ENVIRONMENTAL FRIENDLY SILVER NANOPARTICLES AND ITS APPLICATIONS

(Project Code: BSCH 858)

A

Report Submitted in partial fulfillment of the Requirement for the degree of Masters of Science in chemistry(Honours) May, 2019

Submitted To:

Dr. Romila Manchanda

Associate Professor

SBAS-Chemistry

Submitted By:

SONAM YADAV

Roll No:1703680002

M.Sc. (H) Chemistry





K. R. MANGALAM UNIVERSITY, SOHNA ROAD, GURUGRAM

CERTIFICATE

This is to certify that the Report entitled "ENVIRONMENTAL FRIENDLY SILVER NANOPARTICLES AND ITS APPLICATIONS" is a bonafide record of the work done by Ms. Sonam Yadav under my supervision and submitted to K. R.Mangalam University in a partial fulfilment for the award of the degree of Masters of Science in Chemistry (Honours).

Counter Signed by-

Dr. Meena Bhandari

Dean, SBAS

K. R. Mangalam University

Sohna Road, Gurugram

Supervisor-

Dr. Romila Manchanda

Associate Professor, SBAS

K.R. Mangalam University

Sohna Road, Gurugram

DECLARATION

I Sonam Yadav, a bonafide student of M.Sc (H) Chemistry of K.R.Mangalam University, Gurugram would like to declare that the dissertation entitled "ENVIRONMENTAL FRIENDLY SILVER NANOPARTICLES AND ITS APPLICATIONS" submitted by me in partial fulfillment of the requirement for the award of the degree of Masters of Science in Chemistry (Honours) in my original work.

SONAM YADAV

Roll No:1703680002

M.Sc (H) Chemistry

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INTRODUCTION

In contemeporary world, Nanotechnology plays a vital role in the biomedical applications as it erosses the barriers of current treatment methods such as poor drug dosage form, toxicity and side effects. The idea and concept behind the nanotechnology started by physicist Richard Feynman at American Physical Society at the California Institute of Technology on December 29, 1959. In the field of nanotechnology Paul Ehrlich contributes alot and he was a Nobel prize winning German- Jewish Physician and scientist who works in the field of Hematolgy, immonology and antimicrobial chemotherapy and he invented the precursor technique to Gram staining bacteria. Nanotechnology as the manipulation of matter at least one dimension sized from 1 to 100nm [1]. Nanoparticles are very important in developing sustainable technologies for the future, for the humanity and the environment.

Green synthesis of nanoparticles has been proposed as a cost effective and environmental friendly alternative to chemical and physical methods. Plants mediated synthesis nanoparticles is a green chemistry approach that concept nanotechnology with plants. The word nanoparticles that is used express a particle with extent in the range of 1nm-100nm. At slightest in one of the three possible dimensions. Inside this size range the physical -chemical and biological properties of the nanoparticles changes in fundamental and conducts from the properties of both being atoms/ molecules and of the equivalent bulk materials. There are many ways to synthesise nanoparticles such as solid phase reaction, chemical reaction, co-précipitation and sol gel method etc[2]. The problem with most of the chemical and physical methods of nano silver production is that the reagent are very expensive and also involves the use of very toxic, hazardous chemicals, which may cause potential environmental and biological risks. In the recent years, green synthesis of nanoparticles have several advantages over chemical synthesis. as green synthesis technique eliminates the use of energy, high pressure, temperature, and toxic chemicals. Moreover, green synthesised nanoparticles are compatible for biomedical and food applications [3]. The use of plant extracts to synthesise nanoparticles is receiving attention in recent times because of its simplicity, also, the processes are readily scalable and may be less expensive. Plant extracts may act both as reducing agent and stabilising agents in the synthesis of nanoparticles.

Silver is rare, but naturally occurring element, metallic silver itself is insoluble in water but metallic salt and metallic chloride are soluble in water [4]. Metallic silver appears to cause minimal risk to health, whereas soluble silver compounds are more readily absorbed and have the potential to produce adverse effects.

Although acute toxicity of Silver in the environment is dependent on the availability of free silver ions, investigations have shown that these concentrations go Ag+ ions are too low to lead toxicity that's why plant extract are used for the metal ions bio- reduction to form nanoparticles.

The wide variety of uses of silver allows exposure through various routes of entry into the body. Ingestion is the primary route for entry for silver compounds and colloidal silver proteins. Dietary intake of silver is estimated at 70-90ug/day[5]. Since silver in any form is not thought to be toxic to the immune, cardiovascular, nervous or reproductive system and it is not considered to be carcinogenic. Therefore, silver is relatively non-toxic. Silver demand will likely to raise as silver find new uses, particularly in textiles, plastics, and medical industries, changing the pattern of silver emission as these technologies and products diffuse through the global.

