the society experience is of environmental pollution and especially the contamination of water sources. The industrialization, urbanization, the increase in traffic and the agricultural modernization, contribute to global pollution. Therefore, it is needed to provide information about the quality of water resources. In developing countries about 80% of water pollution is due to domestic waste, as reported by World Health Organization (WHO). Moreover, the availability and quality of water can be affected by inadequate management of water systems [1]. In the last decades, the contamination of ground water resources reported that increased the concern of public for quality of drinking water [2]. Damaged water supply systems can provide ways to accumulated sewage. Thus, the additional

HPLC AN EFFECTIVE TOOL FOR IDENTIFICATION AND QUANTIFICATION OF DRUG SUBSTANCE AND DRUG PRODUCT

Kaushal Mishra, Malik Nasibullah, Qazi Inamur Rahman, Abdul Rahman Khan *

Department of Chemistry, Integral University, Lucknow, Uttar Pradesh 226026, India

*headchem@iul.ac.in

ABSTRACT

This chapter discusses the basics insight of high performance separation techniques, principle working and their important features. The chapter give basic understanding of HPCL & working principle which is utmost required for the people whom so ever working in industries. The chapter also discusses the estimation of bepotastine besilate and benzalkonium chloride by HPLC method.

INTRODUCTION

Prior to HPLC scientists used standard liquid chromatographic techniques. Liquid chromatographic systems were largely inefficient due to the flow rate of solvents being dependent on gravity. Separations took many hours and sometimes days to complete. Gas chromatography (GC) at the time was more powerful than liquid chromatography (LC), however, it was believed that gas phase separation and analysis of very polar high molecular weight biopolymers was impossible. GC was ineffective for many biochemists because of the thermal instability of the solutes. As a result, alternative methods were hypothesized which would soon result in the development of HPLC. Following on the seminal work of Martin and Syngé in 1941, it was predicted by Cal Giddings, Josef Huber, and others in the 1960s that LC could be operated in the high-efficiency mode by reducing the packing-particle diameter substantially below the typical LC (and GC) level of 150 μm and using pressure to increase the mobile phase velocity. These predictions underwent extensive experimentation and refinement throughout the 60s into the 70s. Early developmental research began to improve LC particles, and the invention of Zipax, a superficially porous particle, was promising for HPLC technology. The 1970s brought about many developments in hardware and instrumentation. Researchers began using pumps and injectors to make a rudimentary design of an HPLC system. Gas amplifier pumps were ideal because they operated at constant pressure and did not

COMPUTATIONAL DRUG DISCOVERY AND VIRTUAL SCREENING OF RELEVANT PARAMETERS

Tahmeena Khan^{1*}, Umama Fatima², Saima Zehra², Almas Fatima²

^{1*}*Department of Chemistry, Integral University, Lucknow 226026, India.*

²*Department of Chemistry, Isabella Thoburn College, Lucknow 226007, India*

* tahminakhan30@yahoo.com

ABSTRACT

Drug intake, its absorption in the body, removal and various side effects associated with it are factors considered while designing the drugs. Here, the *in-silico* tools act as virtual shortcuts assisting in the prediction of several important physicochemical properties like molecular weight, polar surface area (PSA), molecular flexibility etc. to evaluate probable drug leads as potential drug candidates. Moreover, these tools also play an important role in prediction of bioactivity score of probable drug lead against various human receptors. This chapter discusses the important parameters that should be met by any compound to qualify as a potential drug candidate. It also includes the observations and results obtained on evaluation of the selected thiosemicarbazone ligands, putting forward values of different parameters predicting their potential to be probable drugs in future. Furthermore, the chapter also includes different softwares and their working principles that can be used to make various predictions about the compounds.

Keywords: Computational, drug, thiosemicarbazones, bioactivity score

INTRODUCTION

The process of discovering and developing new drugs is time consuming, expensive and challenging [1]. From concept to market, the average drug discovery and development cycle takes approximately 14 years and the average cost is between 0.8 and 1.0 billion USD [2]. Increasing access to biological macromolecule and small molecule data has extended the scope of computational drug discovery to nearly every stage of the drug discovery and development process, including the identification and validation of targets, lead discovery and optimization as well as preclinical testing [3]. Using *in silico* tools has advanced pharmaceutical research and made it more efficient than ever [4]. These techniques assist in calculation of important properties prior to synthesis stage, thus saving a lot of time and

ENVIRONMENTAL BENIGN POLYMERS FOR ENCAPSULATION AND DELIVERY OF BIOLOGICALLY ACTIVE COMPOUNDS

Mohammad Irfan Azad¹, and Iqbal Azad^{2*}

¹Materials Research Laboratory, Chemistry Department, Jamia Millia Islamia, New Delhi, India

²Chemistry Department, Integral University, Dasauli, Bas-ha, Kursi Road, Lucknow, India

