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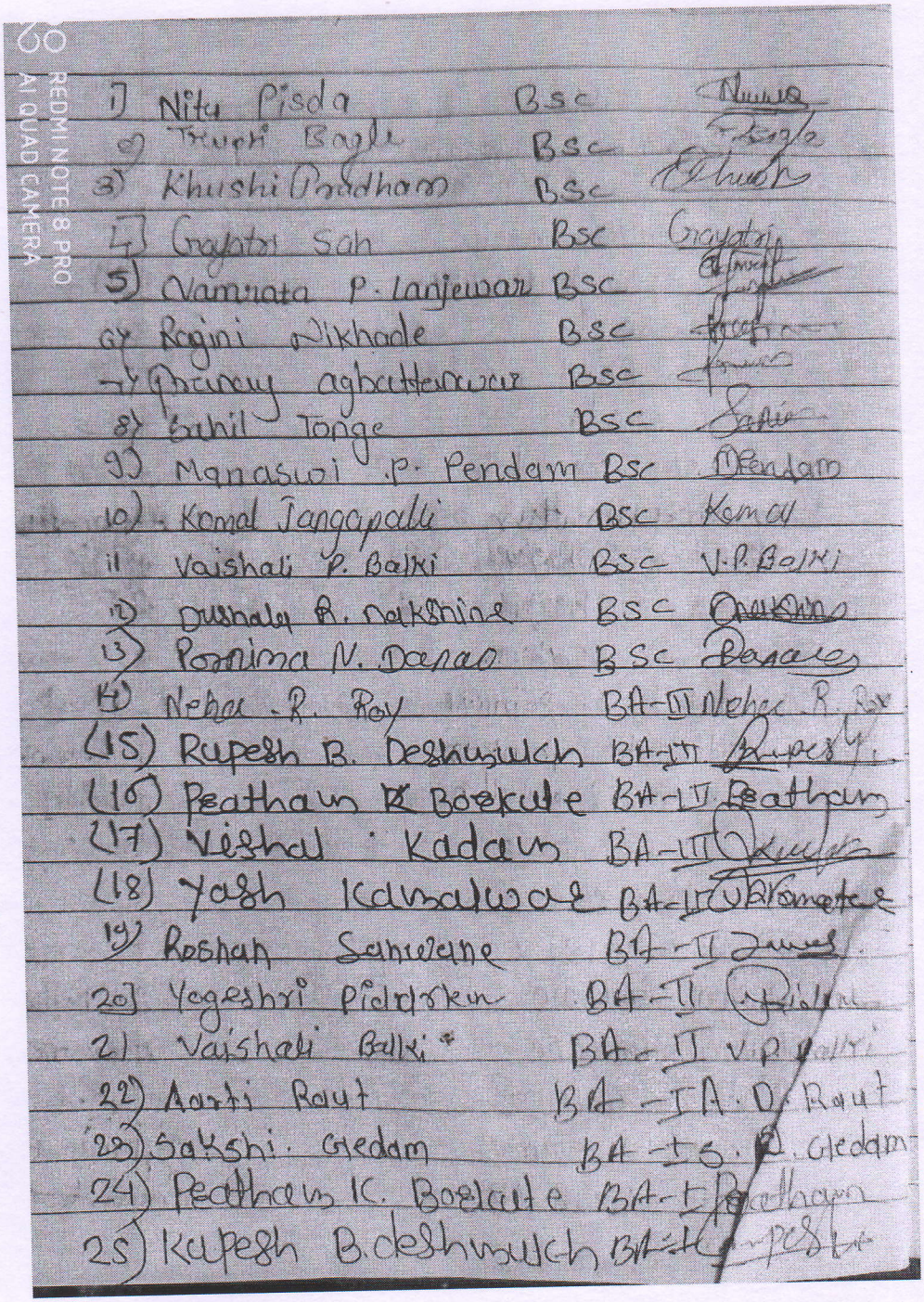
Best Practise I

Free Spoken English Classes



1) Nita Pisda B.Sc
2) Trupti Bagle B.Sc
3) Khushi Pradhan B.Sc
4) Gayatri Sah B.Sc
5) Namrata P. Lanjewar B.Sc
6) Rajni Nikhade B.Sc
7) Shrivey Aghatharwar B.Sc
8) Sahil Tonge B.Sc
9) Manaswi P. Pendam B.Sc
10) Komal Jangapalli B.Sc
11) Vaishali P. Balki B.Sc
12) Pushala R. Nakshine B.Sc
13) Poonima N. Danao B.Sc
14) Neha R. Roy BA-III
15) Rupesh B. Deshmukh BA-III
16) Peatham K Borkute BA-III
17) Vishal Kadam BA-III
18) Yash Kadwalwar BA-II
19) Roshan Sahare BA-II
20) Yogeshri Pidarkar BA-II
21) Vaishali Balki BA-II
22) Aarti Raut BA-I
23) Sakshi Gedam BA-I
24) Peatham K. Borkute BA-I
25) Rupesh B. deshmukh BA-I

Attendance of students Spoken English Class

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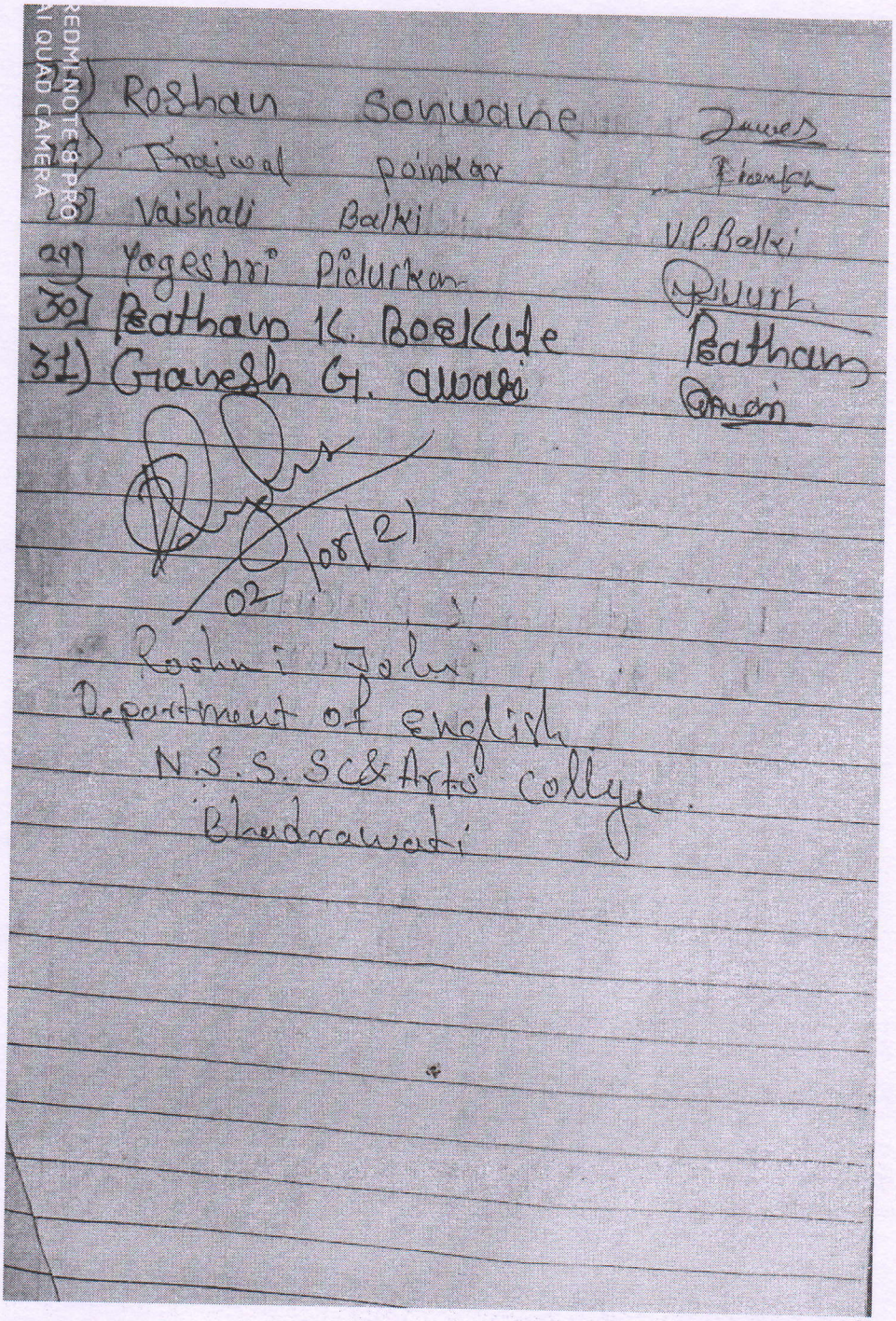

