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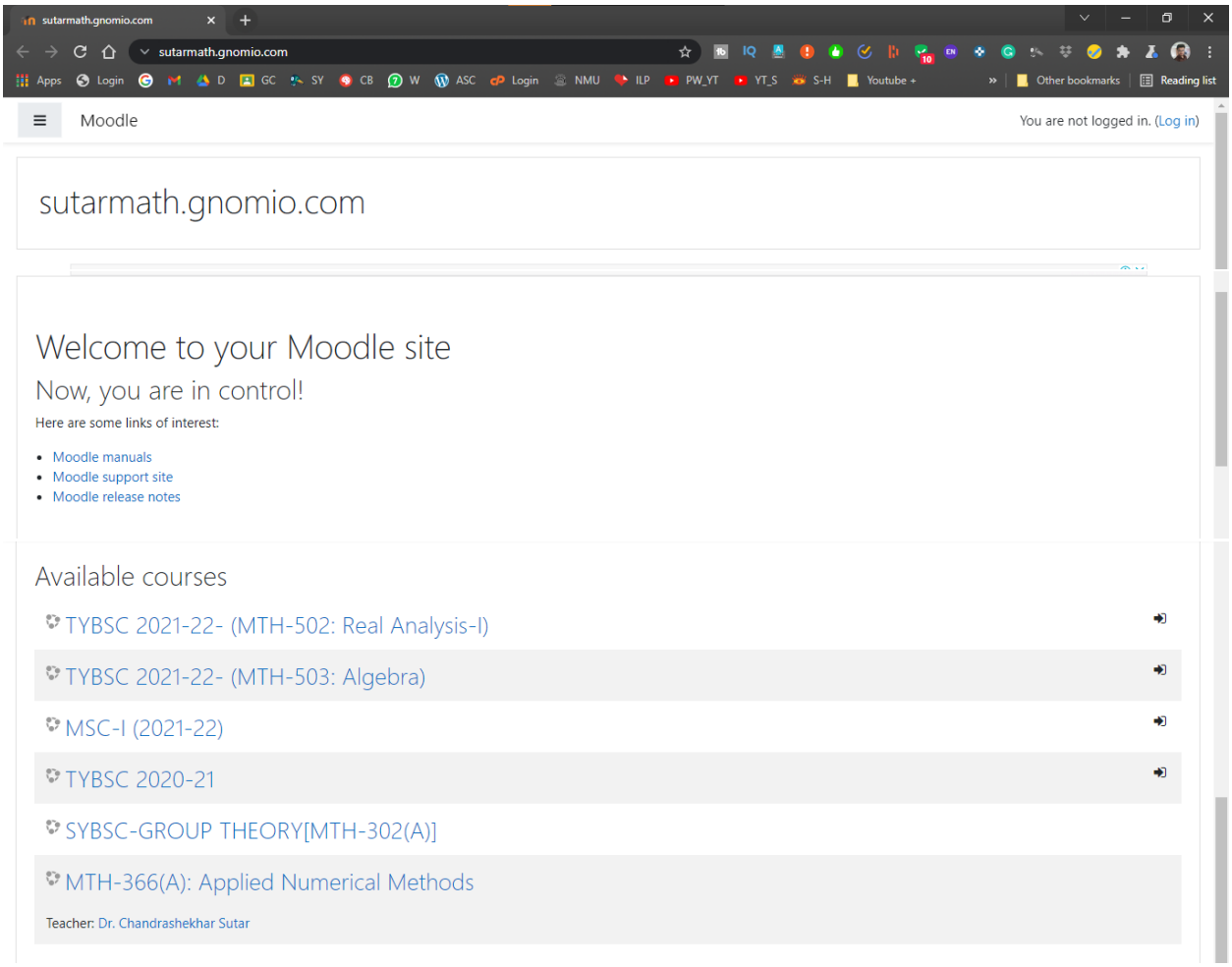

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