DEV SINGH BISHT COLLEGE

DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

सिनेमा का विकास एवं भारतीय समानान्तर सिनेमा

SUBMITTED BY. - AARTI RAJPUT

SUBMITTED TO: - DR. GIRISH RANJAN TIWARI

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

सिनेमा का विकास
एवं
भारतीय समानान्तर सिनेमा

SUBMITTED BY. – AARTI RAJPUT

SUBMITTED TO: - GIRISH RANJAN TIWARI

DEV SINGH BISHT COLLEGE

DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

बेरोजगारी को कम करने के लिए मीडिया की भूमिका

SUBMITTED BY. - AVHAVYA CHAUHAN

SUBMITTED TO: -DR. POONAM BISHT

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER

SESSION 2021-2022

बेरोजगारी को कम करने के लिए मीडिया की भूमिका

SUBMITTED BY. – ABHAVYA CHAUHAN

SUBMITTED TO: - Dr. POONAM BISHT

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER

SESSION 2021-2022

CHALLENGES OF WOMEN IN THE FIELD OF PHOTOGRAPHY AND JOURNALISM

SUBMITTED BY. – ADITI KHURANA

SUBMITTED TO: - Dr. POONAM BISHT

DEV SINGH BISHT COLLEGE

DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

SOCIAL MEDIA

SUBMITTED BY. - AARTI THAKUR

SUBMITTED TO: - DR. GIRISH RANJAN TIWARI

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

SOCIAL MEDIA

SUBMITTED BY. – AARTI THAKUR

SUBMITTED TO: - GIRISH RANJAN TIWARI

कोविड - 19 और भारतीय पत्रकारिता

COVID – 19 AND INDIAN JOURNALISM

कुमाऊं विश्वविद्यालय, नैनीताल

स्नातकोत्तर (जनसंचार एवं पत्रकारिता) उपाधि हेतु प्रस्तुत

लघु शोध प्रबंध

MJMC - चतुर्थ सेमेस्टर

(2022-2023)

निर्देशक
प्रो० गिरीश रंजन तिवारी

शोधार्थी
गरिमा पाण्डे

कोविड - 19 और भारतीय पत्रकारिता

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लघु शोध प्रबंद

MJMC - चतुर्थ सेमेस्टर

(2022-2023)

निर्देशक

प्रो० गिरीश रंजन तिवारी

शोधार्थी

गरिमा पाण्डे

DEV SINGH BISHT COLLEGE

DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

ROLE OF CONTENT IN ADVERTISING

SUBMITTED BY. - HIMANSHI SHARMA

SUBMITTED TO: - DR. GIRISH RANJAN TIWARI

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

ROLE OF CONTENT IN ADVERTISING

SUBMITTED BY. – HIMANSHI SHARMA

SUBMITTED TO: - DR. GIRISH RANJAN TIWARI

कुमाऊँ विश्वविद्यालय नैनीताल

अटल पत्रकारिता एवं जनसंचार विभाग

मास्टर ऑफ जर्ननिलज्म एंड मास कम्युनिकेशन

उपाधि हेतु प्रस्तुत

लघु शोध प्रबंध

सत्र 2021–2022

विषय– वैश्विक महामारी कोविड–19

शोध निर्देशक

डॉ. गिरीश रंजन तिवारी

विभागाध्यक्ष

पत्रकारिता एवं जनसंचार

डी.एस.बी परिसर नैनीताल

शोधार्थी

किरन

डी.एस.बी. परिसर नैनीताल

एम.जे.एम.सी (चतुर्थ सेम)

IMPACT OF SOCIAL MEDIA ON EVERYDAY LIFE OF THE YOUTH

DISSERTATION
SUBMITTED TO THE
DEPARTMENT OF JOURNALISM AND
MASS COMMUNICATION
D. S. B. CAMPUS, NAINITAL

BY
MANSI SHARMA

SUPERVISED BY
GIRISH RAJAN TIWARI
PROFESSOR

IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER IN JOURNALISM
AND
MASS COMMUNICATION
July 2022

IMPACT OF SOCIAL MEDIA ON EVERYDAY LIFE OF THE YOUTH

DISSERTATION
SUBMITTED TO THE

DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION
D. S. B CAMPUS, NAINITAL

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(GIRISH RANJAN TIWARI)
PROFESSOR

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER
IN
JOURNALISM AND MASS COMMUNICATION

July 2022

D.S.B CAMPUS

KUMAUN UNIVERSITY, NAINITAL

IMPACT OF SOCIAL MEDIA ON YOUTH

A Dissertation submitted to :

D.S.B Campus

Masters of journalism and mass communication

BY NEELOFER IMAM

IN GUIDANCE OF HOD DR.GIRISH RANJAN TIWARI

Mrs. Poonam Bisht (A.P)

D.S.B CAMPUS

KUMAUN UNIVERSITY, NAINITAL

IMPACT OF SOCIAL MEDIA ON YOUTH

A Dissertation submitted to :

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Masters of journalism and mass communication

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IN GUIDANCE OF HOD DR.GIRISH RANJAN TIWARI

Mrs. Poonam Bisht (A.P)

DSB CAMPUS NAINITAL
KUMAUN UNIVERSITY

NAME : PURNIMA
ROLL NO.: 210125590010

IMPACT OF INTERNET AND SOCIAL MEDIA IN OUR LIFE

MJMC 2021-22

DSB CAMPUS NAINITAL, UTTARAKHAND

MJMC IV SEMESTER

Session- 2020-22

TOPIC: IMPACT OF INTERNET & SOCIAL MEDIA IN OUR LIFE

Submitted By: Purnima

Roll No.: 210125590010

Submitted To: Dr.Girish Ranjan

DATE:

THE CUSTOM OF DOWRY

A DISSERTATION

Submitted in Partial fulfillment of the Requirements for the Award of the Degree of

MASTER OF JOURNALISM AND MASS COMMUNICATION

Guide
Dr. Girish Ranjan Tiwari

Submitte By
Yogita Brijwasi

DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION
DSB CAMPUS NAINITAL
KUMAOUN UNIVERSITY

2022

THE CUSTOM OF DOWRY

A DISSERTATION

Submitted in Partial fulfillment of the Requirements for

the Award of the Degree of

MASTER OF JOURNALISM
AND
MASS COMMUNICATION

Guide
Dr. Girish Ranjan Tiwari

Yogita

Submitte By
Yogita Brijwasi

DEPARTMENT OF JOURNALISM
AND
MASS COMMUNICATION
DSB CAMPUS NAINITAL
KUMAOUN UNIVERSITY
2022

A
DISSERTATION REPORT
ON

EFFECTS OF EMOTIONS IN JOURNALISM DUE TO THE CORONA VIRUS ERA

FOR THE PARTIAL FULFILMENT OF THE DEGREE IN
MASTER OF JOURNALISM & MASS COMMUNITATION (M.J.M.C.)
SESSION 2021-2022

SUBMITTED TO:
Dr. Poonam Bisht
M.J.M.C. 4th SEMESTER

SUBMITTED BY:
Ankit Chandra
Roll No. 210125590012

Department of Journalism & Mass Communication
D.S.B Campus Kumaun University Nanital

A
DISSERTATION REPORT
ON
EFFECTS OF EMOTIONS IN JOURNALISM DUE TO THE CORONA VIRUS ERA

FOR THE PARTIAL FULFILMENT OF THE DEGREE IN
MASTER OF JOURNALISM & MASS COMMUNITATION (M.J.M.C.)
SESSION 2021-2022

SUBMITTED TO:
Dr. Poonam Bisht

SUBMITTED BY:
Ankit Chandra
M.J.M.C. 4th SEMESTER
Roll No. 210125590012

Department of *Journalism & Mass Communication*
D.S.B Campus Kumaun University Nanital

Dev Singh Bisht College
(DSB Campus)

M.A.JMC 4rd SEM

Session 2021-2022

Role of Photography in Digital Era

Submitted by: Anmol Arya Anmol

Submitted to: Kumaun University, Nainital

DEV SINGH BISHT COLLEGE

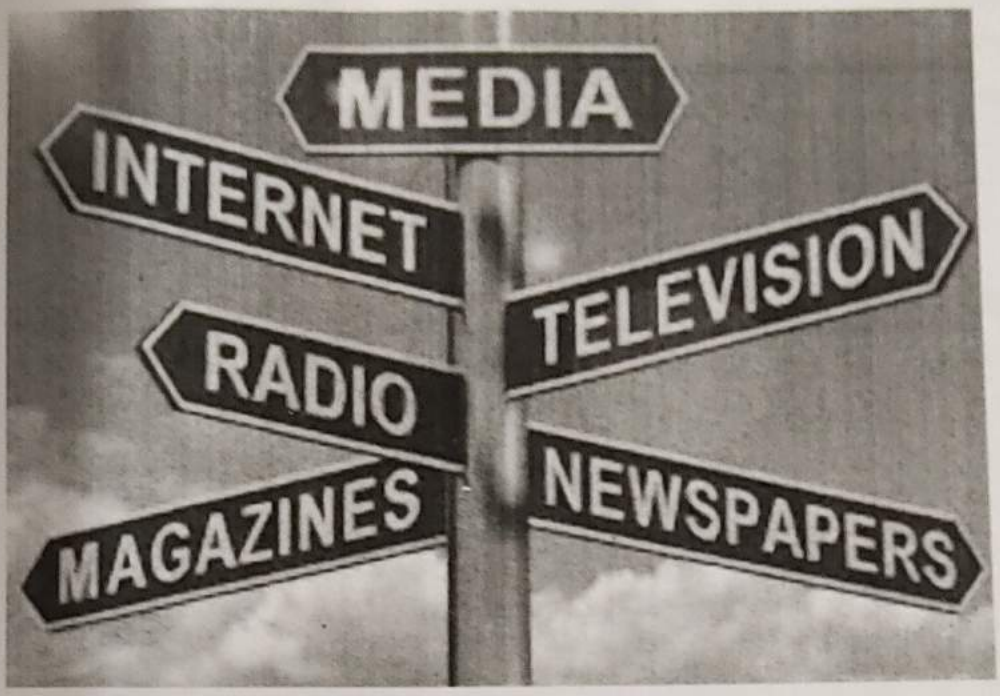
DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

Role of Media

SUBMITTED BY. - KRISHNA BISHT
SUBMITTED TO: -DR. POONAM BISHT

Role of Media



The media's the most powerful entity on earth. They have the power to make the innocent guilty and to make the guilty innocent, and that's power. Because they control the minds of the masses.