From the past, herbal plants used as traditional medicine with lesser toxicity and higher efficacious for overcoming inflammatory disease without fear of genetic mutation in clinical pathogen. There are so many plants used as reducing agents for preparing nanoparticles citrus fruits [6]. On reviewing several literatures we came at conclusion for selecting ball fruit as reducing agent in nanoparticles synthesis as it possesses various positive effects with low lethal effects on subject.

Azadipyrromethene Stabilized Aluminium Compound (Project Code: BSCH858)

Report submitted in partial fulfillment of the requirement for the degree of Masters of Science in Chemistry



Submitted to:
Prof. S. Nagendran
Department of Chemistry
IIT, Delhi
Prof. Meena Bhandari
SBAS-Chemistry
K.R. Mangalam University

Submitted by: Mr. Manoj Kumar Roll No.: 18031 0008 M.Sc. Chemistry

SCHOOL OF BASIC AND APPLIED SCIENCES
K. R. MANGALAM UNIVERSITY
SOHNA ROAD, GURGAON
May, 2020

DECLARATION

I, Manoj Kumar, a bonafide student of M.Sc. Chemistry of K. R. Mangalam University, Gurgaon would like to declare that the dissertation entitled "Azadipyrromethene stabilized aluminium compound" submitted by me in partial fulfillment of the requirement for the award of the degree of Master of Science in Chemistry is my original work.

Registrar K.R. Mangalam University Sohna Road, Gurugram, (Haryana)

Place: Sohna

Date: June 9, 2020

Mr. Manoj Kumar

Roll No.:1803680008

M.Sc. Chemistry

CERTIFICATE

This is to certify that the dissertation entitled "Azadipyrromethene stabilized aluminium compound" is a bonafide record of the work done by Mr. Manoj Kumar (Roll No. 1803100008) under my supervision and submitted to K. R. Mangalam University in partial fulfillment for the award of the degree of Master of Science in Chemistry.

Date: June 9, 2020

Counter Signed by -

Prof. Meena Bhandari

Dean, SBAS

K. R. Mangalam University

Sohna Road, Gurgaon

Supervisor -

Prof. S. Nagendran

Department of Chemistry

Indian Institute of Technology, Delhi

New Delhi 110016

Registrar

K.R. Mangalam University

(Harvane

Sohna Road, Gurugram, (Haryana)

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A work is never successfully completed without the assistance and guidance from appropriate persons. So, now it is a time to express my sincere gratitude towards all persons who have helped me to complete my work.

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I wish to pay glowing tribute to my family who sacrificed their worldly interests to promote my education. I thank the almighty for providing me better health, encouragement, and wisdom.

Mr. Manoj Kumar Roll No: 1803100008

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MEDICINAL APPLICATIONS OF SESQUITERPENES: A REVIEW

(Project Code: BSCH 858)

A

Report submitted in partial fulfilment of the requirement for the degree of Master of Science in Chemistry



Submitted to: Dr. Seema Raj Assistant Professor SBAS-Chemistry Submitted by: Deepshikha Jain Roll No.: 1903680004 M.Sc. Chemistry

SCHOOL OF BASIC AND APPLIED SCIENCES
K. R. MANGALAM UNIVERSITY
SOHNA ROAD, GURGAON
28 JULY, 2021

DECLARATION

I, Deepshikha Jain, a bonafide student of M.Sc. Chemistry of K. R. Mangalam University, Gurgaon would like to declare that the dissertation entitled "Medicinal Applications of Sesquiterpenes: A review" submitted by me in partial fulfillment of the requirement for the award of the degree of Master of Science in Chemistry is my original work.

Place: Sohna

Date: July 28th, 2021

Deepshikha

Deepshikha Jain

Roll No.: 1903680004

M.Sc.Chemistry

CERTIFICATE

This is to certify that the dissertation entitled "Medicinal Applications of Sesquiterpenes: A review" is a bonafide record of the work done by Deepshikha Jain (Roll No. 1903680004) under my supervision and submitted to K. R. Mangalam University in partial fulfillment for the award of the degree of Master of Science in Chemistry.

Date: July 28th, 2021

Counter Signed by-

Prof. (Dr.) Meena Bhandari

Dean, SBAS

K. R. Mangalam University

Sohna Road, Gurgaon

Supervisor-

Dr. Seema Raj

Assistant Professor, SBAS

K. R. Mangalam University

Sohna Road, Gurgaon

ACKNOWLEDGEMENT

A work is never successfully completed without the assistance and guidance from appropriate persons. So, now it is a time to express my sincere gratitude towards all persons who have

First and foremost, I would like to express my deep sense of gratitude and sincere thanks to my supervisor Dr. Seema Raj for her guidance, endeavour throughout the course which helped me in timely completion of this work under whose guidance this task has become reality. I am extremely grateful to her for taking pains in checking my dissertation and giving me valuable suggestions, help and encouragement, without her help it would have been indispensable to accomplish

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In no way, I am thankful to my classmates and all my friends.