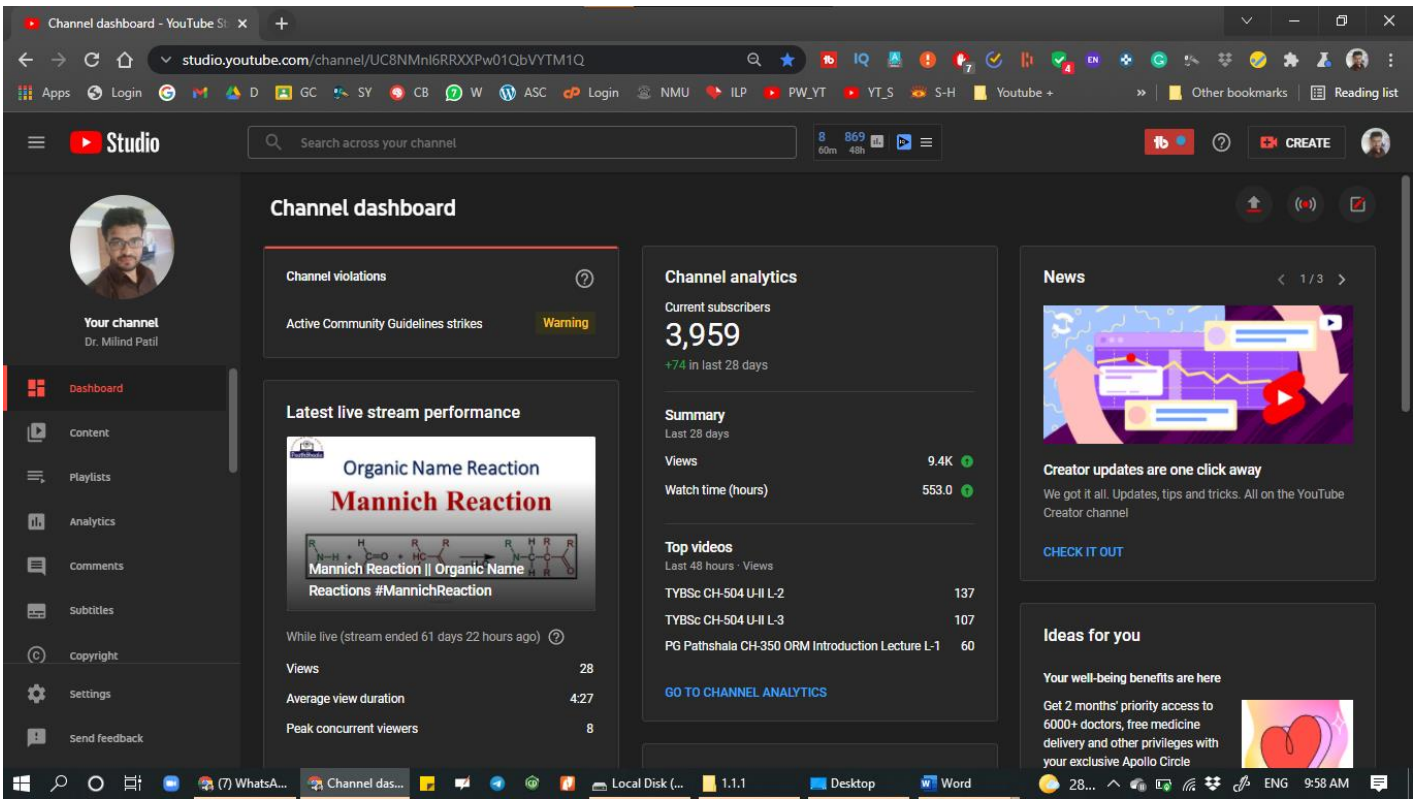
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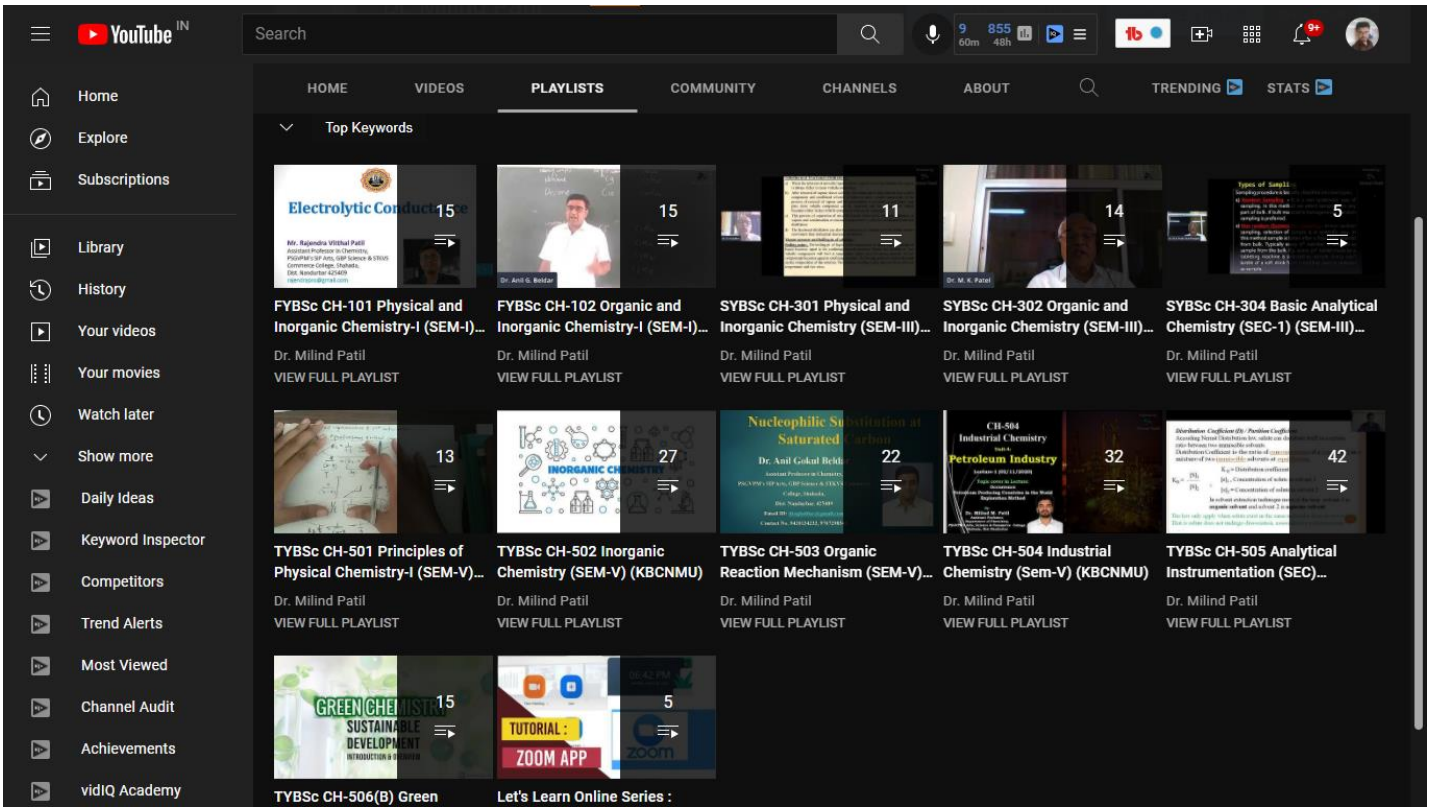