DISSERTATION

MASTER OF JOURNALISM AND MASS COMMUNICATION (L.E.) 4th SEMESTER 2021-22

TOPIC :-ANALYSIS OF UTTARAKHAND 2022 ELECTIONS: A COMPARATIVE STUDY OF TWO HINDI DAILY NEWSPAPERS

Submitted By:-
Manoj Singh Mehra
M.J.M.C. (L.E.) 4th SEM.
Roll No:-210125590015
Enrolment No: - KU10080799

Submitted To: -
Prof. Girish Ranjan Tewari
Dep. of Mass Media & Journalism
D.S.B Campus, Nainital
Kumaun University Nainital

STATE DISTRIBUTION OF MEDICINAL PLANTS IN UTTARAKHAND

Session 2021 - 2022

SUBMITTED TO

Prof. Girish Ranjan Tiwari

Master Journalism

& Mass Communication

Department, Nainital

SUBMITTED BY

Nitesh Kumar

MJMC 4th Sem.

D.S.B Campus Nainital

DSB CAMPUS NAINITAL

कुमाऊँ विश्वविद्यालय
1973
सर्वं ज्ञाने परिसमाप्यते

Topic : 1–छात्रों के लिए सोशल मीडिया का महत्व

2–सोशल मीडिया के फायदे व नुकसान

3–अत्यधिक जनसंख्या भारत के लिए ताकत या कमजोरी.

SUBMITTED TO:-

DR. POONAM BISHT

Poonam Bisht

SUBMITTED BY:

NITIN DEVAL

MJMC

IVTH SEMESTER

A
DISSERTATION REPORT
ON

ROLE OF MEDIA IN SOCIETY

FOR THE PARTIAL FULFILMENT OF THE DEGREE IN
MASTER OF JOURNALISM & MASS COMMUNITATION (M.J.M.C.)
SESSION 2021-2022

SUBMITTED TO:
Dr. Poonam Bisht
M.J.M.C. 4th SEMESTER

SUBMITTED BY:
Pankaj Mohan Joshi
Roll No. 210125590019
Enrollment No.KU20113703

Department of Journalism & Mass Communication
D.S.B Campus Kumaun University Nanital

A
DISSERTATION REPORT
ON
ROLE OF MEDIA IN SOCIETY

FOR THE PARTIAL FULFILMENT OF THE DEGREE IN
MASTER OF JOURNALISM & MASS COMMUNITATION (M.J.M.C.)
SESSION 2021-2022

SUBMITTED TO:
Dr. Poonam Bisht

SUBMITTED BY:
Pankaj Mohan Joshi
M.J.M.C. 4th SEMESTER
Roll No. 210125590019
Enrollment No.KU20113703

Department of *Journalism & Mass Communication*
D.S.B Campus Kumaun University Nanital

DEV SINGH BISHT COLLEGE

DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

Freedom of Press

SUBMITTED BY. -PUNIT KUMAR
SUBMITTED TO: -DR. POONAM BISHT

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4RD SEMESTER

SESSION 2021-2022

Freedom of Press

Punit Kumar

SUBMITTED BY. - PUNIT KUMAR

SUBMITTED TO: - Dr. POONAM BISHT

Poonam Bisht

DEV SINGH BISHT COLLEGE

DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

IMAGE AND MEDIA

SUBMITTED BY. - RAHUL MALL

SUBMITTED TO: -DR. POONAM BISHT

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

IMAGE AND MEDIA

SUBMITTED BY. -RAHUL MALL

SUBMITTED TO: -Dr. POONAMBISHT

DEV SINGH BISHT COLLEGE
DSB CAMPUS

MJMC 4TH SEMESTER SESSION 2021-2022

MODERN RADIO

SUBMITTED BY. – RAJAT JOSHI (Rajat)

SUBMITTED TO: - Dr. POONAM BISHT

Poonam Bisht

कुमाऊँ विश्वविद्यालय, नैनीताल

''पाचन तंत्र पर योग का प्रभाव''

योग विज्ञान विभाग

मास्टर ऑफ आर्टस की उपाधि हेतु प्रस्तुत

लघु शोध प्रबन्ध

सत्र् 2021–22

चतुर्थ प्रश्न पत्र

निर्देशक
डॉ० सीमा चौहान
प्रवक्ता योग विज्ञान विभाग
डी०एस०बी० परिसर, नैनीताल

शोधार्थी
गरिमा शर्मा
एम० ए० चतुर्थ सैमेस्टर
डी०एस०बी० परिसर, नैनीताल

योग विज्ञान विभाग
डी०एस०बी० परिसर, कुमाऊँ विश्वविद्यालय
नैनीताल (उत्तराखण्ड)

प्रमाण पत्र

प्रमाणित किया जाता है कि **गरिमा शर्मा**, डी0एस0बी0, परिसर नैनीताल, योग विज्ञान में एम0ए0 (योग) चतुर्थ सेमेस्टर की छात्रा है ।

यह लघु शोध चतुर्थ प्रश्नपत्र के रूप में प्रस्तुत किया गया है। तथा निर्धारित अवधि में पूर्ण किया गया है।

(डॉ० सीमा चौहान)

प्रवक्ता

योग विज्ञान विभाग

डी0एस0बी0 परिसर नैनीताल

उत्तराखण्ड

कुमाऊँ विश्वविद्यालय, नैनीताल

''योग एवं आयुर्वेद''

योग विज्ञान विभाग

मास्टर ऑफ आर्टस की उपाधि हेतु प्रस्तुत

लघु शोध प्रबन्ध

सत्र् 2021–22

चतुर्थ प्रश्न पत्र

निर्देशक
डॉ० सीमा चौहान
प्रवक्ता योग विज्ञान विभाग
डी०एस०बी० परिसर, नैनीताल

शोधार्थी
दीपिका महरा
एम० ए० चतुर्थ सैमेस्टर
डी०एस०बी० परिसर, नैनीताल

योग विज्ञान विभाग
डी०एस०बी० परिसर, कुमाऊँ विश्वविद्यालय
नैनीताल (उत्तराखण्ड)

प्रमाण पत्र

प्रमाणित किया जाता है कि **दीपिका महरा**, डी0एस0बी0, परिसर नैनीताल, योग एवं समग्र स्वास्थ्य में एम0ए0 (योग) चतुर्थ सेमेस्टर की छात्रा है ।

यह लघु शोध कार्य चतुर्थ प्रश्नपत्र के रूप में प्रस्तुत किया गया है। तथा निर्धारित अवधि में पूर्ण किया गया है।

(डॉ० सीमा चौहान)

प्रवक्ता

योग विभाग

विज्ञान एवं लघुशोध कार्य

डी0एस0बी0 परिसर नैनीताल

उत्तराखण्ड

कुमाऊँ विश्वविद्यालय नैनीताल

आसन एवं प्राणायाम का शरीर पर प्रभाव

चतुर्थ प्रश्न पत्र

मास्टर ऑफ आर्टस
की उपाधि हेतु

प्रस्तुत लघु शोध प्रबन्ध
सत्र-2021–22

शोध निर्देशक
डॉ0 सीमा चौहान
प्रवक्ता योग विभाग

शोधार्थी
प्रियंका द्विवेदी
एम0ए0 चतुर्थ सेमेस्टर
डी0एस0बी0 परिसर
नैनीताल
रोल.न0 200125200007

आसन एवं प्राणायाम का शरीर पर प्रभाव

कुमाऊँ विश्वविद्यालय नैनीताल (उत्तराखण्ड)

शोध निर्देशक प्रमाण पत्र

प्रमाणित किया जाता है कि प्रियंका द्विवेदी डी0एस0बी0 परिसर विश्वविद्यालय नैनीताल की एम0ए0 उत्तरार्ध में योग एवं थैरिपी की विद्यार्थी है।

प्रस्तुत लघु भाोध प्रबन्ध आसन एवं प्राणायाम का शरीर पर प्रभाव का विवेचनात्मक अध्ययन इनका मौलिक कार्य है। यह कार्य मेरे निर्देशन में किया है।

इनके उज्जवल भविश्य की कामना करती हूँ।

(डा0 सीमा चौहान)
प्रवक्ता (योग विज्ञान विभाग)
आसन एवं प्राणायाम का
शरीर पर प्रभाव
डी0एस0बी0 परिसर नैनीताल
(उत्तराखण्ड)

कुमाऊँ विश्वविद्यालय
नैनीताल

"योग में पंचकर्म का महत्त्व"

योग एवं समग्र स्वास्थ्य विभाग

मास्टर ऑफ आर्टस की उपाधि हेतु
प्रस्तुत परियोजना कार्य

सत्र : 2022

निर्देशक
डॉ० सीमा चौहान
प्रवक्ता योग विभाग

प्रस्तुतकर्ता
जितेन्द्र सिंह
एम० ए० चतुर्थ सैमेस्टर
डी0एस0बी0 परिसर, नैनीताल

योग एवं समग्र स्वास्थ्य विभाग
कुमाऊँ विश्वविद्यालय, नैनीताल (उत्तराखण्ड)

प्रमाण पत्र

प्रमाणित किया जाता है कि जितेन्द्र सिंह डी0एस0बी0 परिसर नैनीताल योग एवं समग्र स्वास्थ्य विभाग एम0ए0 द्वितीय वर्ष (चतुर्थ सेमेस्टर) का छात्र है।

प्रस्तुत लघु शोध 'योग में पंचकर्म का महत्स' तो इन्होनें चतुर्थ प्रश्न पत्र के रूप में प्रस्तुत किया है। मेरे निर्देशन में निर्धारित अवधि में पूर्ण किया है।

डॉ0 सीमा चौहान
योग विज्ञान विभाग
डी0एस0बी0 परिसर
कुमाऊँ विश्वविद्यालय

कुमाऊँ विश्वविद्यालय, नैनीताल

''योग चिकित्सा''

योग विज्ञान विभाग

मास्टर ऑफ आर्टस की उपाधि हेतु प्रस्तुत

लघु शोध प्रबन्ध

सत्र् 2021–22

चतुर्थ प्रश्न पत्र

निर्देशक
डॉ० सीमा चौहान
प्रवक्ता योग विज्ञान विभाग
डी०एस०बी० परिसर, नैनीताल

शोधार्थी
गरिमा किरौला
एम0 ए0 चतुर्थ सैमेस्टर
डी०एस०बी० परिसर, नैनीताल

योग विज्ञान विभाग
डी0एस0बी0 परिसर, कुमाऊँ विश्वविद्यालय
नैनीताल (उत्तराखण्ड)

प्रमाण–पत्र

प्रमाणित किया जाता है कि **गरिमा किरौला** डी0एस0बी0 परिसर नैनीताल, योग एवं समग्र स्वास्थ्य विभाग एम०ए० द्वितीय वर्ष, चतुर्थ सेमेस्टर की छात्रा है।

प्रस्तुत लघु शोध योग चिकित्सा को इन्होने चतुर्थ प्रश्न पत्र के रूप में प्रस्तुत किया है। मेरे निर्देशन में निर्धारित अवधि में पूर्ण किया है।

डा0 सीमा चौहान निर्देशक,

योग विभाग

डी0एस0बी0 परिसर

कुमांऊ विश्वविद्यालय

नैनीताल

कुमाऊँ विश्वविद्यालय, नैनीताल

"प्राकृतिक चिकित्सा"

योग एवं समग्र स्वास्थ्य विभाग

चतुर्थ प्रश्न पत्र
मॉस्टर ऑफ आर्ट की
उपाधि हेतु प्रस्तुत

लघु शोध प्रबन्ध

सत्र- 2021-22

शोध निर्देशक
डॉ0 सीमा चौहान
विभागाध्यक्ष योग विभाग

शोधार्थी
हिमानी कनवाल
एम0 ए0 चतुर्थ सैमेस्टर
डी0 एस0 बी0 परिसर
नैनीताल

योग एवं समग्र स्वास्थ्य विभाग
कुमाऊँ विश्वविद्यालय, नैनीताल (उत्तराखण्ड)

दिनांक .....

