

Academic Year 2019-2020

1.NAME OF THE EVENT: GUEST LECTURE

- Topic: '**Electron displacement effects in covalent bonds**'

Date Conducted: 15-07-2019.

- Name and Designation of the Resource person:
- **Dr. D.BALA KARUNA KUMAR**, Lecturer in Andhra Loyola College, Vijayawada

- **Report on the guest lecturer:**

Objectives

Inductive effect & Mesomeric effect:

The inductive effect can be used to determine the stability of a molecule depending on the charge present on the atom and the groups bonded to the atom. For example, if an atom has a positive charge and is attached to a -I group its charge becomes 'amplified' and the molecule becomes more unstable.

Notes on lecture

The **inductive effect** refers to the phenomenon wherein a permanent dipole arises in a given molecule due to the unequal sharing of the bonding electrons in the molecule. This effect can arise in sigma bonds, whereas the electromeric effect can only arise in pi bonds.

Inductive Effect on Acidity and Basicity

Using the inductive effect, we can predict the acidity and basicity of compounds. As a generalisation, it may be said that the electron-withdrawing groups (EWG) increase the acidity of a compound, and the electron-donating group decrease the acidity of a compound.

This is because, if we take the conjugate base of the acid, that is, RCOO^- , if R is electron-withdrawing, then the conjugate base is stabilised via delocalisation of the formed negative charge. If R had been electron-donating, then the conjugate base would have been destabilised because of inter-electronic repulsions.

Types of Inductive Effect

- Negative inductive effect or -I effect
- Positive inductive effect +I effect

-I Effect (Negative Inductive Effect)

When an electronegative atom, such as a halogen, is introduced to a chain of atoms (generally, carbon atoms), the resulting unequal sharing of electrons generates a positive charge which is transmitted through the chain.

This causes a permanent dipole to arise in the molecule wherein the electronegative atom holds a negative charge, and the corresponding effect is called the electron-withdrawing inductive effect or the -I effect.

+I Effect (Positive Inductive Effect)

When a chemical species with the tendency to release or donate electrons, such as an alkyl group, is introduced to a carbon chain, the charge is relayed through the chain, and this effect is called the positive inductive effect or the +I effect.

Inductive Effect on Stability of Molecules

The charge on a given atom and the charge on a group bonded to the atom plays a strong part when determining the stability of the resulting molecule as per the inductive effect.

An example of this can be observed when a group displaying the -I effect is bonded to a positively charged atom, and the positive charge on the resulting molecule is amplified, reducing its stability.

On the other hand, when a negatively charged atom is introduced to a group displaying a -I effect, the charge disparity is somewhat quenched, and the resulting molecule would be stable as per the inductive effect.

When a group displaying the -I effect is bonded to a molecule, the electron density of the resulting molecule effectively reduces, making it more likely to accept electrons and, thereby, increasing the acidity of the molecule.

When a +I group attaches itself to a molecule, there is an increase in the electron density of the molecule. This increases the basicity of the molecule since it is now more capable of donating electrons

The individual bond dipole moments results in a net dipole moment for the molecule. A polar bond is a covalent bond in which there is a separation of charge between one end and the other - in other words in which one end is slightly positive and the other slightly negative. Examples include most covalent bonds. The hydrogen-chlorine bond in HCl or the hydrogen-oxygen bonds in water are typical.

Inductive effect

The effect of the sigma electron displacement towards the more electronegative atom by which one end becomes positively charged and the other end negatively charged is known as the inductive effect. "-I effect is a permanent effect & generally represented by an arrow on the bond."

However, some groups, such as the alkyl group, are less electron-withdrawing than hydrogen and are therefore considered as electron-releasing. This is electron-releasing character and is indicated by the +I effect. In short, alkyl groups tend to give electrons, leading to the induction effect. However, such an effect has been questioned.[2]

As the induced change in polarity is less than the original polarity, the inductive effect rapidly dies out and is significant only over a short distance. Moreover, the inductive effect is permanent but feeble since it involves the shift of strongly held σ -bond electrons and other stronger factors may overshadow this effect.

Relative inductive effects

Relative inductive effects have been experimentally measured with reference to hydrogen, in increasing order of -I effect or decreasing order of +I effect, as follows:

$-\text{NH}_2 > -\text{NR}_2 > -\text{NO}_2 > -\text{SO}_2\text{R} > -\text{CN} > -\text{SO}_2\text{H} > -\text{CHO} > -\text{CO} > -\text{COOH} > -\text{COCl} > -\text{CONH}_2 > -\text{F} > -\text{Cl} > -\text{Br} > -\text{I} > -\text{OR} > -\text{OH} > -\text{NR}$

And $\text{C}-\text{H} < \text{C}-\text{D} < \text{C}-\text{T}$ in increasing order of +I effect, where H is Hydrogen and D is Deuterium and T is Tritium. All are isotopes of hydrogen.