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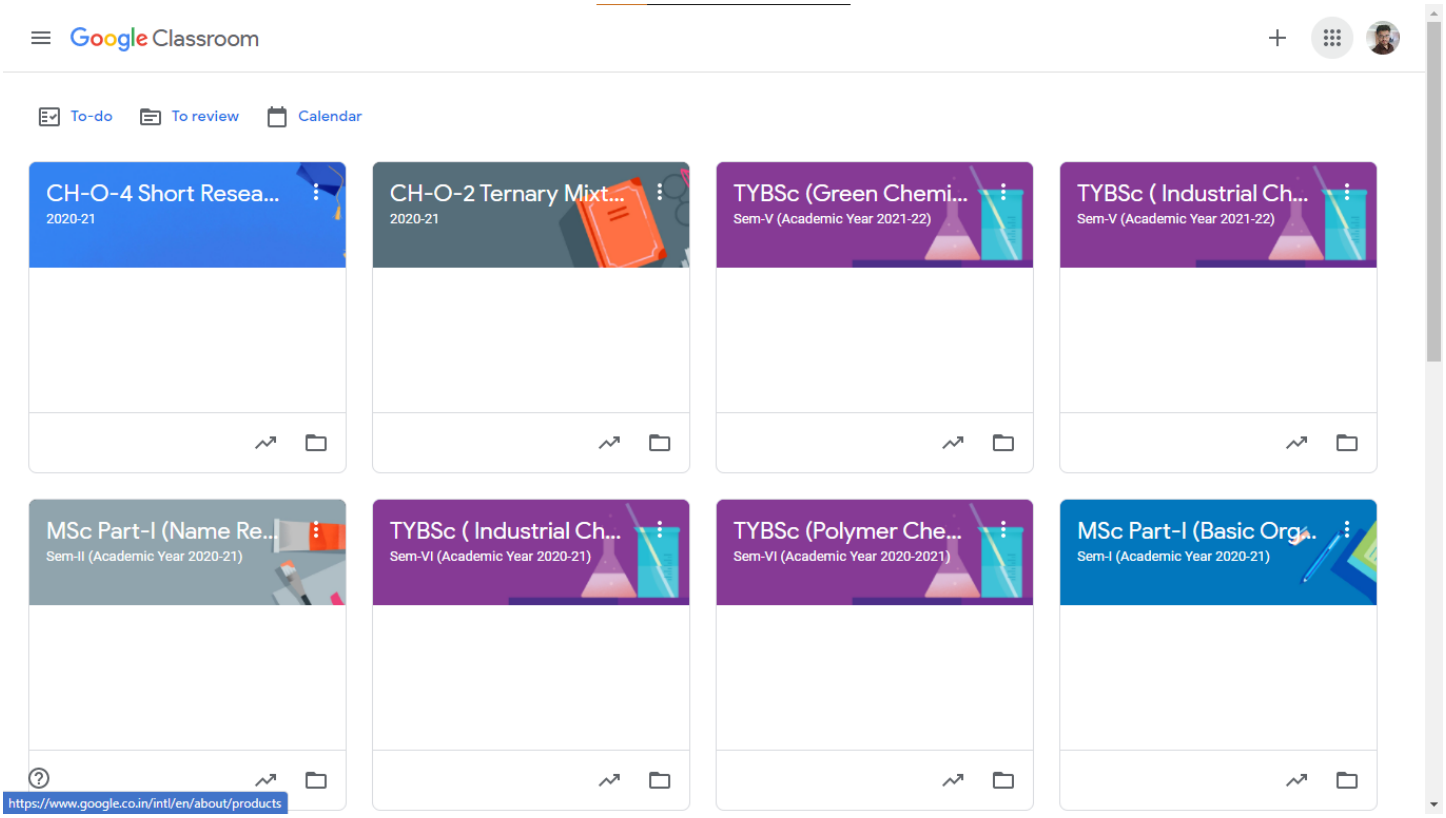

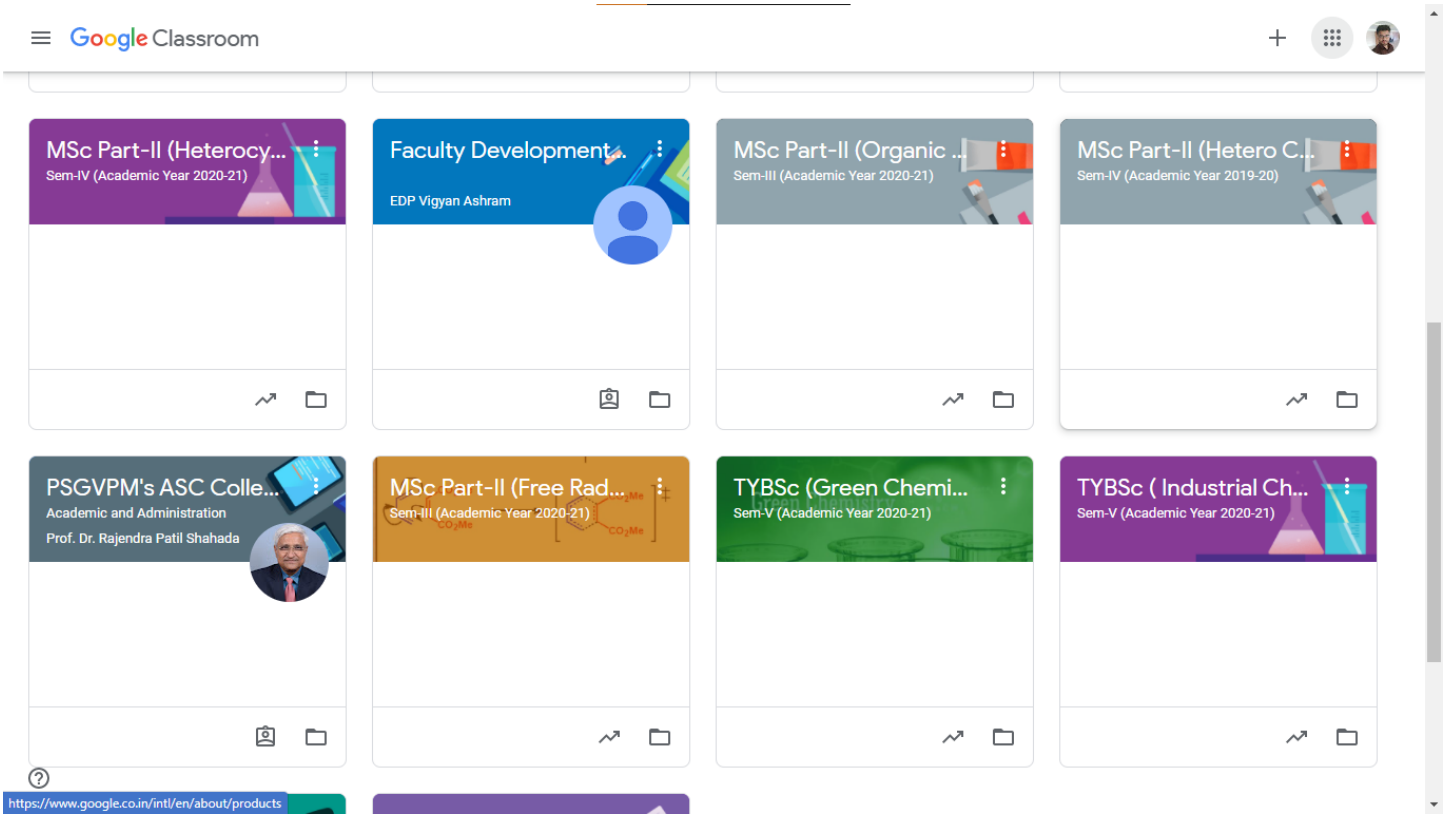