प्रमाण पत्र

प्रमाणित किया जाता है कि हिमानी कनवाल, डी0एस0बी0 परिसर नैनीताल, योग एवं समग्र स्वास्थ्य में एम0ए0 (योग) द्वितीय वर्ष की छात्रा हैं।

यह परियोजना कार्य चतुर्थ प्रश्नपत्र के रूप में प्रस्तुत किया गया है तथा निर्धारित अवधि में पूर्ण किया है।

(डॉ0 सीमा चौहान)
"विभागाध्यक्ष"
योग विभाग
विज्ञान एवं परियोजना कार्य
डी0एस0बी0 परिसर
नैनीताल, उत्तराखण्ड

A DESCRIPTIVE STUDY OF SHATKARMAS AS PER GHERAND SAMHITA ON HUMAN PHYSIOLOGY

DISSERTATION WORK

2021-22

GUIDED BY:
Dr. Seema Chauhan
(Department of Yoga)

SUBMITTED BY:
HIMANI MALARA
(M.A. Yoga)

DEV SINGH BISHT Campus Nainital Uttarakhand

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DEV SINGH BISHT Campus Nainital Uttarakhand

INFORMATION SEEKING BEHAVIOUR OF LAW STUDENT OF DR.RAJENDRA PRASAD INSTITUTE,KUMAUN UNIVERSITY NAINITAL.

A

Dissertation Submitted

To

Department of Library & Information Science

Kumaun University, Nainital

24/09/22

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF LIBRARY AND

INFORMATION SCIENCE

(2021-2022)

SUPERVISON

MR.HEM CHANDRA

DEPTT. LIB.& INF.SC.

KUMAUN UNIVERSITY, NAINITAL

SUBMITTED BY

BHAWANA BISHT

M,LIB & I.SC.

ADOPTING EFFECTIVE PRACTICES TO IMPROVE USAGE OF ACADEMIC LIBRARIES

A

Dissertation Submitted

To

Department of Library & Information Science

Kumaun University, Nainital

24/09/22

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE MASTER'S DEGREE

OF LIBRARY AND INFORMATION SCIENCE

(2021-2023)

UNDER THE GUIDENCE OF:

Dr. Yougal Joshi

H.O.D

Department of Library & Information Science

Kumaun University

SUBMITTED BY:

Suman Lata

Roll No. 210125820005

M.L.I.Sc

"BIBLIOMETRIC STUDY OF MALAYSIAN JOURNAL OF LIBRARY AND INFORMANTION SCIENCE"

A
Dissertation Submitted
To
Kumaun University, Nainital
(Department of Libarary & Information Science)

IN PATIAL FULFILLMENT OF THE REQUIRMENT FOR
THE MASTER DEGREE
OF LIBRARY AND INFORMATION SCIENCE

24/09/22

SUPERVISOR
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SUBMITTED BY
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M.Lib & I.sc.

USE OF INTERNET FOR RESEARCH ACTIVITIES BY THE RESEARCH SCHOLARS OF SCIENCE FACULTY OF D.S.B CAMPUS KUMAUN UNIVERSITY NAINITAL: A STUDY

A

DISSERTATION SUBMITTED

TO

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE
KUMAUN UNIVERSITY, NAINITAL

IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE MASTER DEGREE
OF LIBRARY & INFORMATION SCIENCE

24/08/22

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SUBMITTED BY

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NAINITAL

(2022)

ROLE OF SOCIAL NETWORKING SITE IN LEARNING AND EDUCATION BY THE B.LIB AND M.LIB STUDENT KUMAUN UNIVERSITY, NAINITAL

A
DISSERTATION SUBMITTED
TO
(DEPARTMENT OF LIBRARY & INFORMATION SCIENCE)
KUMAUN UNIVERSITY, NAINITAL

IN PATIAL FULFILLMENT OF THE REQUIRMENT FOR

THE MASTER DEGREE

OF LIBRARY AND INFORMATION SCIENCE

24/04/22

SUPERVISOR

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Kumaun University (Nainital)

SSUBMITTED BY

Shobha Bangari
M.Lib & I.sc.

COMPARATIVE STUDY OF LIBRARY AUTOMATION SOFTWARE (SPECIAL REFERENCE: KOHA, NEWGENLIB, LIBSYS AND SOUL)

A

DISSERTATION SUBMITTED

TO

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE

KUMAUN UNIVERSITY, NAINITAL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE MASTER DEGREE OF

LIBRARY AND INFORMATION SCIENCE

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24/09/22

Supervisor:

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Investigator

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M.Lib.I.Sc.

READING HABITS OF U.G & P.G STUDENTS OF DSB CAMPUS NAINITAL DURING PRE - COVID ERA & POST - COVID ERA (COVID ERA WE ARE LIVING IN)

A
DISSERTATION SUBMITTED

TO

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE
KUMAUN UNIVERSITY, NAINITAL

IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE MASTER DEGREE
OF LIBRARY & INFORMATION SCIENCE

24/09/22

SUBMITTED BY

SAURAV BARGALI

Master of Library & Information Science
(2022)

USER BEHAVIOUR AND THEIR SATISFACTION LEVEL OF DWARAHAT ENGINEERING COLLAGE LIBRARY

A

DISSERTATION SUBMITTED

TO

DEPARTMENT OF LIBRARY & INFORMATION SCIENCE

KUMAUN UNIVERSITY, NAINITAL

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF LIBRARY AND

INFORMATION SCIENCE

(2021-2022)

24/09/22

Supervision

Mrs. Deepa Rana

Dept.of Lib.& Inf.Sc.

Kumaun University, Nainital

Submitted By

Kartik Vedi

Muskmelon (*Cucumis melo*) Peel and Kiwi (*Actinidia deliciosa*) Peel as a possible biosorbent for the heavy metal ions.

A

Dissertation

Submitted for the partial fulfilment for the Degree

of

Master of Science in **CHEMISTRY**

By

Shalini Bisht

M.Sc. 4th Semester

Under the supervision of

Dr. Manoj Dhouni

Assistant Professor

Department of Chemistry

D.S.B. Campus

Kumaun University Nainital -263001

Uttarakhand

2023

Declaration

I hereby declare that this dissertation work titled "**Muskmelon peel and Kiwi peel as possible Biosorbent for heavy metal ions**" represents my own work which have been done for the partial fulfilment of the Degree of Master in Chemistry under the supervision of Dr. Manoj Dhouni,Assistant Professor Department of Chemistry. This dissertation work has not been submitted for the award of any degree, diploma, association or fellowship of any university or institute.

Shalini Bisht

CERTIFICATE

This is to certify that the project is titled "**Muskmelon peel and Kiwi peel as a Possible Biosorbent for heavy metal ions**". This project is submitted by Shalini Bisht, D.S.B Campus Nainital for the requirement for Master's Degree in Chemistry. This project was an authentic work done under by me under my guidance and supervision.

Professor Dr. Chitra Pande
Head
Department of Chemistry

Dr. Manoj Dhouni
Assistant Professor
Department of Chemistry
Supervisor

ACKNOWLEDGEMENT

The project on "**Muskmelon peel and Kiwi peel as possible Biosorbent for heavy metal ions**" has been given to me as a curriculum in 2-year Master's Degree in Chemistry. I tried my best to present the information as clearly as possible that will be easily understandable by the researcher, student, analyst if needed for further studies. I have completed this study under the guidance of Dr. Manoj Dhouni, Assistant Professor. I am sure that this work would not have been possible without his support, understandings and encouragement. I whole heartly thank him for his inspiration, devoted attention and suggestion which were of great help in presenting this work. I also thanks Professor Dr. Chitra Pande Head, Department of Chemistry D.S.B Campus Nainital, for the encouragement and giving us the opportunity. Here I thank Dr. Rautela Sir and Dr. Anita Singh Head, Department of Pharmaceutical Sciences, Bhimtal for the help and support. Also thankful to my batchmate's for the help and support in my dissertation work.

I express my thanks to Dr. Manoj Dhouni for his esteemed supervision. Finally thanks my parents for kind support and love.

Shalini Bisht

CONTENTS

CHAPTER 1

INTRODUCTION

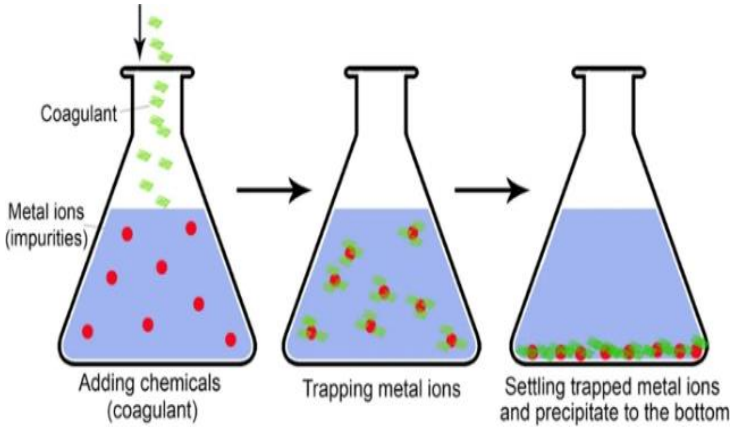
Nature has gifted our earth with four spheres; biosphere, lithosphere, hydrosphere, and atmosphere. Together these spheres are important for maintaining a balanced ecosystem. The industrial revolution or we can say industrialization is accelerated in the past five decades is remarkable. But this increases the of demand indiscriminate exploitation of global resources and due to this anthropogenic activities, increasing population, industrialization and urbanization, all spheres have become polluted. There are two main sources for introduction of heavy metals in the environment are as:

1.Natural sources which includes volcanic emissions, forest fires, deep-sea vents, and geysers

2.Anthropogenic sources which includes mining and smelting sites, metal-manufacturing plants, painting- and coating-industries and tanneries.