/Attendance of students in Spoken English Class 02/08/2021

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Students in Spoken Classes ,2/11/2021

Students in Spoken Classes ,2/11/2021

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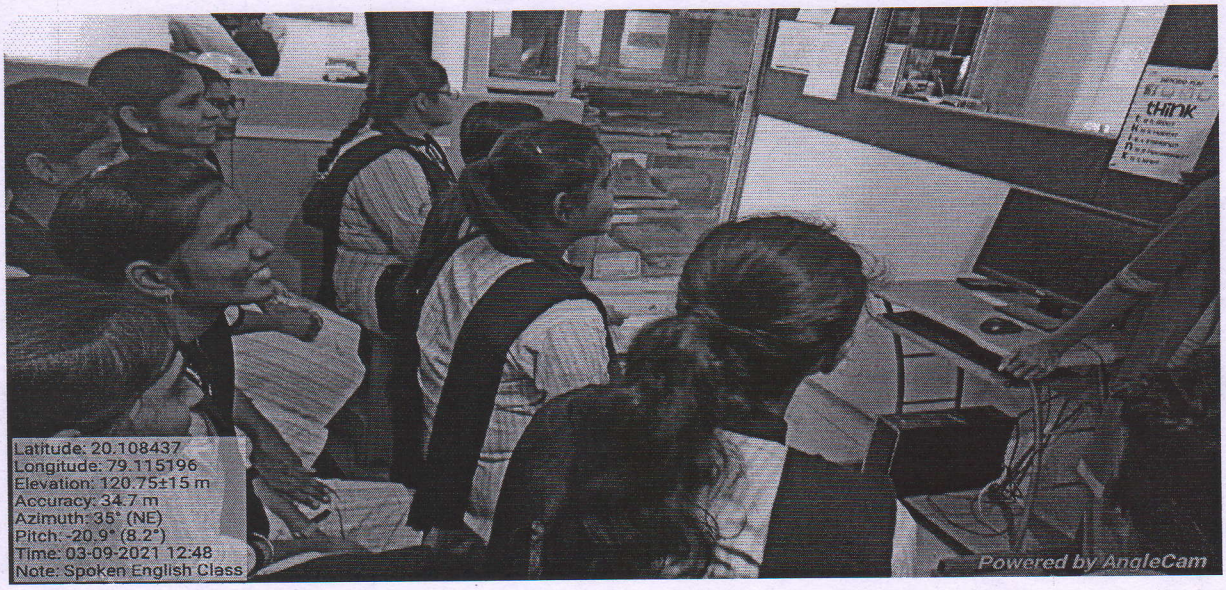

Students in Spoken Classes ,3/09/2021

Students in Spoken Classes ,3/09/2021

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Best Practise II

Enhancing Performance in Chemistry

Notes on NMR

1. NUCLEAR MAGNETIC RESONANCE (N. M. R.) SPECTROSCOPY

Introduction :

The Phenomenon of nuclear magnetic resonance (NMR) was first observed in 1946 and it has been routinely used in organic chemistry since about 1952. It has grown so fast that it has become one of the most useful methods for structure elucidation available to the organic chemist, without the help of experts. When molecules absorb U.V. and I.R. radiations, the electrical component of the electromagnetic radiation interacts with the molecules.

In NMR spectroscopy, we are going to study the interaction of magnetic component of the electromagnetic radiation with the nuclei of certain atoms in the molecules and hence the name NMR spectroscopy. The shorter, more energetic U.V. waves (λ = 200 - 400 nm) affect the energy levels of the electrons, where as the longer, less energetic I.R. waves (λ = 2 - 16 nm) generates mechanical oscillations (e.g. rotational, vibrational) in the molecule.

In NMR spectroscopy, the nucleus of an atom is exposed to very long but low energy (λ = 1000 to 10,000 cm) radiations, known as *radio waves*. The nucleus is excited to higher energy levels and the absorption spectrum so obtained can give lot of valuable information about the structure of the molecule.

Principle of N.M.R. Spectroscopy :

The NMR spectroscopy deals with the nucleus of an atoms that possesses a 'magnetic moment'. The nucleus of an atom is positively charged and contain protons and neutrons. The neutrons are electrically neutral hence we are concerned with the protons only. Like electrons,

PMR - Proton magnetic resonance

nuclei of atoms also spin about their axis. The spinning of these positively charged nuclei generates a magnetic field directed along the axis of spin i.e. these nuclei act like tiny bar magnets. Individual protons and neutrons have spin quantum numbers $+\frac{1}{2}$ and $-\frac{1}{2}$. Therefore, depending on number of nucleons (protons + neutrons) nuclei also possess spin quantum number 'I'. The spin quantum number 'I' is a characteristics of nucleus. All nuclei that have spin quantum number 'I' greater than the zero, behaves as magnet.

NMR spectroscopy is most often concerned with nuclei, $I = \frac{1}{2}$. Example of such nuclei are $^{1}_{1}H$, $^{13}_{6}C$, $^{19}_{9}F$ and $^{31}_{15}P$, while spectra can not be obtained from nuclei with I = 0, as it does not produce magnetic moment, known as non - magnetic nuclei.

Nuclear magnetic resonance is mainly studies for the nucleus of hydrogen i.e. proton, hence also called as ***PMR spectroscopy***. Recent advances in instrument technology have resulted in the increasing availability of C^{13} (carbon-13) NMR. The combination of H^1 & C^{13} NMR spectra provides a powerful method of structure determination.

NUCLEAR EXCITATION : Generation of nuclear energy levels :

Every spinning nucleus with $I \geq O$ give rise to a magnetic field whose axis is coincident with the axis of spin having magnetic moment μ. Hydrogen nucleus ($I = \frac{1}{2}$) also produce a magnetic field having magnetic moment μ directed along its spinning axis (Fig.), when such a spinning nucleus is placed in an uniform external magnetic field (H_o), its magnetic moment can be parallel (alignment A) or antiparallel (alignment B) to the direction of the applied field (H_o).