The strength of inductive effect is also dependent on the distance the substituent group and the main group that react; the longer the distance, the weaker the effect.

Inductive effects can be expressed quantitatively through the Hammett equation, which describes the relationship between reaction rates and equilibrium constants with respect to substituent.

Fragmentation

The screenshot also shows a Windows taskbar at the bottom with a search bar, application icons, and system tray information including 38°C Sunny, 3:06 AM, and 6/5/2023.

Outcome

Lecture was received by all first B.Sc Students Impressively. And get knowledge on this topic

- PHOTOS



Introducing Topic

- News paper cuttings



A. Pudiw

Signature of HOD

Academic Year 2019-20

2..NAME OF THE EVENT: GUEST LECTURE

- Topic: **Thermodynamics**
- Date Conducted: 09-09-2019
- Name and Designation of the Resource person:
D.VimalaKumari lecturer in chemistry ANR collegeGudivada.

- **Report on the guest lecturer:**

Objectives

To Explain Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes.

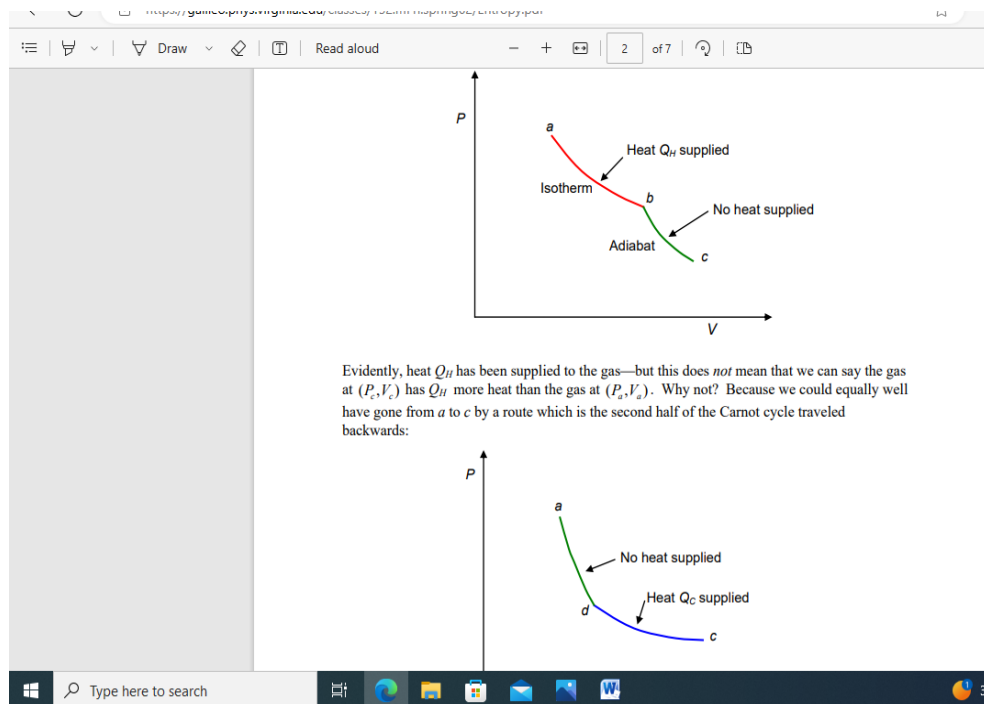
Notes on lecture

Thermodynamics is essentially the study of flow of energy. Its entire chapter is based on the underpinning that there is transference and transformation of energy from one form to another. Since the measurement of energy has to be about a specific system, class 11 Chemistry chapter 6 thermodynamics notes begin with elaborating various properties of a system

The chapter of thermodynamics in CBSE class 11 Chemistry is quite exhaustive in its content. A student has to learn multiple topics under this chapter, along with the relevant mathematical sums. To fully grasp the chapter, the core concepts must be clear at the outset. Students, while preparing this chapter, can download the PDF of the notes for free on Vedantu's official website.

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Outcome

Lecture was received by all third B.Sc Students Impressively.