Heavy metals are particularly problematic since they are non-degradable and hence linger. These heavy metals are released directly into the environment. Metals exhibit health issues if their concentrations exceed allowable limits. Even when the concentration of metals does not exceed these limits, there is still a potential for bioaccumulation and associated chronic toxicity as heavy metals are known to be accumulative within biological systems. These metals include arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc. Industrial effluents are known to contain heavy metals which originate from metal plating, mining activities, smelting, battery manufacture, tanneries, petroleum refining, paint manufacture, pesticides, pigment manufacture, and printing and photographic industries.

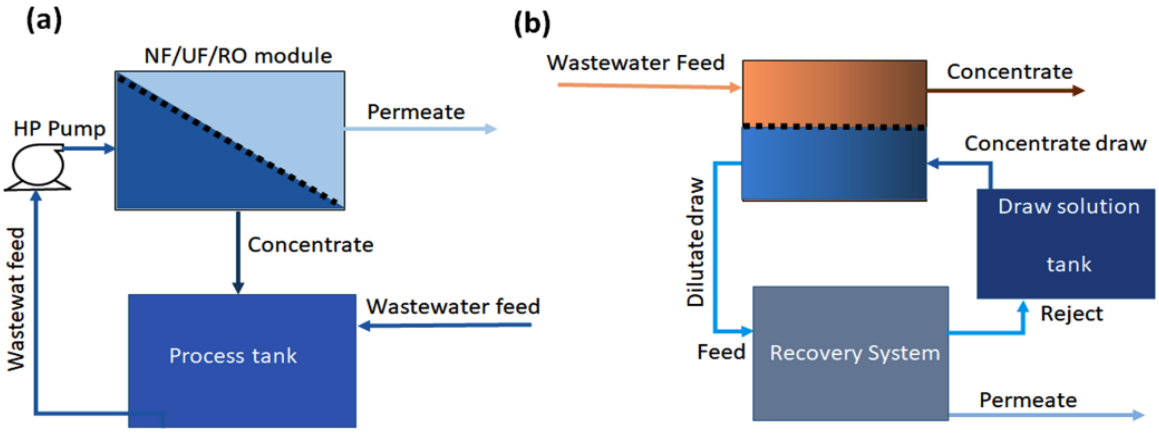
Removal of heavy metal ions from wastewater is of prime importance for a clean environment and human health. So, to protect communities and the planet, harmful heavy metals ions should be eliminated from wastewater. Chemical precipitation, ion exchange, adsorption, membrane filtration, electrochemical techniques and many other ways for removing heavy metal ions are being used.

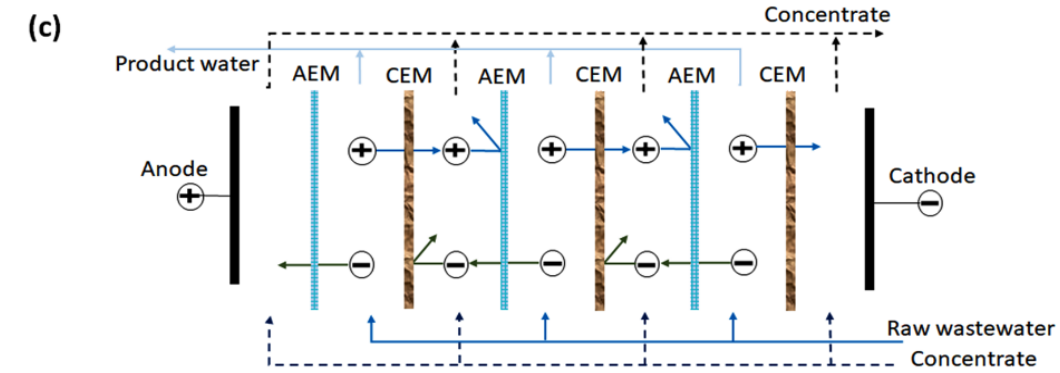


Chemical precipitation is the most common technology used in removing dissolved metals from solutions, such as wastewaters containing toxic metals. The ionic metals are converted to an insoluble form by the chemical reaction between the soluble metal compounds and the precipitating reagent. The effectiveness of a chemical precipitation process is dependent on several factors, including the type and concentration of ionic metals present in

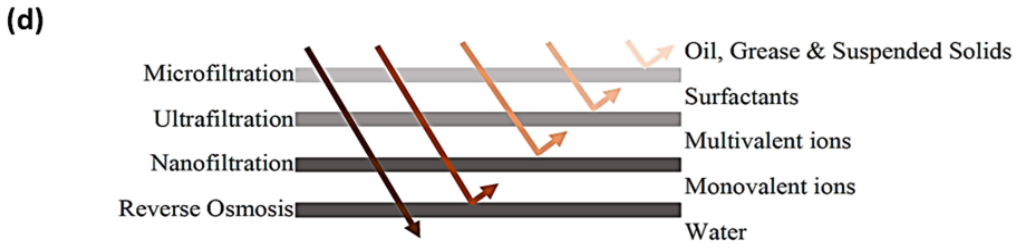
solution, the precipitant used, the reaction conditions (especially the pH of the solution), and the presence of other constituents that may inhibit the precipitation reaction.

Another method is membrane filtration, technological advancement in membrane development has led to an increase in the use of membranes for filtration and extraction of heavy metal ions from wastewater. A simplified schematics for different membrane-based filtration processes is illustrated in figure a, b, c while figure d demonstrates various pollutants that can be separated by different membrane techniques.





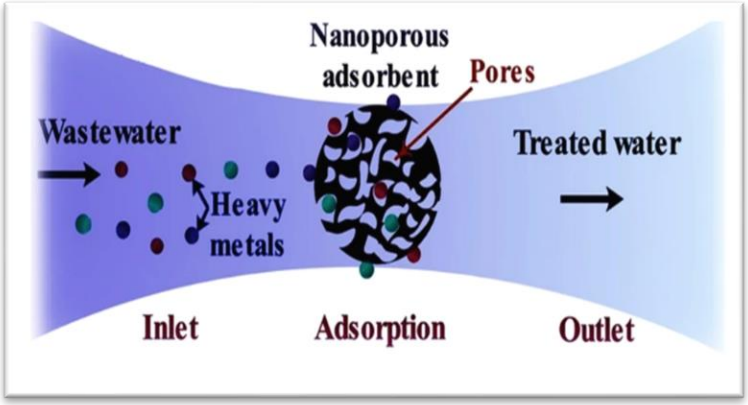
AEM: Anion exchange membrane; CEM: cation exchange membrane



The ion exchange process has been increasingly used for the removal of heavy metals or the recovery of precious metals. In this method layer can remove heavy metal ions through sulfonic acid groups and quaternary amine groups. In addition, the ion exchange layer can be regenerated by electro-deionization, which is meaningful for sustainable membrane usage.

In an electrochemical techniques, oxidation is performed at the anode (positive side), where electrons transfer to the cathode (negative side), at which the reduction process occurs.

These two chemical reactions are called redox (reduction-oxidation), leading to water purification through metal removal. Selection of the anode and cathode mainly decides the type of the electrochemical method and influences the removal efficiency towards specific metal ions. The electrochemical processes are primarily classified into electrodeposition/electroplating, electrooxidation, electroflotation.



Adsorption is a process in which atoms or molecules from a substance it could be liquid, gas or dissolved solid adhere to a surface of the adsorbent. It is a surface phenomenon. Generally, there are two types of adsorption i.e., physical and chemical adsorption. Physical adsorption occurs when the adsorbate molecule are held on adsorbent by physical forces like van der waals forces and chemical adsorption occurs when adsorbate molecule is held on adsorbent by chemical forces like covalent bonds. The adsorption mechanism is defined by the physicochemical properties of adsorbent and heavy metals and operating conditions (i.e., temperature, adsorbent amount, pH value, adsorption time, and initial concentration of metal ions). Generally, heavy metal ions can be adsorbed onto the adsorbent's surface. This method was reported to have low operating costs, high removal capacity, easy implementation, environmental friendly and simple treatment by regenerating the adsorbed heavy metal ions. When it comes to designing new adsorbents and separation methods, studying the adsorption mechanism is critical.

Therefore, a method introduced was Biosorption, it is a process which represents a biotechnological innovation as well as a cost effective excellent tool for removing heavy metals from aqueous solutions. Biosorption is a process of rapid and reversible binding of ions from aqueous solutions onto functional groups that are present on the surface of biomass.

Bacterial cell wall encountering the metal ion is the first component of biosorption. The metal ions get attached to the functional groups (amine, carboxyl, hydroxyl, phosphate, sulfate, amine) present on the cell wall.

****

CHAPTER 2

ADSORPTION

2.1 What is adsorption?

The term adsorption was first coined in 1881 by a German physicist named Heinrich Kayser. Adsorption is often described as a surface phenomenon where particles are attached to the top layer of material. It normally involves the molecules, atoms or even ions of a gas, liquid or solid in a dissolved state that is attached to the surface. The use of solids for removing substances from either gaseous or liquid solutions has been widely used since biblical times. This process, known as ***adsorption***, involves nothing more than the preferential partitioning of substances from the gaseous or liquid phase onto the surface of a solid substrate. From the early days of using bone char for decolorization of sugar solutions and other foods, to the later implementation of activated carbon for removing nerve gases from the battlefield, to today's thousands of applications, the adsorption phenomenon has become a useful tool for purification and separation.

Adsorption is mainly a consequence of surface energy. Generally, the surface particles which can be exposed partially tend to attract other particles to their site. Interestingly, adsorption is present in many physical, natural, biological and chemical systems.

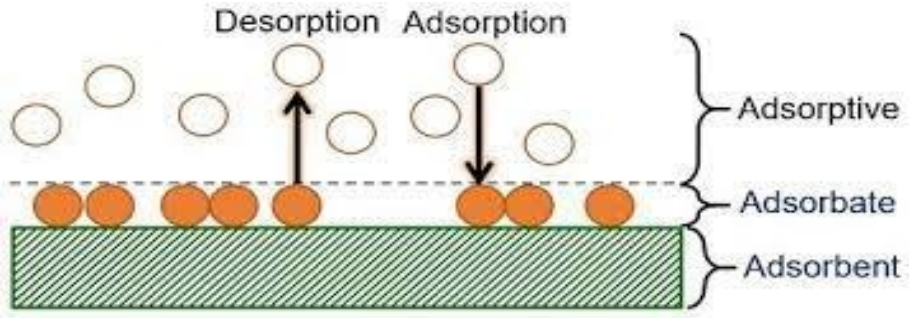
Adsorption is the adhesion of atoms, ions or molecules from a gas, liquid or dissolved solid to a surface. This process creates a film of the adsorbate (solute) on the surface of the adsorbent (solvent)."

Or

"Adsorption is a process that involves the accumulation of a substance in molecular species in higher concentrations on the surface. If we look at Hydrogen, Nitrogen and Oxygen, these gases adsorb on activated charcoal. Also, we note that adsorption is different from absorption.