The number of orientations of the nucleus in external magnetic field is given by (2I + 1), where 'I' is the spin quantum number of the nucleus. For proton 'H' $I = \frac{1}{2}$, and hence it will have only two orientation.

Number of orientation for 'H' $= (2I + 1) = \left(2 \times \frac{1}{2} + 1\right) = 2$

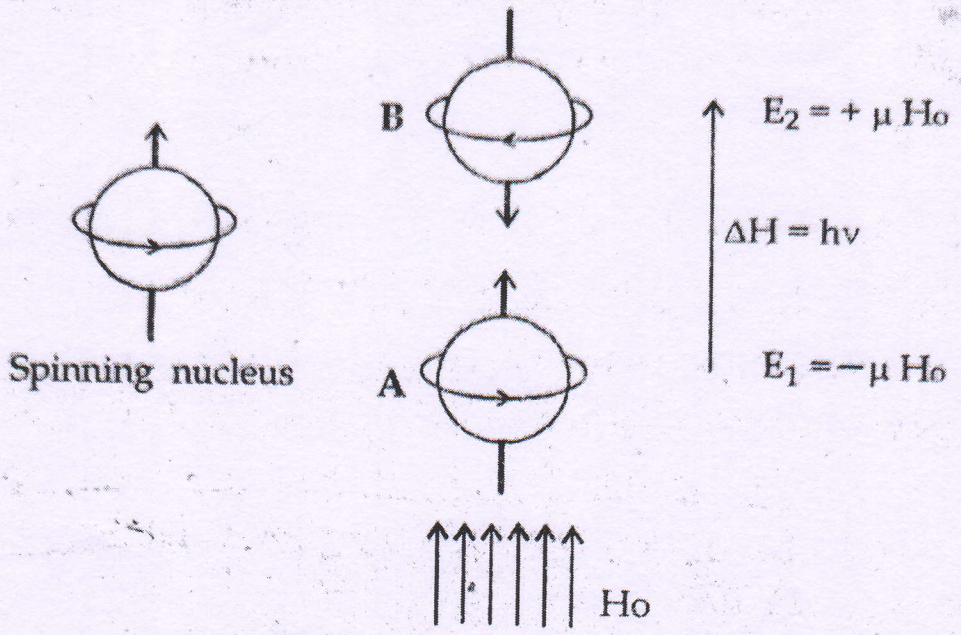

Fig. Orientation of hydrogen nucleus in external magnetic field

When the spinning proton is placed in external magnetic field, it can orient itself in two ways with respect to the direction of the applied magnetic field H_o -

(i) the direction of the magnetic field of the proton and that of the applied magnetic field are parallel to each other and

(ii) the direction of the magnetic field of the proton and that of the applied magnetic field are antiparallel to each other.

These two orientations represent two nuclear energy for proton E_1 and E_2 ($E_2 > E_1$).

Majority of nuclei would be present in the lower level (E_1). These nuclei can be excited to the higher energy level E_2 by providing the necessary energy (ΔE).

$$\Delta E = E_2 - E_1$$

$$\Delta E = (\mu H_o) - (-\mu H_o)$$

$$= \mu H_o + \mu H_o = 2(\mu H_o)$$

But $\Delta E = h\nu$

$$\therefore \quad \nu = \left(\frac{2\mu}{h}\right) H_o$$

UNIT - IV

Green Chemistry

Page No. 120
Date

Green chemistry - Green chemistry is a design of product or process that reduce or eliminate the use or generation of hazardous compound is known as green chemistry.

Green chemisty is deals with product or process in regard to use of reactant, use of reagent, sefty of chemicals, hazardous level of the chemical, manufactur cost.

Discuss the principle of green chemistry

Green chemistry approach can be accomplish by following 12 principle and these 12 principle are known as green chemisty principle.

> Waste Prevention
A chemical product and processes should be design in a such a way that it does not form any waste product. (By product).

> Atomi Economy
By green chemisty approach all reactant molecule and the atom shoud be converted

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UNIT - IV

Green Chemistry

Page No. 120
Date

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Discuss the principle of green chemistry

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1> Waste Prevention
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2> Atom Economy
By green chemistry approach all reactant molecule and the atom should be converted

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into product. so as to ~~rich~~ obtain 100 % atom economy

Ex. Diels Alder reaⁿ
Cope - rearrangement
Claisen rearrangement
Oxy-cope rearrangement

3> Safe chemical Design
The chemical processes should be safe to the environment and to the human bein

4> Benign solvents and ⊖ Auxiliaries
Chemical process should be carried out alon with environmentally friendly, easy to recover, less cost, unreactive solvents

Ex. CO_2 when use as a solvent, it can be remove very easily from the reaction medi

5> Energy Efficiency
The chemical process should be carried out at ambient condition (at room temperature and if possible higher temperature and higher pressure should be design at lowe temperature and lower pressure. In other words reaⁿ must be carried out at

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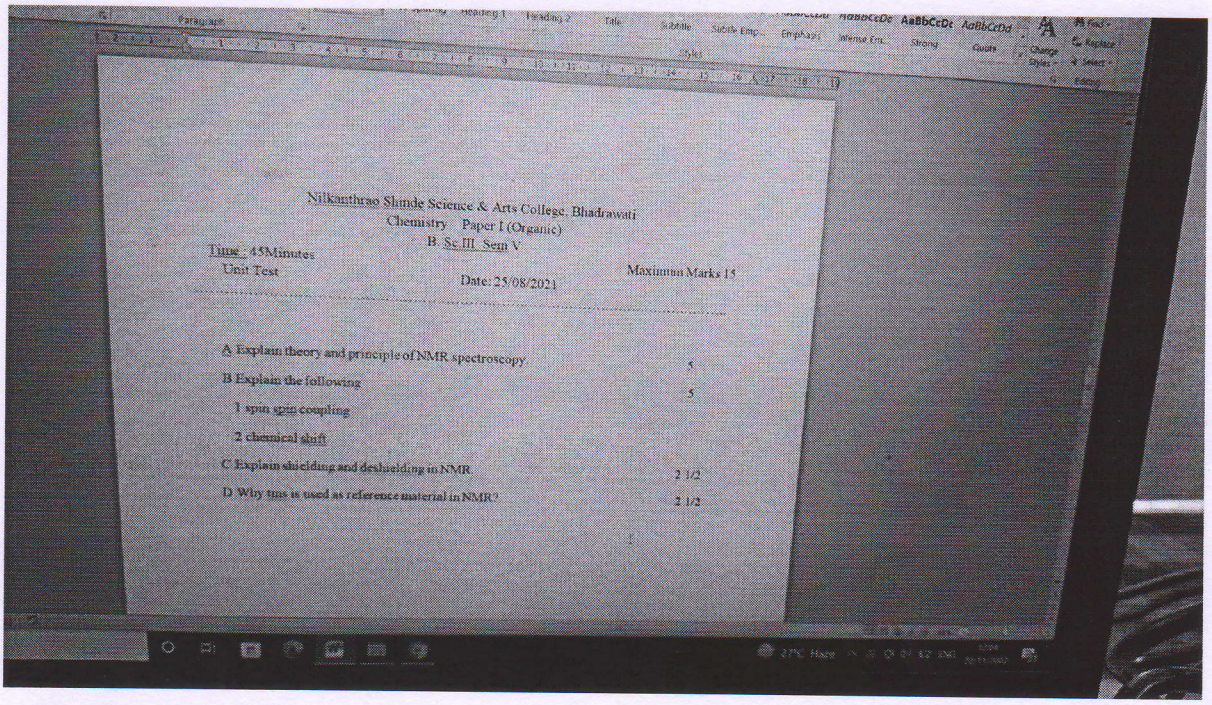