- PHOTOS



Interaction with students

- News paper cuttings

ఉష్ణగతిక శాస్త్ర ప్రాధాన్యతపై అవగాహన



ఉయ్యూరు : ఏజీఅండ్ఎస్జీ సిద్ధార్థ కళాశాలలో రసాయన శాస్త్ర విభాగం ఆధ్వర్యంలో సోమవారం ఉష్ణగతిక శాస్త్ర ప్రాధాన్యత అంశంపై అవగాహన సదస్సు నిర్వహించారు. సదస్సుకు ముఖ్య అతిథిగా హాజరైన గుడివాడ ఏఎన్ఆర్ కళాశాల రసాయన శాస్త్ర అధ్యాపకులు డీ విమల విద్యార్థులకు శక్తి నిత్యత్వ సూత్రం, ఎంట్రోపీ స్వేచ్ఛా శక్తి, అంశాల గురించి వివరించారు. రసాయన శాస్త్రంలో విద్యార్థుల సందేహాలను నివృత్తి చేశారు. ఈ కార్యక్రమంలో డిగ్రీ ప్రిన్సిపల్ బాలకృష్ణ, ప్రత్యేక అధికారి సత్యనారాయణ, అధ్యాపకులు ఇందిర, నాగేశ్వరరావు, రమేష్ పాల్గొన్నారు.

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A. Rudra

Signature of HOD

A.G & S.G Siddhartha Degree College of Arts & Science, Vuyyuru

Academic Year 2019-2020

3.NAME OF THE EVENT: GUEST LECTURE

Topic: 'NMR SPECTROSCOPY'

Date 26-02-2020

- Name and Designation of the Resource person:
 - **Dr.M.Sivanadh**, Associate Professor, ANR College, Gudivada.
- **Report on the guest lecturer:**

Objectives

NMR SPECTROSCOPY PRINCIPLE-APPLICATIONS

The NMR spectroscopy determines the physical and chemical properties of atoms or molecules. It relies on the phenomenon of nuclear magnetic resonance and provides detailed information about the structure, dynamics, reaction state, and chemical environment of molecules.

Notes on lecture

What is NMR Spectroscopy?

NMR Spectroscopy is abbreviated as *Nuclear Magnetic Resonance spectroscopy*.

Nuclear magnetic resonance (NMR) spectroscopy is the study of molecules by recording the interaction of radiofrequency (Rf) electromagnetic radiations with the nuclei of molecules placed in a strong magnetic field.

Zeeman first observed the strange behaviour of certain nuclei when subjected to a strong magnetic field at the end of the nineteenth century, but the practical use of the so-called “*Zeeman effect*” was only made in the 1950s when NMR spectrometers became commercially available.

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- [NMR Spectroscopy Applications](#)
- [Recommended Videos](#)
- [Frequently Asked Questions – FAQs](#)

It is a research technique that exploits the magnetic properties of certain atomic nuclei. The NMR spectroscopy determines the physical and chemical properties of [atoms or molecules](#).

It relies on the phenomenon of nuclear magnetic resonance and provides detailed information about the structure, dynamics, reaction state, and chemical environment of molecules.

Basis of NMR Spectroscopy

Nuclear Magnetic Resonance (NMR) was first detected experimentally at the end of 1945, nearly concurrently with the work groups Felix Bloch, Stanford University and Edward Purcell, Harvard University. The first NMR spectrum was first published in the same issue of the Physical Review in January 1946. Bloch and Purcell were jointly awarded the 1952 Nobel Prize in Physics for their research of Nuclear Magnetic Resonance Spectroscopy.

Nuclear magnetic resonance (NMR) spectroscopy is a crucial analytical tool for organic chemists. The research in the organic lab has been significantly improved with the aid of the NMR. Not only can it provide information on the structure of the molecule, it can also determine the content and purity of the sample. Proton (^1H) NMR is one of the most widely used NMR methods by organic chemists. The protons present in the molecule will behave differently depending on the surrounding chemical environment, making it possible to elucidate their structure.

NMR Spectroscopy Principle

Many nuclei have spin, and all nuclei are electrically charged, according to the NMR principle. An energy transfer from the base energy to a higher energy level is achievable when an external magnetic field is supplied.

- All nuclei are electrically charged and many have spin.
- Transfer of energy is possible from base energy to higher energy levels when an external magnetic field is applied.
- The transfer of energy occurs at a wavelength that coincides with the radio frequency.
- Also, energy is emitted at the same frequency when the spin comes back to its base level.
- Therefore, by measuring the signal which matches this transfer the processing of the NMR spectrum for the concerned nucleus is yield.

NMR Spectroscopy Working

- Place the sample in a magnetic field.
- Excite the nuclei sample into nuclear magnetic resonance with the help of radio waves to produce NMR signals.
- These NMR signals are detected with sensitive radio receivers.
- The resonance frequency of an atom in a molecule is changed by the intramolecular magnetic field surrounding it.
- This gives details of a molecule's individual [functional groups](#) and its electronic structure.

- Nuclear magnetic resonance spectroscopy is a conclusive method of identifying monomolecular organic compounds.
- This method provides details of the reaction state, structure, chemical environment and dynamics of a molecule.