For the adsorption process, two components are required:

- **Adsorbate:** An adsorbate is any substance that has undergone adsorption on the surface. Substance that is deposited on the surface of another substance. For example, H_2, N_2 and O_2 gases.
- **Adsorbent:** Surface of a substance on which adsorbate adsorbs. Adsorbents have small pore diameters so that there is a high surface area to facilitate adsorption. The pore stability and resistance to abrasion. Depending on the application, the surface may be hydrophobic or hydrophilic. Both polar and nonpolar adsorbents exist. The adsorbents come in many shapes, including rods, pellets, and etc. shapes. Some example are: alumina, silica, graphite



2.2 Mechanism of Adsorption

The molecules or atoms that make up the majority of the adsorbent are symmetrically surrounded by other atoms or molecules. As a result, it will have no net attractive force. However, since the surface molecules are not symmetrically surrounded, they have some residual force due to the valence force. Adsorption occurs at the surface of the adsorbent due to the residual force remaining at the surface.

As we know, adsorption is a spontaneous process (ΔG = negative). Thus from thermodynamics,

$$\Delta G = \Delta H - T\Delta S$$

where ΔH = change in enthalpy, ΔS = entropy change, T = absolute temperature. Entropy reduces when the adsorbate is adsorbed on the surface of the adsorbent, that is S = negative. As a result, the previous equation becomes

$$\Delta G = \Delta H + T\Delta S$$

ΔH must be negative and greater than TΔS in order to get ΔG = negative. Thus, the adsorption process is exothermic as ΔH is negative for the exothermic process.

2.3 Types of Adsorption

Adsorption is of two types:

1. Chemical adsorption
2. Physical adsorption

- **Physical Adsorption:** Physical adsorption occurs when an adsorbate is kept on the adsorbent's surface by a weak van, der Waal's force of attraction. Adsorption of oxygen on charcoal is an example of physical adsorption.

The characteristics of physical adsorption are as follows:

1. **Physical change**: In this, there is no chemical bond formation. It is simply a physical change. Therefore, it is called physical adsorption.
2. **Non-specific nature**: As van der Waals forces are universal and not associated with a particular type of substance, physisorption is non-specific.

3. **Nature of adsorbate**: Easily liquefiable gases have stronger van der Waals forces of attraction.
4. **Reversible nature**: Physisorption is generally reversible. It can reverse by decreasing the pressure or increasing the temperature.
5. **Enthalpy of adsorption**: Physisorption is an exothermic process, but the heat of adsorption involved is quite low, about 20–40kJ/mol20–40kJ/mol.
6. **Multi-layered nature**: Due to the non-specific nature and van der Waals forces, physisorption is multi-layered.
7. **Effect of temperature**: Physisorption decreases with an increase in temperature. The energy of activation of physical adsorption is almost equal to zero. Therefore, the rate of adsorption remains unaffected at a very low temperature.
8. **Effect of pressure**: Physisorption increases with an increase in pressure.

- **Chemical Adsorption:** Chemical adsorption occurs when an adsorbate is kept on the adsorbent's surface by a strong chemical bond. Adsorption of hydrogen on nickel is one of the examples of it.

The characteristics of chemical adsorption are as follows:

1. **Chemical change:** It involves the formation of a chemical bond between the adsorbate and the adsorbent.
2. **Highly specific nature**: Chemisorption is highly specific because it occurs only if chemical bond formation is possible between the adsorbate and the adsorbent.
3. **Nature of adsorbate**: Adsorbate should have the ability to form a chemical bond with the adsorbent.
4. **Irreversible nature**: Due to irreversible chemical change in most cases, chemisorption is generally irreversible.
5. **Enthalpy of adsorption**: Chemisorption is an exothermic process, and the heat of adsorption involved is about 80–240kJ/mol.80–240kJ/mol.
6. **Unimolecular layers of adsorption**: Chemisorption forms a unimolecular layer. The chemical bond is formed only with the layer of molecules coming in direct contact with the surface of the adsorbent.
7. **Effect of temperature:** Chemisorption is exothermic. It is favoured at low temperature. The extent of adsorption first increases and then decreases with a temperature rise.
8. **Effect of pressure**: Chemisorption increases with an increase in pressure. At higher pressure, the gas molecules come closer to the surface of the adsorbent and help in the formation of chemical bonds.

2.4 Factors Affecting Adsorption

Factors affecting adsorption are as follows:

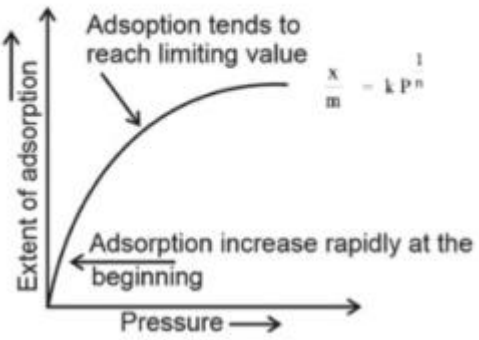
1. **Adsorption and Surface area of the adsorbent**: Since adsorption is a surface phenomenon, the amount of adsorption is proportional to the area of the surface. The total amount of gas absorbed increases as the surface area of the adsorbent increases.

2. **Nature of Gas**: The amount of gas that a solid can absorb is determined by the gas's composition. In general, the more liquefiable a gas is, the easier

3. **Temperature:** Physical adsorption decreases with an increase in temperature, while chemisorption increases with an increase in temperature.

4. **Pressure**: The adsorption of gas increases with increasing pressure at a constant temperature.

Graphical representation:



5. **Exothermic nature**: The heat of adsorption can be defined as the energy liberated when 1 g mol of a gas is adsorbed on a solid surface. When the temperature is increased the kinetic energy of the gas molecules also increases which results in more number of collisions between the molecules and the surface

2.5 Application of Adsorption

Some of the applications of adsorption:

- **Production of high vacuum:** The last traces of air can be absorbed by charcoal from a vessel evacuated by a vacuum pump to achieve a very high vacuum.

- **Gas masks:** A gas mask (a device made of activated charcoal or a combination of adsorbents) is commonly used in coal mines to adsorb poisonous gases.

- **Control of humidity:** Adsorbents such as silica and aluminium gels are used to remove moisture and control humidity.
- **Colour removal from solutions:** Animal charcoal removes colours from solutions by adsorbing coloured impurities.

- **Heterogeneous catalysis:** Adsorption of reactants on the solid surfaces of catalysts accelerates the reaction. There are numerous industrially important gaseous reactions that use solid catalysts. The production of ammonia with iron as a catalyst, the production of H_2SO_4 through a contact process, and the use of finely divided nickel in the hydrogenation of oils are all excellent examples of heterogeneous catalysis.

- **Separation of inert gases:** Adsorption on coconut charcoal at different temperatures can separate a mixture of noble gases due to the difference in the degree of adsorption of gases by charcoal.

- **In curing diseases:** Several drugs are used to kill germs by becoming adsorbent on them.

- **Froth floatation process:** Using pine oil and a frothing agent, a low-grade sulphide ore is concentrated by separating it from silica and other earthy matter.

- **Adsorption indicators:** Surfaces of certain precipitates, such as silver halides, have the property of adsorbing dyes such as eosin, fluorescein, and others, resulting in a distinct colour at the endpoint.

- **Chromatographic analysis:** Chromatographic analysis based on the adsorption phenomenon has a variety of applications in analytical and industrial fields.

- **Purification of water:** Impurities are adsorbed on the alum stone when alum stone is added to water, and the water is purified.

- **Separation of noble gases by Dewar's flask process:** In the presence of heated coconut charcoal, a mixture of noble gases (Neon, Argon, and Krypton) is passed through a Dewar's flask. Argon and Krypton gels have been absorbed, leaving Neon.

****

CHAPTER 3

BIOSORPTION

3.1 What is Biosorption?

Biosorption refers to a set of processes that involve physical and chemical adsorption, ion exchange, electrostatic interactions, complexation, chelation, and microprecipitation, that occur in the cell wall and precede the anaerobic or aerobic biodegradation processes. It is characterized by high selectivity and efficiency (high performance and low cost). Natural materials, such as marine algae or weeds, or industrial waste, such as excess activated sludge or fermentation wastes, may be used as biosorbents.

Heavy Metals	Source	Threshold limit value (mg/m3)
Arsenic	Pesticides	0.5
Cadmium	Welding	0.2
Lead	Paint	0.2
Manganese	Fuel addition	5
Chromium	Mines	1
Copper	Mining, chemical industry	1
Mercury	Pesticides, batteries	0.01
Zinc	Refineries	5

Biological sludge wastewater treatment processes utilize biosorption and bioaccumulation as part of organic and inorganic pollutants, priority substances, heavy metals, and organic pollutants/micropollutants removal mechanisms.

The idea of using biomass in technologies to protect the environment originates at the early twentieth century when Arden and Lockett found that some species of living bacteria are capable of removing nitrogen and phosphorus from wastewater during aeration This process is known as activated sludge process. The removal mechanism has been explained in the context of bioaccumulation capacity. This phenomenon as well as the activation process itself has continued to be widely used. The break occurred in the late 1970s of the last century. Knowing the sequestration nature of biologically inactive biomass has led to a shift in research from bioaccumulation to biosorption.

Biosorption is a physicochemical process that utilizes the mechanisms of absorption, adsorption, ion exchange, surface complexing, and precipitation processes. It is a spontaneous process independent of the metabolism of microorganisms.

Biosorption is defined as the passive adsorption of toxic substances by dead, inactive or biologically derived materials. Biosorption is a consequence of several metabolic processes

independent of the cell membrane, the mechanisms responsible for the absorption of the pollutant vary according to the type of applied biomass.

It can also be defined as, Biosorption is "ability of biological materials to accumulate heavy metals from wastewater through metabolically mediated (by the use of ATP) or spontaneous physicochemical pathways of uptake (not at the cost of ATP), or as a property of certain types of inactive, non-living microbial biomass which bind and concentrate heavy metals from even very dilute aqueous solutions". It is a complex process that depends on different-factors like cell physiology, physicochemical factors such as pH, temperature, contact time, ionic strength, and metal concentration, chemistry of the metal ions, cell wall composition of microorganisms. Biosorption of different heavy metals example: cadmium, silver, lead, nickel etc. by using microorganisms like fungi, algae or bacteria was studied by different groups.