Nilkanthrao Shinde Science & Arts College, Bhadrawati
Chemistry Paper I (Organic)
B. Sc. III Sem V

Time : 45Minutes
Unit Test

Date: 25/08/2021

Maximum Marks 15

A Explain theory and principle of NMR spectroscopy 5

B Explain the following 5

1 spin spin coupling

2 chemical shift

C Explain shielding and deshielding in NMR 2 1/2

D Why tms is used as reference material in NMR? 2 1/2

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Nilkanthrao Shinde Science & Arts College, Bhadrawati

Chemistry Organic Paper I

B. Sc. I Sem II

Time : One Hours Mxinum Marks 20

DATE: 17/01/2022

A Explain hydrolysis of methyl bromide with energy profile diagram. 5

B Explain 1) Gatterman reaction 2) Sandmeyer reaction. 5

OR

C Explain mechanism of E1 reaction. 2 1/2

D Discuss substitution reaction with example. 2 1/2

E Explain benzye mechanism. 2 1/2

F Discuss reactivity of C-halogen bond in vinyl halides. 2 ½

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Gondwana University Gadchiroli

Nilkanthrao Shinde Science & Arts college, Bhadrawati

Paper – I(Organic chemistry)

B.Sc III Year V- semester

CBCS

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1. a. An organic compound having molecular formula C_3H_6O shows following NMR data

i) 3H – Triplet δ-1.5

ii) 2H- Quartet δ-2.6

iii) 1H- Singlet δ-7.2

Deduce the structure. 5

b. Write brief note on-

i) The Role of TMS in NMR Spectroscopy.

ii) Equivalent and Non-equivalent protons. 5

OR

c.What is chemical Shift ? $2^1/_2$

d. Define coupling contant 'J'. $2^1/_2$

e. What is shielding and deshielding of protons in NMR spectroscopy? $2^1/_2$

f. What is spin – spin coupling. $2^1/_2$

2. a.Write a note on acidity of α - hydrogen atom 5

b. Discuss synthesis of ethyl acetoacetate by Claisen condensation. 5

OR

c. Write note on Keto-enol Tautomerism. $2^1/_2$

d. Write a note on Malonic ester synthesis. $2^1/_2$

e. Discuss the alkylation of ethyl acetoacetate. $2^1/_2$

f. Starting from malonic ester how will you prepare

i) Succinic acid ii) n-butyric acid $2^1/_2$

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3. a. Discuss the classification of polymers based on the source? 5

b. Discuss the cross-linking polymerisation reaction. Give an example. 5

OR

c. Write a note on thermosetting polymers. $2^1/_2$

d. Write a note on phenol-formaldehyde Resins. $2^1/_2$

e. What is Biodegradable and Conducting Polymers. $2^1/_2$

f. What is rubber ? Discuss the importance of Rubber. $2^1/_2$

4. a. Define Green Chemistry. Discuss the main purpose of Green Chemistry. 5

b. Explain the alternative solvent or replacement of solvents in green chemistry. 5

OR

c. What do you mean by cardle to cardle design ? $2^1/_2$

d. Discuss scientific areas for practical applications of green chemistry. $2^1/_2$

e. Write short note on Reduction of solvent toxicity. $2^1/_2$

f. Write a note on Phase transfer catalysis. $2^1/_2$

5. Solve any ten

i).How many NMR signal obtain in ethyl acetate. 1

ii). Write the name of solvent used in NMR. 1

iii). Define and Express the formula to calculate chemical shift. 1

iv). What is enolate ion. 1

v). What is keto – enol Tautomerism. 1

vi). What is alkylation. 1

vii). What is amphiphilic polymers. 1

viii). Write uses of Bakellite. 1

ix). What is chloroprene and Neoprene. 1

x). What is atom economy. 1

xi). What are Green alternatives to synthesis of organic compounds ? 1

xii).What are Green solvents? 1

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Unit Test (Physical Chemistry Paper II)

B.Sc. III Sem-VI

Dt. 21/04/2022 **Total Marks 20**

1. Write the difference between Thermal and Photochemical Process. 2M
2. Write the causes for high quantum yield. 2M
3. Write a short note on fluorescence and phosphorescence. 3M
4. Derive the expression for Beer-Lamberts law of photochemistry. 3M
5. Write a short note on i) Grothus-Draper law
   ii) Stark-Einstein law 4M
6. Explain Jablonski diagram for depicting radiative and non-radiative Fluorescence and phosphorescence processes. 4M
7. Write a short note on energy transfer process. 2M

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Unit Test (Physical Chemistry Paper II)

B.Sc. III Sem-V

Dt. 06/11/2021 **Electrochemistry I, II** **Total Marks 20**

1. Define following 3M
   a) Equivalent conductance
   b) Molar conductance
   c) Specific conductance
2. Write a short note on Kohlrausch's law with applications 3M
3. Explain Arrhenius Theory of electrolyte dissociation and give its applications. 4M
4. Write a short note on moving Boundary method and Hittorf's Method. 5M
5. What are Reversible and Irreversible cells and determine the pH by using Quinhydrone electrode. 5M

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Unit Test (Physical Chemistry Paper II)

B.Sc. II Sem-III

Dt. 08/10/2021 **Total Marks 20**

1. Define following terms with examples. 4
   a) Osmotic Pressure
   b) Molarity of solution
   c) Van't Hoff factor
   d) Half life period
2. State and explain Raoults law. 3
3. Derive the relation between molecular wt. of solute and elevation of boiling point. 3
4. Explain Collision theory of bimolecular reaction. 3
5. How the osmotic pressure measured by Berkeley and Harteley method ? 3
6. Explain Integration method and Ostwald's Dilution method for determination of order of reaction. 4