Deepshikha Deepshikha Jain

Roll No: 1903680004

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INTRODUCTION TO FUEL CELLS

(Project Code: BSCH 858)

A

Report submitted in partial fulfillment of the requirement for the degree of Master's of Science in Chemistry (Honours)



Submitted to: Dr. Sona Gandhi Assistant Professor SBAS-Chemistry Submitted by: Ms Anshul

Roll No.: 1903680009

MSc. (H) Chemistry

SCHOOL OF BASIC AND APPLIED SCIENCES

K. R. MANGALAM UNIVERSITY

SOHNA ROAD, GURGAON

July, 2021

DECLARATION

I, Anshul, a bonafide student of M.Sc(H) Chemistry of K. R. Mangalam University, Gurgaon would like to declare that the dissertation entitled "Introduction to Fuel cells" submitted by me in partial fulfillment of the requirement for the award of the degree of Masters of Science in Chemistry (Honours) is my original work.

Place: Gurgaon

Date: July 28th, 2021

Ms Anshul

Roll. No: 1903680009

M.Sc (H) Chemistry

CERTIFICATE

This is to certify that the dissertation entitled "Introduction to Fuel cells" is a bonafide record of the work done by Ms. Anshul (Roll No. 1903680009) under my supervision and submitted to K. R. Mangalam University in partial fulfillment for the award of the degree of Masters of Science in Chemistry (Honours).

Date: July 28th, 2021

Counter Signed by-

Prof. (Dr.)

Dean, SBASAssistant Professor, SBAS

K. R. Mangalam University

Sohna Road, Gurgaon

Supervisor-

Dr. Sona Gandhi

K.R. Mangalam University

Sohna Road, Gurgaon

Registrar K.R. Mangalam University Sohna Road, Gurugram, (Haryana)

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ACKNOWLEDGEMENT

A work is never successfully completed without the assistance and guidance from appropriate persons. So, now it is a time to express my sincere gratitude towards all persons who have

First and foremost, I would like to express my deep sense of gratitude and sincere thanks to my supervisor Dr. Sona Gandhi for her guidance, endeavor throughout the course which helped me in timely completion of this work under whose guidance this task has become reality. I am extremely grateful to her for taking pains in checking my dissertation and giving me valuable suggestions, help and encouragement, without her help it would have been impossible to

am highly obliged to Prof. (Dr.) Meena Bhandari, Dean SBAS, for giving me this pportunity and the teaching and Lab staff of the Department for providing necessary facilities.

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no way, I am thankful to my classmates and all my friends.

Ms. Anshul

Roll No: 1903680009

I. INTRODUCTION

A fuel is any compound that has stored energy. Photosynthesis and respiration are two processes that harness this energy in chemical bonds. During oxidation, energy is released. The most prevalent type of oxidation is combustion, which is the direct reaction of a fuel with oxygen. Wood, gasoline, coal, and a variety of other fuels have energy-rich chemical bonds that are formed using the Sun's energy and released when the fuel is burned (i.e., the release of chemical energy). Chemical fuels, often known as fossil fuels, are a valuable source of energy and are thus widely used. [1]

A fuel cell is an electrochemical cell that uses a pair of redox processes to transform the chemical energy of a fuel (typically hydrogen) and an oxidizing agent (commonly oxygen) into electricity. Fuel cells differ from most batteries in that cells require a constant supply of fuel and oxygen (typically from the air) to keep the chemical reaction going, whereas in a battery, the chemical energy is normally provided by the battery.

In compared to the multi-step processes involved in combustion-based heat engines (e.g., from chemical to thermal to mechanical to electrical energy), the one-step nature of this method offers several unique advantages. For example, today's combustion-based energy producing technologies are extremely detrimental to the environment and contribute mostly to global warming. [2]

Fuel cells, on the other hand, provide an energy conversion process that is both efficient and clean. Furthermore, for sustainable development and energy security, fuel cells are comparable to renewable sources and modern energy carriers (e.g., hydrogen). As a result, they are viewed as the future's energy conversion gadgets. Fuel cells generate electricity and heat during electrochemical reaction which happens between the oxygen and hydrogen to form the water. Fuel cell technology is a promising way to provide energy for rural areas where there is no access to the public grid or where there is a huge cost of wiring and transferring electricity. In addition, applications with essential secure electrical energy requirement such as uninterruptible power supplies (UPS), power generation stations and distributed systems can employ fuel cells as their source of energy. [3]