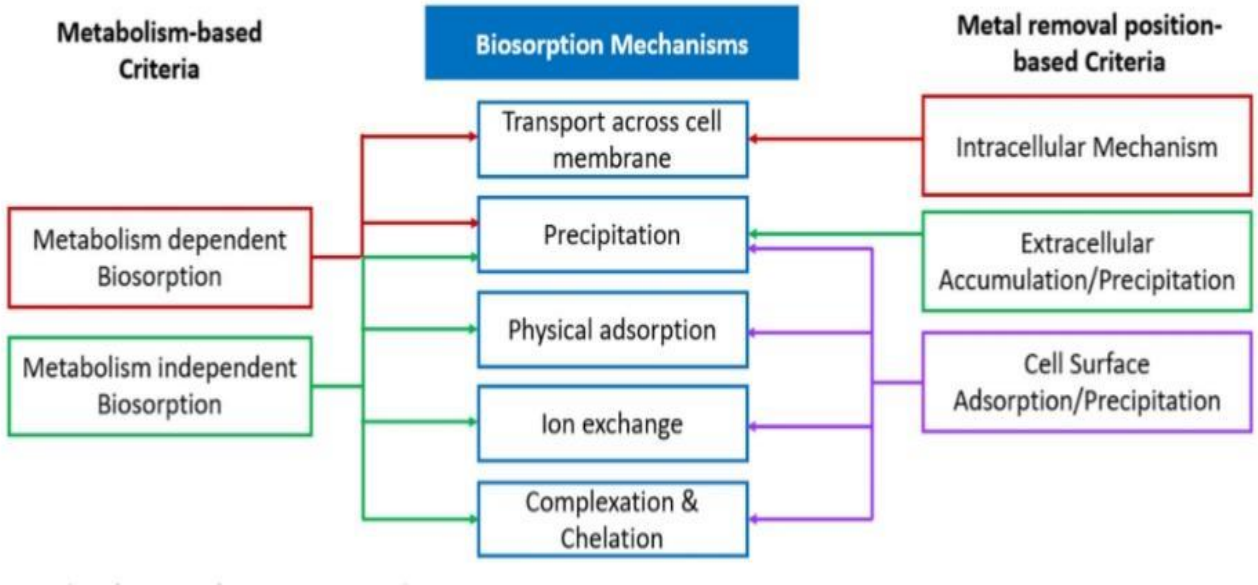
Heavy metals are usually defined as metals having density more than 5 g/cm^3. They are classified as essential and non-essential metals. The metals which are need for normal cellular growth are essential metals example: zinc, nickel, copper, etc. Such metals are required in low concentrations (nM), but at higher concentrations (μM to mM) all heavy metals have detrimental effects to organisms. If the metals have no known biological function, they are called as non-essential metals e.g., lead, cadmium, mercury. Such metals are toxic at any concentration. The list of essential and non-essential heavy metals is given. There are 90 naturally occurring elements in periodic table, 21 are non-metals, 16 are light metals and the remaining 53 (with as included) are heavy metals. In periodic table, transition elements are mostly heavy metals. They have incompletely filled 'd' orbitals which allow heavy-metal cations to form complex compounds that may or may not be redox-active. In this way, heavy metals play an important role as 'trace elements' (cobalt, copper, nickel, and zinc) in sophisticated biochemical reactions and are important cofactors for metallo-proteins and enzymes. The toxicity of heavy metal ions starts when their concentration becomes higher in the cells, due to which they form complex compounds. Microorganisms acquire resistance to these toxic metals by lateral gene transfer. The interaction of microorganism with metal ions depends on factors like oxidation state of the metal ion, chemical/physical nature of metals, growth phase of microorganism etc.

3.2 Mechanism of biosorption

Biosorption of heavy metals and organic compounds occur due to the physicochemical interactions between the metal and the functional groups present at the surface of the biosorbent. The processes involved include physical adsorption, ion exchange, and chemical sorption that are not related to metabolism. The cell walls of microorganisms consist mainly of polysaccharides, proteins and lipids and have carboxyl, sulfate, phosphate and amino groups to form bonds with metals, and their complexes. Such biosorption occurs relatively rapidly and can be reversible. Various mechanisms of removal of heavy-metal by activated sludge microorganisms. e.g., by Pagnanelli and others.

Organic pollutants differ significantly in their structure. As a result, biosorption is affected by molecule size, charge, solubility, hydrophobicity, and reactivity. The biosorbent process can also significantly influence the type of biosorbent and the composition of wastewater. The lipophilic nature of the hydrophobic compounds allows them to pass through

cell membranes and absorb into the organic cell matrix. An important component of biosorption of organic pollutants may be absorption in cell membranes or lipid containing cell structures. Other mechanisms are involved in biosorption include surface adsorption, chemisorption, and complexation.



The complex structure of microorganism implies that there are many ways for the metal to be taken up the microbial cell. Biosorption mechanism are various:

According to the dependence on the cell's metabolism, biosorption mechanism be divided into:

1.Metabolism dependent

2.Non-metabolism dependent

According to the location from where the metal removed from the solution, then biosorption mechanism divided into:

1.Extracellular mechanism

2.Intracellular mechanism

3.Cell surface sorption/precipitation

3.3 Factors Affecting Biosorption

Factors affecting biosorption are as follows:

- **Temperature**: Temperature affects the surface activity of the biosorbent and thus the biosorption capacity. The effect of temperature on the biosorption process depends on the nature of the process. Increasing the temperature for an exothermic biosorption process Would result in a decrease in metal ion removal, the Opposite is true for

endothermic biosorption processes. Likewise, decreasing the Temperature for an exothermic biosorption process Would result in an increase in metal ion removal, the Opposite is true for endothermic biosorption processes. Biosorption is not highly affected between changes in temperatures ranging from 20˚C up to 35˚C.

- **Contact time:** Contact time usually refers to the time allocated for biosorption process to take place. Biosorption capacity is not directly affected by contact time of the biosorbent and sorbate, however it can act as a limiting factor. Under experimental conditions, increasing contact time would allow the biosorbent material to unveil the maximum biosorption capacity. When the biosorbent reaches its maximum biosorption capacity. At defined conditions its binding sites become fully Saturated, increasing contact time would not have any further effect.

- **Biomass:** At low biomass dosage an increase in the specific uptake of metal ions has been observed. Nevertheless, using low biomass dosage in complex contaminated water would increase competition for binding site of biosorbent and will limit the biosorption capacity of the biosorbent. Increasing the biomass dosage would decrease the competition between metal ions present for binding to the functional groups, specifically when more than one metal ion is present. In most of the published researches, the amount of biomass used was between 0.5 -6.0 g/L.

- **Initial metal concentration:** As a biosorbent for heavy metals, it was found that the metal biosorption increases when the initial metal concentration increases (Ashraf, 2011). Increasing initial metal concentration, has a similar effect as increasing contact time. Using low metal concentration would not unveil the true maximum biosorption capacity of the biosorbent, as many metal binding sites may not be occupied. Increasing the metal concentration up to full saturation of binding sites of the biosorbent would reveal the full potential of metal removal. Upon saturation of biosorbent, further increasing the initial metal concentration will not be effective. In most of the published researches, the initial metal concentration used in experimental conditions was 5-200 mg/L.

- **pH:** The pH under which biosorption takes place is very significant and directly affects the biosorption capacity, and in some cases the mechanism via which biosorption takes place as. pH affects both the chemistry of the functional groups of biosorbent and the chemistry of metal ions. The biosorption capacity often increases with the increase of pH until it reaches the optimum pH where the maximum biosorption capacity is observed. The biosorption of metal ions such as copper, cadmium, nickel, cobalt and zinc are usually reduced at low acidic pH conditions, in which competition occurs between the metal cations and hydronium ions for the binding sites of the biosorbent. pH does not only affect the functional groups of the biosorbent, it also affects the chemistry of metal ions.

- **Other factors:** Surface area of the biosorbent material affects the biosorption capacity of the biosorbent, higher surface area would increase biosorption under the same conditions.

3.4 Advantages of Biosorption

Advantages of biosorption are as follows:

- Cheaper production of biomass (bacteria or fungi)
- Use of biomass for removal of heavy metals
- Multiple heavy metals uptake at a time
- Treatment of large volumes of wastewater
- No need for chemical additions as highly selective for uptake and removal of specific metals
- Functional over wide range of conditions including temperature, pH, presence of other metal ions, etc.
- Easy and cheaper desorption of metals attached to biomass
- Reduced volume of waste or toxic materials production

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CHAPTER 4

Adsorption Isotherm

Definition:

Adsorption isotherms have been of immense importance to research dealing with environmental protection and adsorption techniques.

A graph between amount of gas adsorbed per gram of the adsorbent (x/m) and the equilibrium pressure of the adsorbate at constant temperature is called **adsorption Isotherm.**

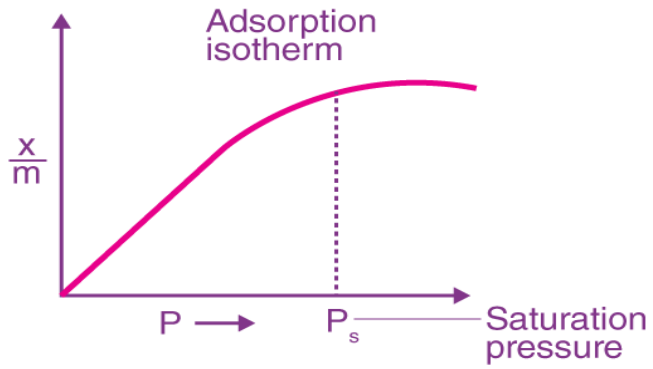
Or

An adsorption isotherm is a graph that represents the variation in the amount of adsorbate (x) adsorbed on the surface of the adsorbent with the change in pressure at a constant temperature.

As we know according to Le Chatelier's principle, the direction of equilibrium in a reaction shifts in the direction in which stress is relieved. So, here we can see that upon application of excess pressure on the system, the equilibrium shifts in the direction where the number of molecules decreases so that the pressure in the system decreases.

x/m = amount of adsorption

x = mass of adsorbate



m = mass of adsorbent

As the pressure increases so the adsorption increases. And after certain point it becomes constant. The value of x/m increases and pressure also increases and reaches maximum corresponding to pressure P which is called **equilibrium pressure.**

From the graph, we also observe that after attaining a pressure P_s, that is the **saturation pressure**, the variation in the amount of adsorbent adhering to the adsorbate becomes zero. This happens because the surface area available for adsorption is limited and as all the sites are occupied, a further increase in pressure does not cause any difference.

Different adsorption isotherms have been proposed by different scientists namely

- ***Langmuir isotherm***
- ***Freundlich isotherm***
- ***BET theory***

4.1 Freundlich Adsorption Isotherm

The derivation of extent of adsorption (x/m) with pressure (P) at a particular temperature was given mathematically by **Freundlich** in 1909.