Chemical Shift in NMR Spectroscopy

A spinning charge generates a magnetic field that results in a magnetic moment proportional to the spin. In the presence of an external magnetic field, two spin states exist; one spin up and one spin down, where one aligns with the magnetic field and the other opposes it.

Chemical shift is characterized as the difference between the resonant frequency of the spinning protons and the signal of the reference molecule. Nuclear magnetic resonance [chemical change](#) is one of the most important properties usable for molecular structure determination. There are also different nuclei that can be detected by NMR spectroscopy, ^1H (proton), ^{13}C (carbon 13), ^{15}N (nitrogen 15), ^{19}F (fluorine 19), among many more. ^1H and ^{13}C are the most widely used. The definition of ^1H as it is very descriptive of the spectroscopy of the NMR. Both the nuts have a good charge and are constantly revolving like a cloud. Through mechanics, we learn that a charge in motion produces a magnetic field. In NMR, when we reach the radio frequency (Rf) radiation nucleus, it causes the nucleus and its magnetic field to turn (or it causes the nuclear magnet to pulse, thus the term NMR).

NMR Spectroscopy Instrumentation

This instrument consists of nine major parts. They are discussed below:

- **Sample holder** – It is a glass tube which is 8.5 cm long and 0.3 cm in diameter.
- **Magnetic coils** – Magnetic coil generates magnetic field whenever current flows through it

- **Permanent magnet** – It helps in providing a homogenous magnetic field at 60 – 100 MHz
- **Sweep generator** – Modifies the strength of the magnetic field which is already applied.
- **Radiofrequency transmitter** – It produces a powerful but short pulse of the radio waves.
- **Radiofrequency** – It helps in detecting receiver radio frequencies.
- **RF detector** – It helps in determining unabsorbed radio frequencies.
- **Recorder** – It records the NMR signals which are received by the RF detector.
- **Readout system** – A computer that records the data.

NMR Spectroscopy Techniques

1. Resonant Frequency

It refers to the energy of the absorption, and the intensity of the signal that is proportional to the strength of the magnetic field. NMR active nuclei absorb electromagnetic radiation at a frequency characteristic of the isotope when placed in a magnetic field.

2. Acquisition of Spectra

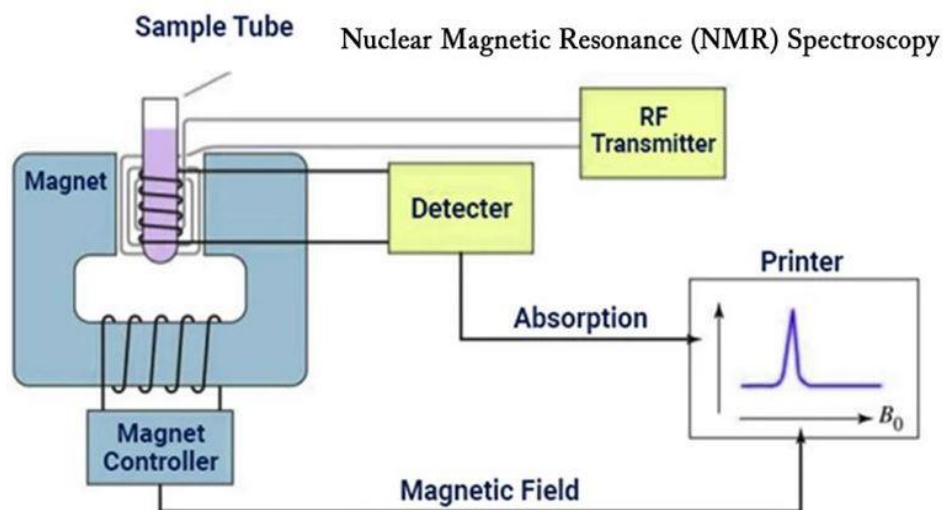
Upon excitation of the sample with a radiofrequency pulse, a nuclear magnetic resonance response is obtained. It is a very weak signal and requires sensitive radio receivers to pick up.

NMR Spectroscopy Applications

1. NMR spectroscopy is a [Spectroscopy](#) technique used by chemists and biochemists to investigate the properties of organic molecules, although it is applicable to any kind of sample that contains nuclei possessing spin.

2. For example, the NMR can quantitatively analyze mixtures containing known compounds. NMR can either be used to match against spectral libraries or to infer the basic structure directly for unknown compounds.
3. Once the basic structure is known, NMR can be used to determine molecular conformation in solutions as well as in studying physical properties at the molecular level such as conformational exchange, phase changes, solubility, and diffusion.

What is NMR spectroscopy?



NMR Spectroscopy Principle

Outcome

Lecture was received by all first B.Sc Students Impressively.

- PHOTOS



NMR SPECTROSCOPY

• New



A. Pudiw

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