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Green Chemistry

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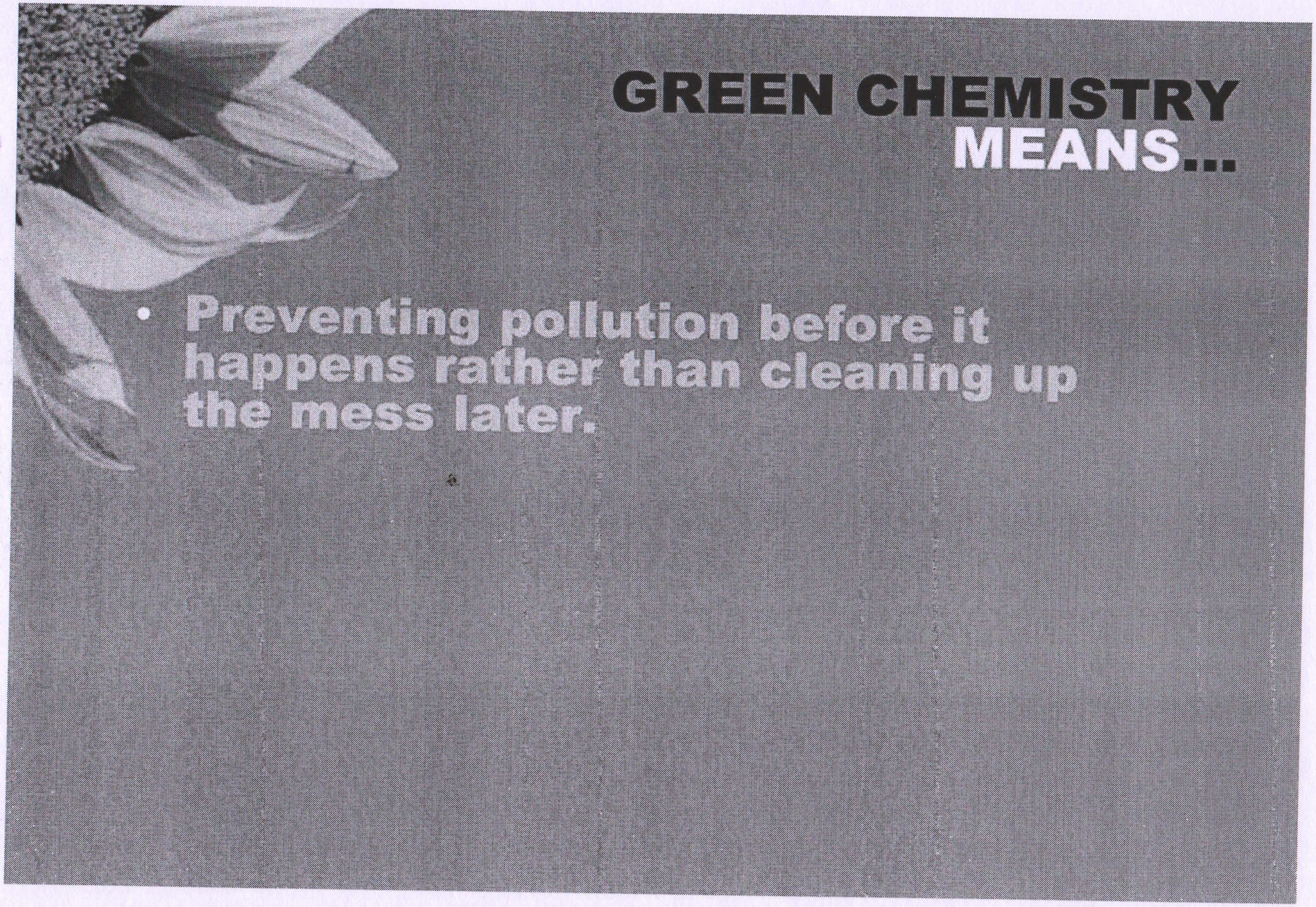
Arts College, Bhadrawati



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(Dr. A. B. Dhote)

सिपेट : सेंटर फॉर स्किलिंग एण्ड टेक्निकल सपोर्ट (सीएसटीएस)
(रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार)
प्लॉट नं. सी.१०/१, एम.आय.डी.सी. ताडाली औद्योगिक क्षेत्र,
चंद्रपूर - ४४२ ४०६
दूरध्वनि : ७८८८०९७०९७
ई-मेल : cipetchandrapur@gmail.com
chandrapur@cipet.gov.in
वेबसाईट : www.cipet.gov.in

CIPET : CENTRE FOR SKILLING AND TECHNICAL SUPPORT (CSTS)
(Dept. off Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India)
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Chandrapur - 442 406
Tel. No. : 7888097097
E-mail : cipetchandrapur@gmail.com
chandrapur@cipet.gov.in
website : www.cipet.gov.in

CIPET:CSTS/CHAN/VTC/ 2020-21/ Date: 24.12.2021

CERTIFICATE

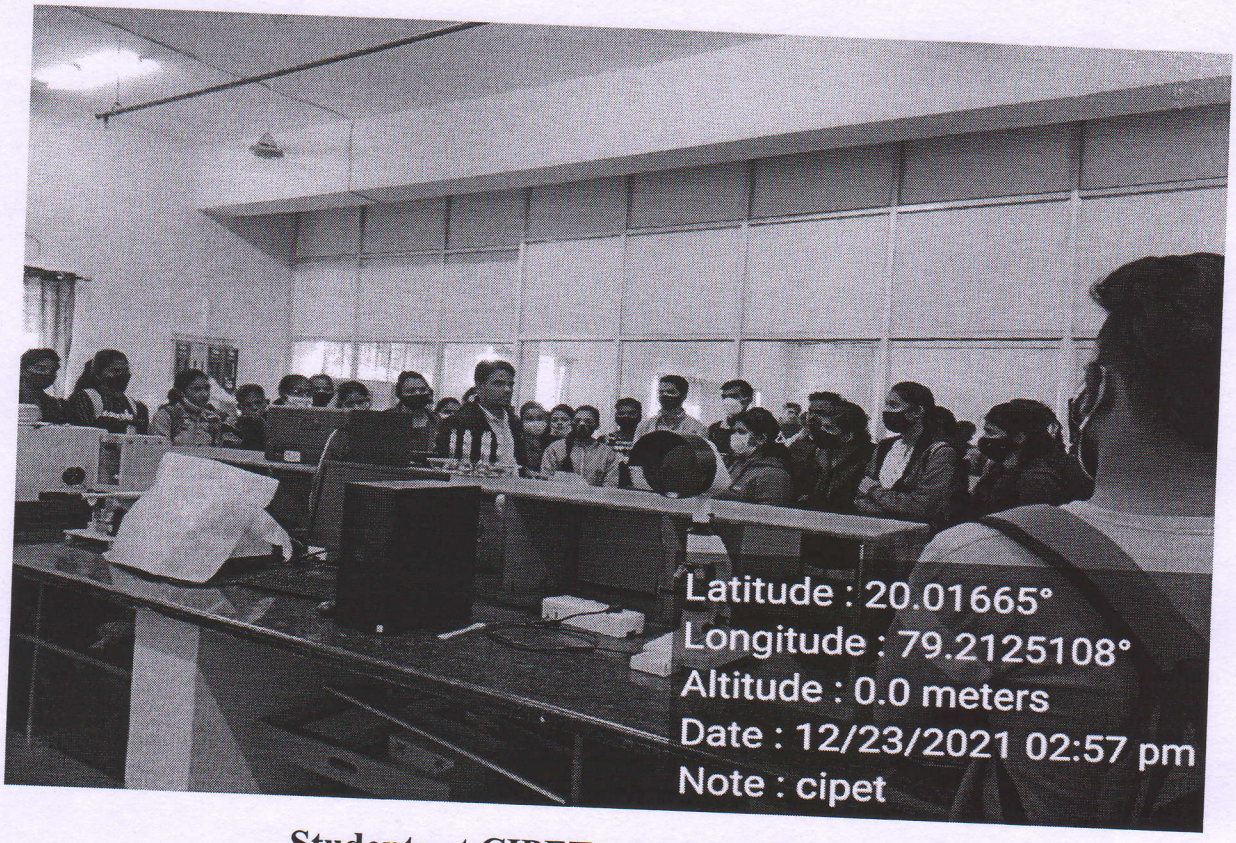
This is to certify that *MISS. AISHWARYA RAJIVKUMAR TIWARI,* D/o *Mr. RAJIVKUMAR TIWARI,* has successfully completed skill upgradation training program titled *"PLASTIC MATERIALS & MODERN PLASTIC PROCESSING TECHNIQUES"* from 23.12.2021 to 24.12.2021 organized at CIPET: CSTS, Chandrapur.