The relationship between quantity of gas adsorbed on the surface of adsorbent at varying pressure is expressed in terms of equation

$x/m = K. P^{1/n}$

From the adsorption drawn the following observation can be easily made such as:

1. **At low pressure**: The graph is almost straight line which indicate that x/m is directly proportional to pressure.
   It is expressed as: $x/m = KP$

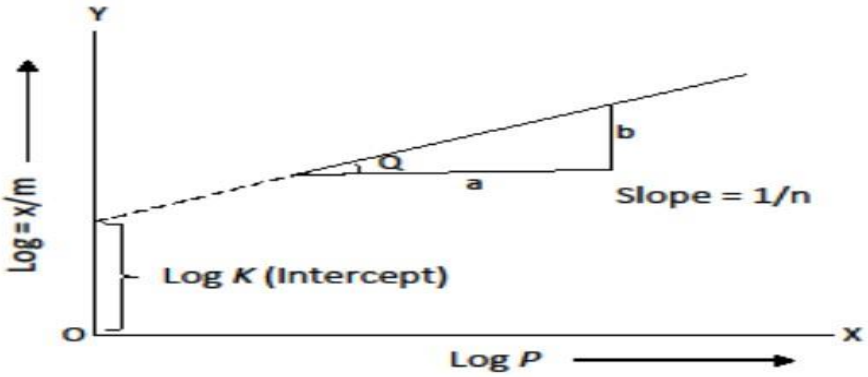
2. **At hight pressure**: The graph becomes almost constant which means that it is independent of x/m.
   It is expressed as: $x/m = KP^0$

3. **At intermediate pressure**: x/m will depend on the power of pressure which is between 0 to 1.
   It is expressed as: $x/m = P^{1/n}$

Where, n can be any whole number value which depends upon the nature of adsorbate and adsorbent.

The above relationship is called **Freundlich adsorption Isotherm.**

- $\log x/m = \log K + 1/n \log P$
- Slope of line equal to 1/n and intercept equal to log K.



4.1.1 Limitations:

The limitations of the Freundlich adsorption isotherm is as:

- There is no theoretical background to the Freundlich equation.
- It is only applicable for low pressure.
- Constant used in equation K and n vary with temperature.

4.2 Langmuir adsorption Isotherm

Langmuir adsorption Isotherm is given by German scientist **Langmuir** in 1916.

The major assumptions of Langmuir adsorption Isotherm was:

1. Adsorption is always monolayer.
2. The adsorbed layer is homogenous across the adsorbent.
3. No interaction between the molecules that are adsorbed next to one another.
4. Each adsorbent has different energy sites but the adsorption energy is same for all of them.
5. Adsorption is a reversible process.
6. The rate of adsorption depends on the fraction of uncovered (unoccupied) and pressure.

Langmuir proposed that gas molecules collide with a solid surface and get adsorbed. Some of these molecules then quickly evaporate or are desorbed. Between the two opposing process (adsorption and desorption) a dynamic equilibrium is eventually established.

The Langmuir adsorption isotherms **predict linear adsorption at low adsorption densities and a maximum surface coverage at higher solute metal concentrations.**

Langmuir adsorption Isotherm equation is

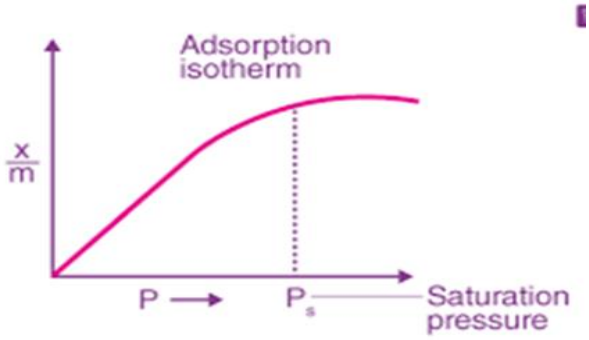
$\Theta = K_1P/K_2+K_1P$

Here, K_1/K_2 = b constant

The amount of gas adsorbed on the surface of adsorbent is proptional to Θ.

$x/m \propto \Theta$

$x/m = K_3 \Theta$ Here $K_3 = a/b$ Then, $x/m = aP/1+bP$



4.2.1 Limitations:

The limitations of Langmuir adsorption isotherm are as:

- This work resonably well for the low pressure but it cannot provide an exact relationship at high pressure.
- Describe only the formation of monolayer.
- Effect of temperature on adsorption is not considered.
- Relationship between heat of adsorption and surface area is not explained.

4.3 Brunauer–Emmett–Teller (BET)Theory

The BET theory was developed by Stephen Brunauer, Paul Emmet, and Edward Teller in 1938. The BET theory was an extension of the Langmuir adsorption theory developed by I. Langmuir. It aims to explain the physical adsorption of gas molecules on a solid surface.

The Langmuir theory relates the monolayer adsorption of the gas molecules called adsorbates into a solid surface. But BET theory explains the physical adsorption of gas molecules on solid surface or BET theory applies to system of multilayer adsorption.

The BET theory extends the Langmuir theory to multilayer adsorption with these additional assumptions.

- Gas molecules will physically adsorb on solid in layers infinitely.
- The different adsorption layers do not interact.
- The theory can be applied to each layer.
- Dynamic equilibrium exists between successive layer.
- Rate of evaporation is equal to rate of condensation of preceding layer.
- The enthalpy of adsorption of first layer is constant whereas that of any layer above first layer is the energy of liquefaction of adsorbate.
- Condensation forces are the principles forces of attraction.

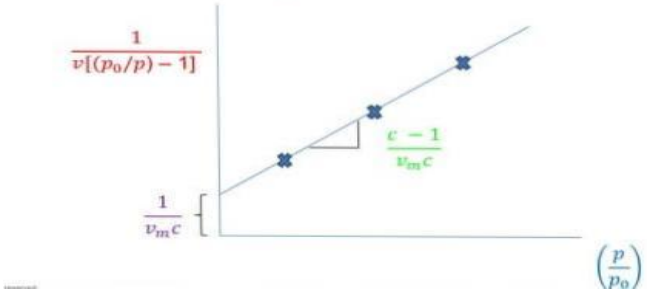
$$\frac{P}{V_{total}(P-P_0)} = \frac{1}{V_{mono}C} + \frac{c-1}{V_{mono}C}\left[\frac{P}{P_0}\right]$$

$$V_{total} = \frac{V_{mono}C\left[\frac{P}{P_0}\right]}{\left[P-\frac{P}{P_0}\right]\left[1+C\left[\frac{P}{P_0}\right]-\frac{P}{P_0}\right]}$$

V_{total} = volume of gas adsorb at pressure P
V_{mono} = volume adsorbed when surface curved with monolayer
c = BET constant

$$\frac{1}{v[(p_0/p)-1]} = \frac{c-1}{v_m c}\left(\frac{p}{p_0}\right) + \frac{1}{v_m c}$$

$$y = mx + b$$



4.3.1 Application:

Some of the application are as follows:

- **Catalysis:** In the field of solid catalysis, the surface area of catalysts is an important factor in catalytic activity. Inorganic materials such as mesoporous silica and layered clay minerals have high surface areas of several hundred m^2/g calculated by the BET method, indicating the possibility of application for efficient catalytic materials.

- **Activated carbon**: Activated carbon has strong affinity for many gases and has an adsorption cross section of 0.162 nm^2 for nitrogen adsorption at liquid-nitrogen temperature (77 K). BET theory can be applied to estimate the specific surface area of activated carbon from experimental data, demonstrating a large specific surface area, even around 3000 m^2/g. However, this surface area is largely overestimated due to

enhanced adsorption in micropores, and more realistic methods should be used for its estimation, such as the subtracting pore effect (SPE) method.

- **Cement and concrete**: The rate of curing of concrete depends on the fineness of the cement and of the components used in its manufacture, which may include fly ash, silica fume and other materials, in addition to the calcinated limestone which causes it to harden. Although the Blaine air permeability method is often preferred, due to its simplicity and low cost, the nitrogen BET method is also used.

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CHAPTER 5

Kiwi Peel: Chemical Analysis

Chemical analysis:

- **Kiwi peel:** The conversion of kiwi peels gives huge quantities of agriculture by-products. The employment of agricultural wastes could minimize the waste disposal problems and serve as a prospect novel source of proteins, fats, carbohydrates, vitamins, minerals and bioactive substances. These components are important nutrients and active constituents as a food source. Accumulation of the wastes of agriculture food industry leads not only to environmental regression and pollution but also to the deprivation of materials of great economic value. These materials can be processed to produce worthy products which have economic potential health benefits such as fuel, food supplements and drug products. Kiwi peels as a natural source of antioxidant and antimicrobial agents in food industries.
- **Chemical composition:** Kiwi peels were analyzed for moisture, ash, crude protein, crude lipid and total carbohydrate as well as macro and microelements. It also consists of Epicatechin, and also phenolic group such as given below:

Phenolic compounds
Gallic acid
Protocatechuic acid
Gentisic acid
Catechin
Chlorogenic acid
Caffeic acid
Syringic acid
Vanillic acid
Ferulic acid
Sinapic acid
Coumarin
Cinnamic acid
Rosmarinic acid
Chrysin acid
Ellagic acid
Tannic acid
Pyrogallol
Quercetin
Rutin
Acacetin
Oleuropein

Proximate analysis of kiwi peels

Proximate analysis*	Composition (%)
Moisture	85.27± 0.18
Carbohydrate	76.92+0.76
Crude fat	3.70±0. 55
Crude protein	12.62± 0.56
Ash content	6.50± 0.40