INTRODUCTION TO FUEL CELLS: A REVIEW

(Project Code: BSCH 858)

A

Report submitted in partial fulfillment of the requirement for the degree of Master's of Science in Chemistry (Honours)



Submitted to: Dr. Sona Gandhi Assistant Professor SBAS-Chemistry Submitted by: Ms Shailja Goel Roll No.: 1903680002 MSc. (H) Chemistry

SCHOOL OF BASIC AND APPLIED SCIENCES

K. R. MANGALAM UNIVERSITY

SOHNA ROAD, GURGAON

July, 2021

DECLARATION

I. Shailja Goel, a bonafide student of M.Se(II) Chemistry of K. R. Mangalam University, Gurgaon would like to declare that the dissertation entitled "Introduction to Fuel cells" submitted by me in partial fulfillment of the requirement for the award of the degree of Masters of Science in Chemistry (Honours) is my original work.

Place: Gurgagn

Ms Shailja Goel

Roll. No: 1903680002

M.Sc (H) Chemistry

Date: July 28th, 2017

CERTIFICATE

This is to certify that the dissertation entitled "Introduction to Fuel cells" is a bonafide record of the work done by Ms. Shailja Goel (Roll No. 1903680002) under my supervision and submitted to K. R. Mangalam University in partial fulfillment for the award of the degree of Masters of Science in Chemistry (Honours).

Date: July 28th, 2021

Counter Signed by-

Dr. Meena Bhandari

Dean, SBASAssistant Professor, SBAS

K. R. Mangalam University

Sohna Road, Gurgaon

Jane

Supervisor-

Dr. Sona Gandhi

K.R. Mangalam University

Sohna Road, Gurgaon

Registrar K.R. Mangalam University

Sohna Road, Gurugram, (Haryana)

ACKNOWLEDGEMENT

A work is never successfully completed without the assistance and guidance from appropriate persons. So, now it is a time to express my sincere gratitude towards all persons who have helped me to complete my work.

First and foremost, I would like to express my deep sense of gratitude and sincere thanks to my supervisor Dr. Sona Gandhi for her guidance, endeavor throughout the course which helped me in timely completion of this work under whose guidance this task has become reality. I am extremely grateful to her for taking pains in checking my dissertation and giving me valuable suggestions, help and encouragement, without her help it would have been impossible to accomplish my work.

I am highly obliged to Prof. (Dr.) Meena Bhandari, Dean SBAS, for giving me this opportunity and the teaching and Lab staff of the Department for providing necessary facilities.

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Ms. Shailfa Goel

Roll No. 1903680002

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Phytochemicals-Extraction and Usage (Project Code: BSCH858)

1

Report submitted in partial fulfillment of the requirement for the degree of Master of Science in Chemistry



Submitted to:

Dr. Meena Bhandari DEAN SBAS SBAS-Chemistry Submitted by:

Mona Vashistha Roll no.1903680007 M.Sc. Chemistry

SCHOOL OF BASIC AND APPLIED SCIENCES

K. R. MANGALAM UNIVERSITY

SOHNA ROAD, GURGAON

July, 2021

DECLARATION

I, Mona Vashistha, a bonafide student of M.sc Chemistry of K. R. Mangalam University, Gurgaon would like to declare that the dissertation entitled "Phytochemicals -Extraction and Usage" submitted by me in partial fulfillment of the requirement for the award of the degree of Master of Science in Chemistry is my original work.

Place: Gurugram

Date:

Ms. Mona Vashistha

Roll No.:1903680007

M.Sc. Chemistry

CERTIFICATE

This is to certify that the dissertation entitled "Phytochemicals extraction and usage" is a bonafide record of the work done by Ms. Mona Vashistha (Roll No. 1903680007) under my supervision and submitted to K. R. Mangalam University in partial fulfillment for the award of the degree of Master of Science in Chemistry.

Date:

Counter Signed by -

Dr. Meena Bhandari

Dean, SBAS

K.R. Mangalam University Sohna road, Gurgaon Supervisor-

meens

Dr. Meena Bhandari

Dean, SBAS

K.R.Mangalam University

ACKNOWLEDGEMENT

A work is never successfully completed without the assistance and guidance from appropriate persons. So, now it is a time to express my sincere gratitude towards all persons who have helped me to complete my work.

First and foremost, I would like to express my deep sense of gratitude and sincere thanks to my supervisor Dr. Meena Bhandari for her guidance, endeavour throughout the course which helped me in timely completion of this work under whose guidance this task has become reality. I am extremely grateful to her for taking pains in checking my dissertation and giving me valuable suggestions, help and encouragement, without her help it would have been indispensable to accomplish my work.

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hou

Ms. Mona Vashistha

Roll no.:1903680007

M.Sc. Chemistry

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