COURSE CO-ORDINATOR

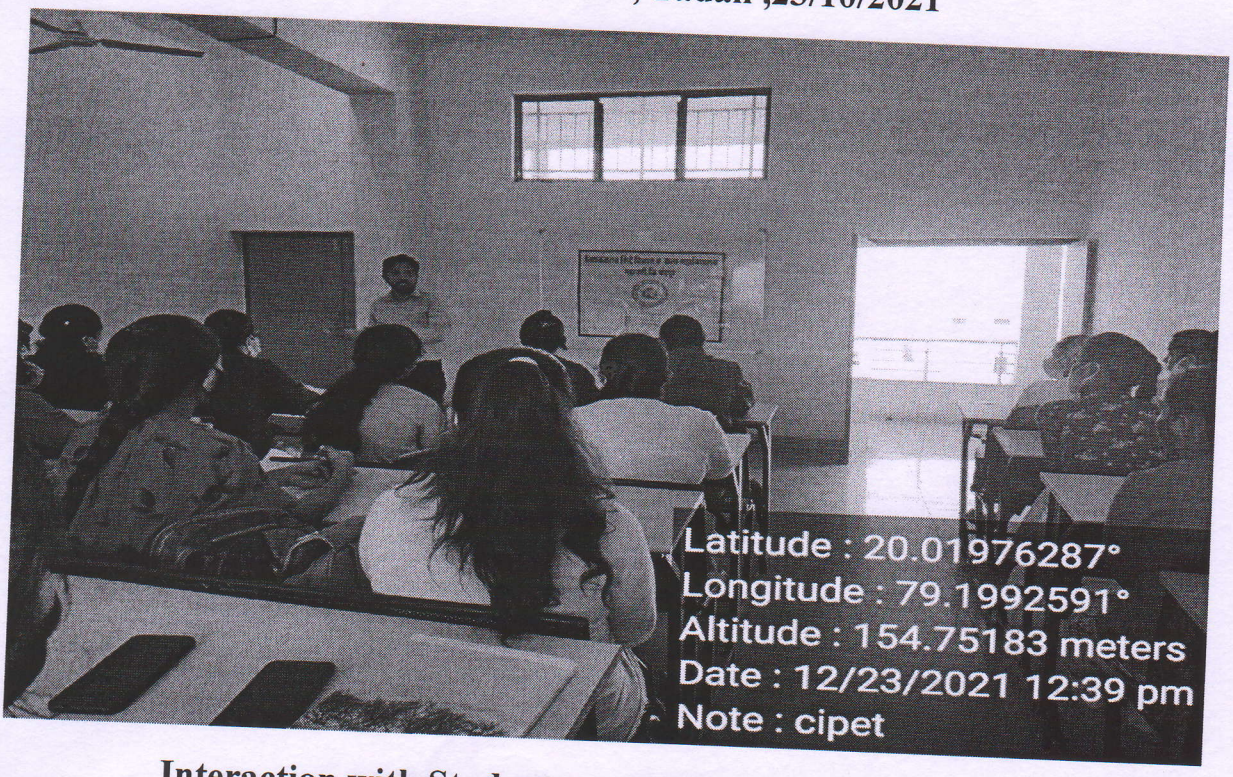
VTC IN CHARGE

DIRECTOR & HEAD

Dr. L.S. Ladke
Principal
N.S. Science & Arts College
Bhadrawati, Dist-Chandrapur



Students at CIPET , Tadali ,23/10/2021



Interaction with Students at CIPET, Tadali, 23/10/2021

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B.SC. SEM-II DISTICTION FIRST CLASS STUDENTS (2021-2022)
Summer-2022 Examination

Sr. No.	Name of Student
1.	AWARI BHUVANESHWARI RAJU
2.	KOLTE SAKSHI SHANKAR
3.	YERGUDE SAKSHI ANIL
4.	GHODMARE VAISHNAVI BHOJRAJ
5.	KADUKAR MADHAVI BANDUJI
6.	ZADE CHAITALI RAMKRUSHNA
7.	HELWATE PRAGATI SURESH
8.	JADHAO SAKSHI VINOD
9.	DHOKE SAKSHI VINOD
10.	SHEIKH RUHINA PARVIN MO SHAGIR
11.	POTRAJE SNEHA RAMESH
12.	DEHARKAR PAVAN DADAJI
13.	KUMAR SHALONI ANIL
14.	PARKHI DURGESHWARI RAMDAS
15.	WARARKAR PURVA SANTOSH
16.	RAIPURE CHAITALI VILAS
17.	TANDULKAR VAISHNAVI BHAGWAN
18.	ASAMPALLIWAR LINA VITTHAL
19.	MARAPELLI YAMINI KOMURAIAH
20.	KHANDALKAR EKATA ARVIND

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21.	UIKE PRANALI DURYODHAN
22.	RAM AMRITA RAGHUNATH
23.	ANDRASKAR RITIKA DILIP
24.	MAGGIDWAR SHRADDHA RAJU
25.	MATTE DIPTI SUNIL
26.	VAIDYA SAKSHI SUNIL
27.	RUYARKAR CHETAN KISHOR
28.	SHENDE DEVAKI DNYANDEO
29.	DEOGADE SIMRAN UMESHWAR
30.	PETKAR SNEHAL VIJAY
31.	SHRASTI SHARMA
32.	BHAJANKAR CHETANA VILAS
33.	GAJBHAR BHARTI NAVNATH
34.	RAUT RENUKA AVINASH
35.	DIDMUTHE MANSI MINANATH
36.	TAJANE NEHA BHALCHANDRA
37.	BAWANE TEJASWI SUNIL
38.	NANDURKAR ACHAL SURESH
39.	DAS RIYA RADHAKANT
40.	MANDAL PRIYANKA TARUN
41.	CHOPKAR VAISHNAVI RAVINDRA
42.	WANKHEDE KOMAL KAWADU
43.	MUKADE ANKIT GANESH

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44.	LABHANE NEHA DOMA
45.	BHATARKAR VEDANT RAJU
46.	GOND LAXMI SANTOSH
47.	CHIKTE MAYURI KISHOR
48.	BAWANE PRANAY SANJAY
49.	SHARMA VIDHI AJAYKUMAR
50.	VIRUTKAR MINAKSHI BABAN
51.	NAGOSE DHANSHREE GANESH
52.	DONGRE PRERANA VINOD
53.	UTANE DHANASHREE RAJENDRA
54.	DAHULE KOMAL RAJU
55.	BALPANE PRAPTI RAMCHANDRA
56.	WABHITKAR PRACHI DADAJI
57.	DEARKAR RITUJA KAILAS
58.	DOYE VAIBHAV MANOHAR

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(Dr. A. B. Dhote)

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B.SC. SEM-IV DISTICTION FIRST CLASS STUDENTS (2021-2022)
Summer-2022 Examination