1.Kiwi

2.Kiwi Peel

3.Powder form of Kiwi Peel

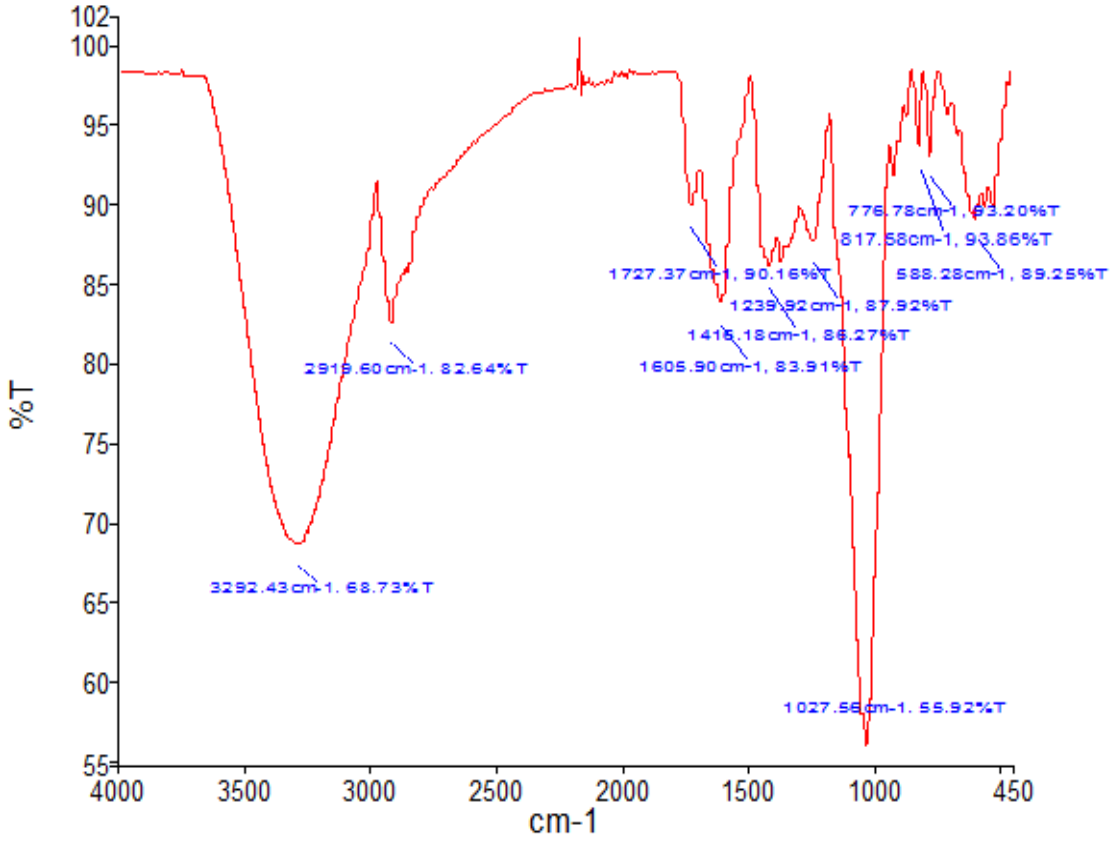
5.1 FTIR: FTIR Data of Kiwi Peel

Spectrum Name	Number Of Peaks
Kiwi peel	10

Kiwi peel Details:

Peak Number	X (cm-1)	Y (%T)
1	3292.43	68.73
2	2919.6	82.64
3	1727.37	90.16
4	1605.9	83.91
5	1416.18	86.27
6	1239.92	87.92
7	1027.56	55.92
8	817.58	93.86
9	776.78	93.2
10	588.28	89.25

Kiwi peel Spectra:



5.2 Kiwi Peel: Possibility as Biosorbent

Biosorbent are those which are able to absorb containments from the environment. We shave seen that in Kiwi Peel there consist of functional groups like: Phenol, alkane, carbonyl group (aldehyde, ketone, carboxylic acid), aromatic ring, nitro, ester, ether, fluoride, alkenes (out of plane), chloride, halogen.

These functional groups contain a hetero atom like oxygen, nitrogen, fluoride, which have lone pairs of electrons and these lone pairs of electron act as good binding site for heavy metal ions. As it contains a plentiful functional groups in their structures being able to adsorb positively charged metal ions. Their abilities to remove ions from waste aqueous solutions can be investigated by using various parameters, i.e. the effects of biosorbent dosages, pH values, contact time, and initial metal ion concentrations on biosorption process. Hence, using this as biosorbents to remove heavy metals would help providing effective biosorbent for the treatment of metal-bearing wastewater.

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CHAPTER 6

Muskmelon Peel: Chemical Analysis

Chemical analysis:

Muskmelon Peel: To characterize the profile of bioactive compounds and the antioxidant activity of melon peels. Melon peels were divided into three fractions: a solid fraction with a higher content of carbohydrates (84.81%); a liquid fraction with a higher ash content (11.5%); and a pellet fraction with a higher protein content (34.90%). The structure study revealed a composition of cellulose (27.68%), hemicellulose (8.2%) and lignin (26.46%) in the solid fraction. The liquid fraction had the highest antioxidant activity. Flavones, hydroxybenzoic and hydroxycinnamic acids were the main phenolic classes found in all fractions. In addition, β-carotene, lutein, β-cryptoxanthin and violaxanthin had also been quantified. Melon fractions were rich in nutrients and bioactive substances and could be useful in the development of novel functional products, considering the growing market demand for safe and healthy food products.

Chemical Composition: In the melon peel aqueous extract, eight compounds were identified: gallic acid, salicylic acid, ellagic acid, catechin, quercetin, vanillin, eugenol, and vanillic acid.

1.**Muskmelon**

2. **Muskmelon Peel**

3.**Powder Form of Muskmelon Peel**

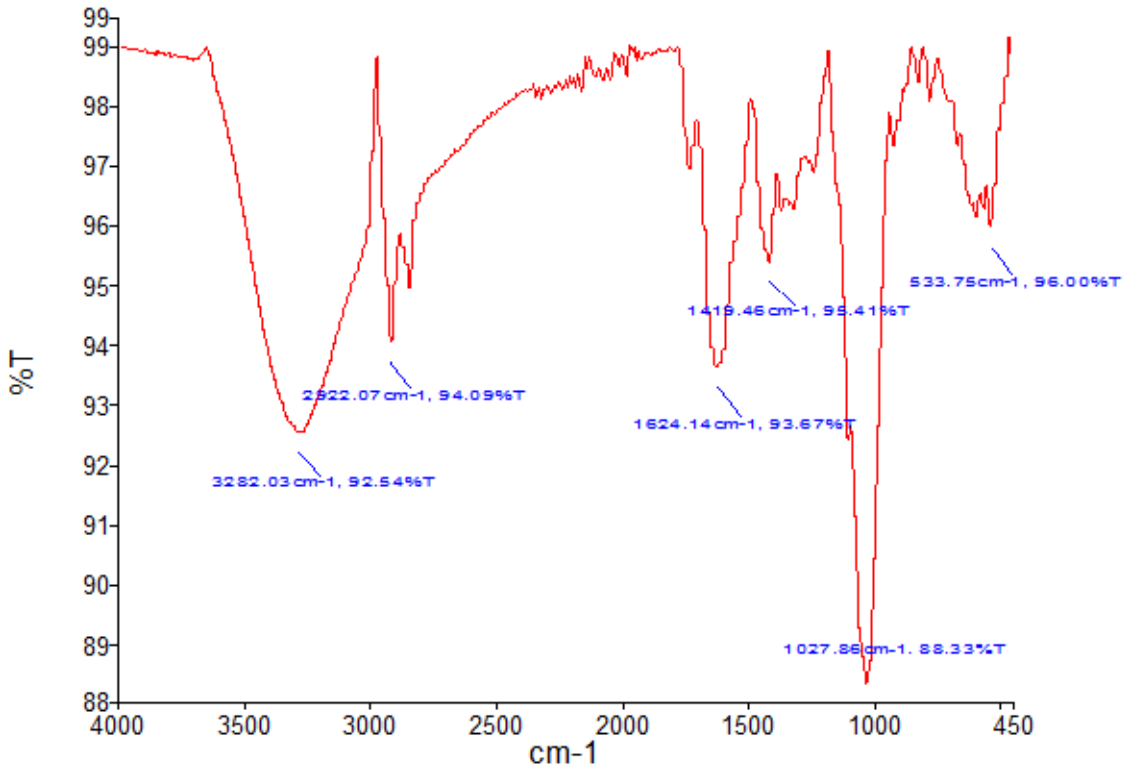
6.1 FTIR: FTIR Data of Muskmelon Peels:

Spectrum Name	Number Of Peaks
Muskmelon peel_	6

Muskmelon Peel Details:

Peak Number	X (cm-1)	Y (%T)
1	3282.03	92.54
2	2922.07	94.09
3	1624.14	93.67
4	1419.46	95.41
5	1027.86	88.33
6	533.75	96

Muskmelon Peel Spectra:



6.2 Muskmelon Peel: Possibility as Biosorbent

Biosorbent are those which are able to absorb containments from the environment. So, in a Muskmelon peel there consist of many functional groups like: Phenol, alkane, alkene, aromatic ring, nitro group, fluoride, halogen.

These functional groups contain a hetero atom like oxygen, nitrogen, halogens, which have lone pairs of electrons and these lone pairs of electron act as good binding site for heavy metal ions. The possibility as a biosorbent evaluated by different methods as pH, contact time, initial metal concentrations, temperature. Hence, using this as biosorbents to remove heavy metals would help providing effective biosorbent for the treatment of metal-bearing wastewater.

6.3 CONCLUSION

Outcome of the above shows that:

A. Powder form of Kiwi peel has numerous of functional groups which was identified by the IR Spectroscopy. And these functional groups contain hetero atom like oxygen, nitrogen, halogens, that have a lone pairs of electrons. These lone pairs of electron act as good binding site for the heavy metal ions. So, we can conclude that the Kiwi peel may be act as a good biosorbent.
B. Powder form of Muskmelon peel consist of large number of functional groups. These functional groups consits of hetero atom like oxygen, nitrogen, halogens, having lone pairs of electrons. These attract act as good binding site for heavy metal ions. So, we can conclude that Muskmelon peel can act as a good biosorbent.

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CHAPTER 7

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CERTIFICATE

This is to certify that **Ms. ACHLA JOSHI** has carried out the dissertation work at Geology Department, D.S.B. Campus Kumaun University, Nainital, under my supervision. The candidate has been regular, sincere, and hardworking throughout dissertation work.

The work includes in the project entitled, **"PATTERN OF ACTIVE UPLIFT IN THE HANGING WALL OF SOUTH ALMORA THURST ALONG KOSI RIVER SECTION, KUMAUN LESSER HIMALAYA: INSIGHTS FROM STREAM LENGTH GRADIENT (SL) INDEX"**, was performed by the candidate herself during the M.Sc. -IV Semester.

The assistance and help received during this project work and literature have been duly acknowledged.

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This is to certify that the work contained in the Thesis entitled " Plate Tectonics And Mineralisation" submitted by Ali raza Khan for the award of the degree of Masters of Science To the Kumaun University , Nainital is a record of bonafide research works carried out by him under my direct supervision and guidance.

I considered that the thesis has reaches the standards and fulfilling the requirements of the rules and regulations relating to the nature of the degree . The contents embodied in the thesis have not been submitted for the award of any other degree or diploma in this or any other university.

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SYSTEMATIC STUDY OF RADIOLARIA FROM THE CORE ABP-06 STATION II (SECTION I) FROM CENTRAL INDIAN OCEAN

DISSERTATION

Submitted to

KUMAUN UNIVERSITY, Nainital

FOR FULFILLING THE REQUIREMENT FOR MASTER OF SCIENCE IN GEOLOGY

2022

By

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This is to certify that **Mr. Himanshu Singh** Gaira S/O **Mr. Bhim Singh Gaira** has carried out the present dissertation work entitled **"Systematic study of Radiolaria of the core ABP-06 Station II (Section I) from the Central Indian Ocean"** under my supervision for the requirement of Degree of Master of Science in Geology from Department of Geology (Centre of Advanced Study) Kumaun University, Nainital, Uttarakhand, India.

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