*iqbalazad@iul.ac.in

ABSTRACT

The encapsulation approach which recently has developed progressively popular, fine solid particles, confirms the inclusion of liquids or gases with synthetic or natural polymers. Encapsulation presents many advantages from separation of components to avoid potential conflicts, increasing the strength of components up to security of various compounds from destructive action of several physicochemical agents. Due to inert property polymer becomes more valuable material in the therapeutic and medicinal field. It also enhances the pharmacokinetic and pharmacodynamic properties of active core material by increasing the solubility of low molecular weight drugs, decreases the immunogenicity, provides the stability, plasma half-life, and has a promise of targeted drug release. Nevertheless, natural polymers are biodegradable and most abundant in the earth although their purification and reproduction are very difficult previously; in the same way due to immunogenicity synthetic polymers are unsafe for long-term exposure. Therefore, polymers are most suitable material for the encapsulation and drug delivery system in the presence of their efficacy, absence of immunogenicity, biological inactivity, safety, sufficient pharmacokinetics, hydrophilicity, formation of copolymer, presence of functional groups for covalent conjugation of drugs and targeting moieties. Furthermore, cell encapsulation attracts the researchers to enhance cell persistence utilizing biomaterials with extraordinary biodegradation, biocompatibility, and flexibility. In this review, all these characteristics are considered with the explanation of the most popular approaches for formulating microcapsules, their role in drug delivery system, the benefits of their usage and numerous applications.

Keywords: Encapsulation, Targeted drug delivery, Microcapsules, Pharmaceutical, Therapeutic Agent

CHAPTER-9

ANAEROBIC DEGRADATION OF TOLUENE IN WASTEWATER AND BIOGAS PRODUCTION

Mohammad Danish Khan¹, Nafees Ahmad*²

¹Industrial Chemistry Research Laboratory, Department of Chemistry, Faculty of Sciences, Aligarh Muslim University, Aligarh-202 002, India

²Department of Chemistry, Integral University, Lucknow, 226026, India

* anafees@iul.ac.in

ABSTRACT

Petroleum hydrocarbons and BTEX compounds can be easily be transferred into the groundwater. The main sources of pollution are industrial wastes, improper disposal and accidents during oil transportation, storage tanks, paint manufactures and chemical industries. Textile manufacture, wood processing and tobacco products discharge Benzene and Toluene into the environment. Wastewater polluted with toluene need to be treated before final discharge in order to reduce the hazardous nature of toluene. For this purpose, physical, chemical and biological processes are usually used for effluent treatment. Biodegradation of toluene in wastewater is generally more economically feasible and energy sufficient than any alternative physical and chemical treatment processes. Among the various biodegradation methods, anaerobic digestion is one of the most prevalent process for wastewater treatment. Methanogens were potentially used for the biodegradation of organic pollutant. Conventionally, aerobic biological methods have been used for biodegradation of nonaromatic compounds. However, due to their low energy requirement and sludge yield, anaerobic biological methods are now being known as a capable method.

Keywords: Hydrocarbons, Anaerobic degradation, Sludge, Toluene wastewater, Environment

INTRODUCTION

BTEX (Benzene, Toluene, Ethyl benzene and Xylenes) compounds are naturally occurring in crude oil, coal tar, crude petroleum and a wide range of petroleum products [1-4]. Benzene is generally found at levels up to 4 g/L in crude petroleum, and can also be found in sea water (0.8 ppb) in the proximity of natural gas and petroleum deposits. The other natural sources of BTEX compounds are emissions of gas from volcanoes and forest fires. The main

NANOMATERIALS: AN ATTEMPT FOR BASICS OF NANO-MATERIALS TRENDS AND THEIR CLASSIFICATIONS

Daraksha Bano*

Department of Chemistry, Integral University, Lucknow-226026

*darakshab@iul.ac.in

ABSTRACTS

The recent past in the mechanical improvement confirmed that advancement in nanotechnology and nanoscience is the key element. Nanotechnology is multidisciplinary science which manages physical science, chemical science, materials science and other molecular designing sciences. The utilizations of nanotechnology are spreading in all the branch of science and innovation. The present chapter deals with the different aspects of nanomaterial, properties, and synthetic technology and characterization techniques. Moreover, the gap reasons are also revealed successfully in the current chapter, which will help in the examination work to be done in not so distant future on

INTRODUCTION

The word “nanotechnology” is introduced in 1959 by the noble laureate Richard P. Feynman. He established that the atoms could be manipulated at an enormously small scale i.e., the nanoscale [Feynman (1960)]. The term Nanotechnology was given by Professor Norio Taniguch [Handy *et al.* (2008), Taniguchi (1974)]. Nanotechnology is distinct by its scale, one billionth (10^{-9}) of a meter or the nanometer (nm). The manipulated materials by the use of above technology are recognized as nanomaterials. However, the materials with at least one dimension having a size range between 1 and 100 nm are being regarded as nanomaterials. The nanotechnology definitely standing out enough to be noticed in nearly all designing branches yet the ordinary citizens didn't get the information about its presence in day to day existence however its huge use in the medication, designing, climate, hardware, protection, and security is as yet expanding. Recently, the nanomaterials are receiving huge interest of the scientists engaged in the areas of environment, energy, catalysis, cosmetics, pesticides, stain resistant clothing, sunscreens, automotive paints, sporting goods and digital cameras, biomedical, electronics, health care, drug-gene delivery, mechanics, optics, chemical industries, space industries, science, light emitters, single electron transistors, nonlinear optical devices and photo-electrochemical applications.