Sr. No.	Name of Student
1.	NIMJE TEJASWINI PRAMOD
2.	RAIPURE PRANJALI GAMTIDAS
3.	PATIL SANUJ SUDHAKAR
4.	DOYE GAYATRI ANIL
5.	GAIKWAD CHAITALI DIPAK
6.	BOINWAR KOMAL SUNIL
7.	HARANE PALLAVI NARESHRAO
8.	JIWTODE TUMESHWARI SHARAD
9.	KADAVE SAKSHI MORESHWAR
10.	KAKDE ARATI SUNIL
11.	PANDIT TANUJ UTTAM
12.	PATARANGE PRATHAM DILIP
13.	PARKHI PRANALI VILAS
14.	RAUT SUCHITA ANIL
15.	RAUT NAKSHATRA YUVARAJ
16.	CHATTE PRIYANKA GHANSHYAM
17.	CHAUDHARI ASTIK SHAMRAO
18.	CHAUDHARI ROSHAN SURYBHAN
19.	NEHARE KARTIK ASHOK
20.	THENGNE HITAKSHI MILIND

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21.	NANHE SAKSHI SUKHADEO
22.	PATIL NIKANKSHA PRAMOD
23.	SUNDARGIRI RAJESHWARI SHANKAR
24.	KUTTARMARE PRERANA NATTHU
25.	LAMBOLE KALYANI RAJENDRA
26.	MAREKAR TRUPTI VIJAY
27.	BODHALE ISHA VITTHAL
28.	BODHANE PRAJAKTA NATTHU
29.	BOINWAR DIPALI SUNIL
30.	JIDGALWAR ACHAL RAVINDRA
31.	KAMRE NANSI DEONATH
32.	KANNAKE JYOTI KASHINATH
33.	SINGH GUDIYA PARAMHANS
34.	SWAN SAMIKSHA ASHOKRAO
35.	MATTE SAKSHI ASHOK
36.	MUNESHWAR ARYA SANJAY
37.	KUMAR KESHAV ANIL
38.	MAHAKULKAR HARSHAL NILKANTH
39.	TATED VIBHA SANTOSHKUMAR
40.	TIWARI AISHWARYA RAJIVKUMAR
41.	YADAV SAMEER RAMCHANDRA
42.	BAGADE PRACHI SURESH
43.	BALPANE SUPRIYA VITTHAL

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44.	JAWALE ANUSHKA RAJU
45.	WADEKAR ANISHA EKNATH
46.	ZADE BADAL SHALIK
47.	SHEIKH AFRIN IRFAN
48.	SHEIKH ALISHANAAZ ABDUL SALAM
49.	VYAVAHARE DIVYA DIPAK
50.	AWALE PRATIKSHA MAROTI
51.	BASASHANKAR SAMIKSHA MAROTI

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(Dr. A.B. Dhole)

B.SC. SEM-VI DISTICTION FIRST CLASS STUDENTS (2021-2022)
Summer-2022 Examination

Sr. No.	Name of Student
1.	PETKAR KRUSHIKESH RAJENDRA
2.	DHAWAS ANKITA ANIL
3.	DESAI NAMRATA VIJAY
4.	SHEIKH KHUSHBOO ASIF
5.	ISLAWAT BHOLA DEVILAL
6.	DATE PRANALI RAJENDRA
7.	CHALKHURE MEHANDI NARESHCHANDRA
8.	SATPUTE KIRAN DATTU
9.	BAIN BIJENDRA KAILASH
10.	LEDANGE ROSHAN LATARI
11.	KHARWADE PRATIKSHA SUDHAKAR
12.	PARKHI VAISHALI RAJENDRA
13.	ASAMPALLIWAR DIKSHA SHANKAR
14.	PATRANGE KUNAL SUNIL
15.	BHOYAR NEHA UTTAM
16.	KUMARE SHRUTIKA SAINATH
17.	WANDHARE ASHWINI GAJANAN
18.	MANDAL SAPNA NIHAR
19.	NAGRALE BABLI SHALIK
20.	DEOTALE PURVA HARIDAS

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21.	DHOBARE AMAN RAVINDRA
22.	PRASAD NEHA BALWANT
23.	BOBADE SURAJ GULAB
24.	CHAMATKAR PRATIKSHA SUDHAKAR
25.	CHANDANKAR SWAPNIL MANOJ
26.	SHEIKH HUMERA HAIDER
27.	GHATE PALASH DNYANESHWAR
28.	BODHE KOMAL SUDHAKAR
29.	SHINDE PRATIKSHA PRAVIN
30.	RAMTEKE PREM SACHIN
31.	DETHE VAISHNAVI GOPAL
32.	NIMSARKAR ALISHA DILIP
33.	RAIPURE SHRUTI BANDU
34.	CHENDE DHANSHRI RAJU
35.	PRASAD AMRITA KRISHNA
36.	NASNURKAR SAMEER ANIL
37.	PATHAN AABEDA FATEMA ISRAIL
38.	ROHANKAR ABHIJIT ANIL
39.	SAH PRIYA UMESH
40.	TARALE MEGHA VITTHAL
41.	JADHAO KARAN VINOD
42.	FULMALI RUTIKA ANIL
43.	GHORUDE SAMIKSHA NARAYAN

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44.	BAWANE SWATI DADAJI
45.	PATRANGE POOJA GOVINDA
46.	YERGUDE PRIYANKA UTTAM
47.	ZADE PRATIKSHA HEMRAJ
48.	BANDURKAR SAKSHI RAMESH
49.	BHAJANKAR DIPTI VILAS
50.	BHALME AKASH SHALIK
51.	BHUSARI SNEHA SHAMRAO
52.	KAKDE PARIKSHITA CHANDRAPAL
53.	KAMATKAR NIKITA PRABHAKAR
54.	THAKUR TUSHAR SANOJ
55.	THAWARI PRITI SUNIL
56.	KAMBALE VIDYA DHARMRAO
57.	POTE PRITI BANDU
58.	SAO HARSHADA SHARAD
59.	WADHAI SMITA NANDKISHOR
60.	WALKE ANIKET PRAKASH
61.	WANKAR HASEEL BHAURAO
62.	WATKAR MAYURI PURUSHOTTAM
63.	TIWARI RITESH KRISHNACHAND
64.	AMATE RUNALI SITARAM
65.	DONGE KALYANI SACHIN
66.	DUDHKOHAL VIJETA SURESH

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67.	KANNAUJIYA AACHAL SUDARSHAN
68.	KORADE NUTAN SHARAD
69.	SONEWANE SIDHANTI YOGESHWAR
70.	SURESH PRIYANKA SURESH
71.	ASKAR HARSHAD SHYAMSUNDAR
72.	ASUTKAR TUSHAR DNYANESHWAR
73.	LILHARE KHUSHBU SUKHARAM
74.	MADKE CHUELI PRABHAKAR
75.	MADOT POOJA DEORAO
76.	RAUT ACHAL RAJENDRA
77.	RODE POOJA NATTHUJI

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Notes on NMR

1. NUCLEAR MAGNETIC RESONANCE (N. M. R.) SPECTROSCOPY

Introduction :

The Phenomenon of nuclear magnetic resonance (NMR) was first observed in 1946 and it has been routinely used in organic chemistry since about 1952. It has grown so fast that it has become one of the most useful methods for structure elucidation available to the organic chemist, without the help of experts. When molecules absorb U.V. and I.R. radiations, the electrical component of the electromagnetic radiation interacts with the molecules.

In NMR spectroscopy, we are going to study the interaction of magnetic component of the electromagnetic radiation with the nuclei of certain atoms in the molecules and hence the name NMR spectroscopy. The shorter, more energetic U.V. waves (λ = 200 - 400 nm) affect the energy levels of the electrons, where as the longer, less energetic I.R. waves (λ = 2 - 16 nm) generates mechanical oscillations (e.g. rotational, vibrational) in the molecule.

In NMR spectroscopy, the nucleus of an atom is exposed to very long but low energy (λ = 1000 to 10,000 cm) radiations, known as *radio waves*. The nucleus is excited to higher energy levels and the absorption spectrum so obtained can give lot of valuable information about the structure of the molecule.

Principle of N.M.R. Spectroscopy :

The NMR spectroscopy deals with the nucleus of an atoms that possesses a 'magnetic moment'. The nucleus of an atom is positively charged and contain protons and neutrons. The neutrons are electrically neutral hence we are concerned with the protons only. Like electrons,

PMR - Proton magnetic resonance

nuclei of atoms also spin about their axis. The spinning of these positively charged nuclei generates a magnetic field directed along the axis of spin i.e. these nuclei act like tiny bar magnets. Individual protons and neutrons have spin quantum numbers $+\frac{1}{2}$ and $-\frac{1}{2}$. Therefore, depending on number of nucleons (protons + neutrons) nuclei also possess spin quantum number 'I'. The spin quantum number 'I' is a characteristics of nucleus. All nuclei that have spin quantum number 'I' greater than the zero, behaves as magnet.

NMR spectroscopy is most often concerned with nuclei, $I = \frac{1}{2}$. Example of such nuclei are $^{1}_{1}H$, $^{13}_{6}C$, $^{19}_{9}F$ and $^{31}_{15}P$, while spectra can not be obtained from nuclei with I = 0, as it does not produce magnetic moment, known as non - magnetic nuclei.

Nuclear magnetic resonance is mainly studies for the nucleus of hydrogen i.e. proton, hence also called as ***PMR spectroscopy***. Recent advances in instrument technology have resulted in the increasing availability of C^{13} (carbon-13) NMR. The combination of H^1 & C^{13} NMR spectra provides a powerful method of structure determination.

NUCLEAR EXCITATION : Generation of nuclear energy levels :

Every spinning nucleus with $I \geq O$ give rise to a magnetic field whose axis is coincident with the axis of spin having magnetic moment μ. Hydrogen nucleus ($I = \frac{1}{2}$) also produce a magnetic field having magnetic moment μ directed along its spinning axis (Fig.), when such a spinning nucleus is placed in an uniform external magnetic field (H_o), its magnetic moment can be parallel (alignment A) or antiparallel (alignment B) to the direction of the applied field (H_o).

The number of orientations of the nucleus in external magnetic field is given by (2I + 1), where 'I' is the spin quantum number of the nucleus. For proton 'H' $I = \frac{1}{2}$, and hence it will have only two orientation.

Number of orientation for 'H' $= (2I + 1) = \left(2 \times \frac{1}{2} + 1\right) = 2$

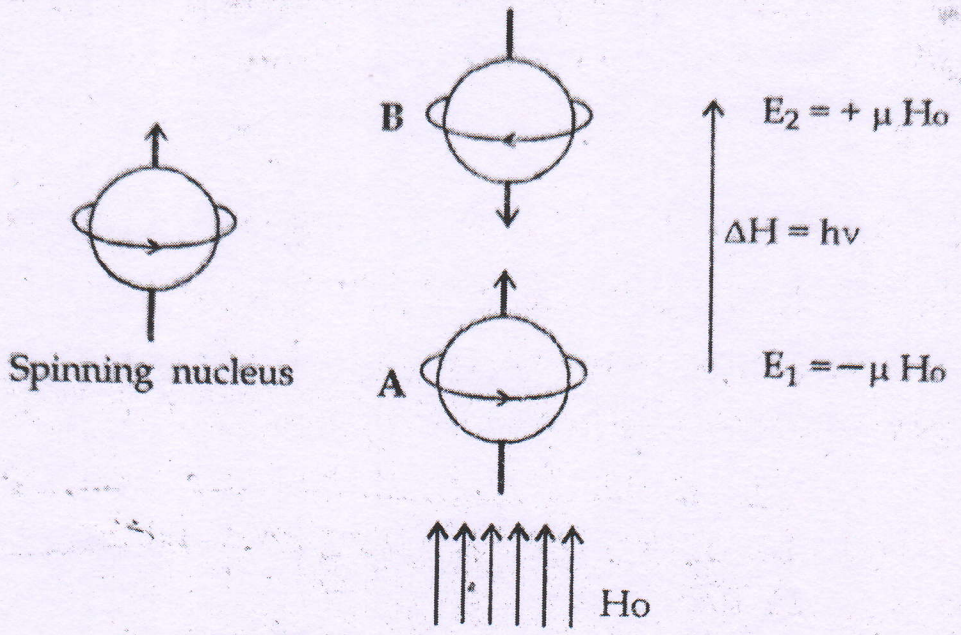

Fig. Orientation of hydrogen nucleus in external magnetic field

When the spinning proton is placed in external magnetic field, it can orient itself in two ways with respect to the direction of the applied magnetic field H_o -

(i) the direction of the magnetic field of the proton and that of the applied magnetic field are parallel to each other and

(ii) the direction of the magnetic field of the proton and that of the applied magnetic field are antiparallel to each other.

These two orientations represent two nuclear energy for proton E_1 and E_2 ($E_2 > E_1$).

Majority of nuclei would be present in the lower level (E_1). These nuclei can be excited to the higher energy level E_2 by providing the necessary energy (ΔE).

$$\Delta E = E_2 - E_1$$

$$\Delta E = (\mu H_o) - (-\mu H_o)$$

$$= \mu H_o + \mu H_o = 2(\mu H_o)$$

But $\Delta E = h\nu$

$$\therefore \quad \nu = \left(\frac{2\mu}{h}\right) H_o$$

UNIT - IV

Green Chemistry

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Date

Green chemistry - Green chemistry is a design of product or process that reduce or eliminate the use or generation of hazardous compound is known as green chemistry.

Green chemisty is deals with product or process in regard to use of reactant, use of reagent, sefty of chemicals, hazardous level of the chemical, manufactur cost.

Discuss the principle of green chemistry

Green chemistry approach can be accomplish by following 12 principle and these 12 principle are known as green chemisty principle.

> Waste Prevention
A chemical product and processes should be design in a such a way that it does not form any waste product. (By product).

> Atomi Economy
By green chemisty approach all reactant molecule and the atom shoud be converted

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into product. so as to ~~rich~~ obtain 100 % atom economy

Ex. Diels Alder reaⁿ
Cope - rearrangement
Claisen rearrangement
Oxy-cope rearrangement

3> Safe chemical Design
The chemical processes should be safe to the environment and to the human bein

4> Benign solvents and ⊖ Auxiliaries
Chemical process should be carried out alon with environmentally friendly, easy to recover, less cost, unreactive solvents

Ex. CO_2 when use as a solvent, it can be remove very easily from the reaction medi

5> Energy Efficiency
The chemical process should be carried out at ambient condition (at room temperature and if possible higher temperature and higher pressure should be design at lowe temperature and lower pressure. In other words reaⁿ must be carried out at

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