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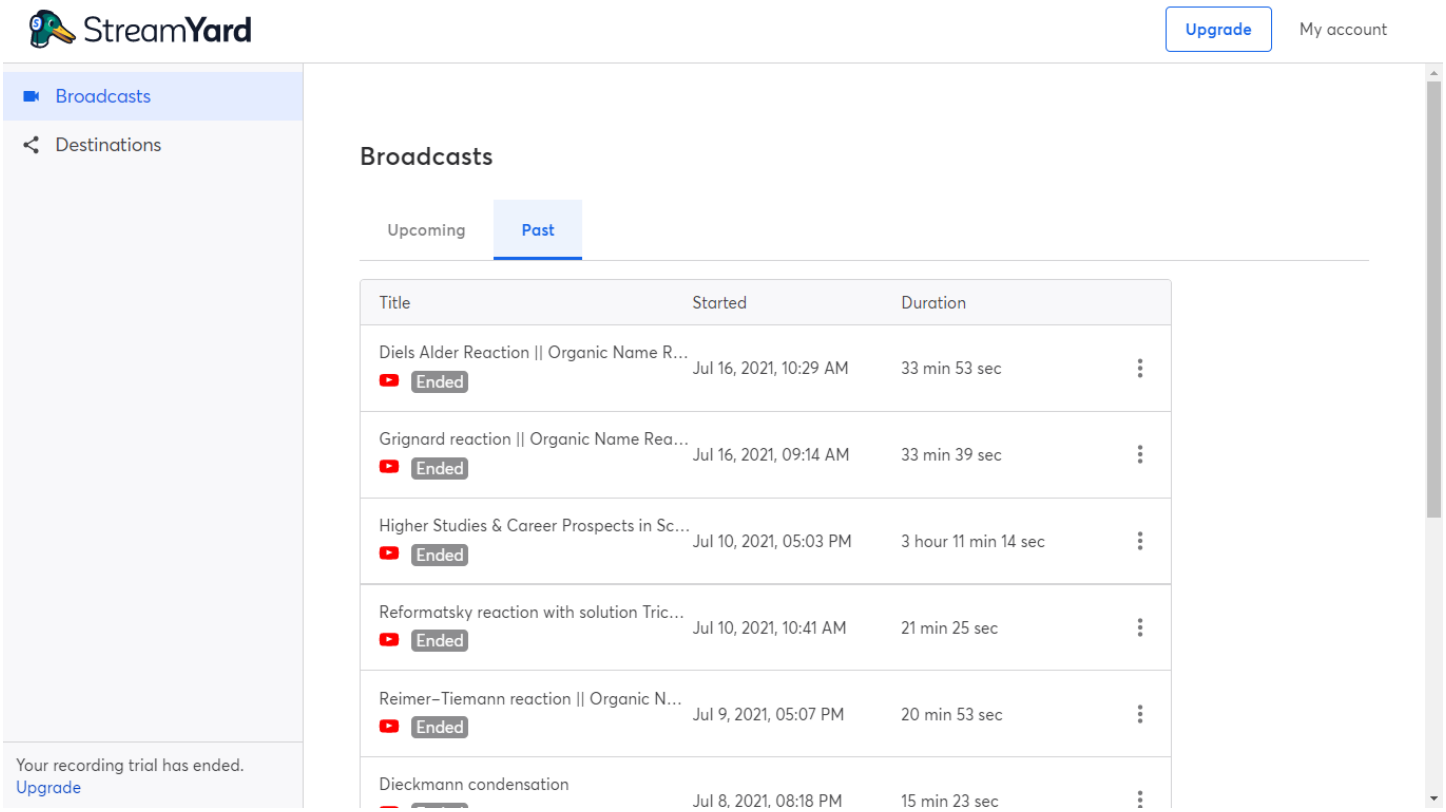
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Grignard reaction || Organic Name Rea...
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Jul 16, 2021, 09:14 AM
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Jul 10, 2021, 05:03 PM
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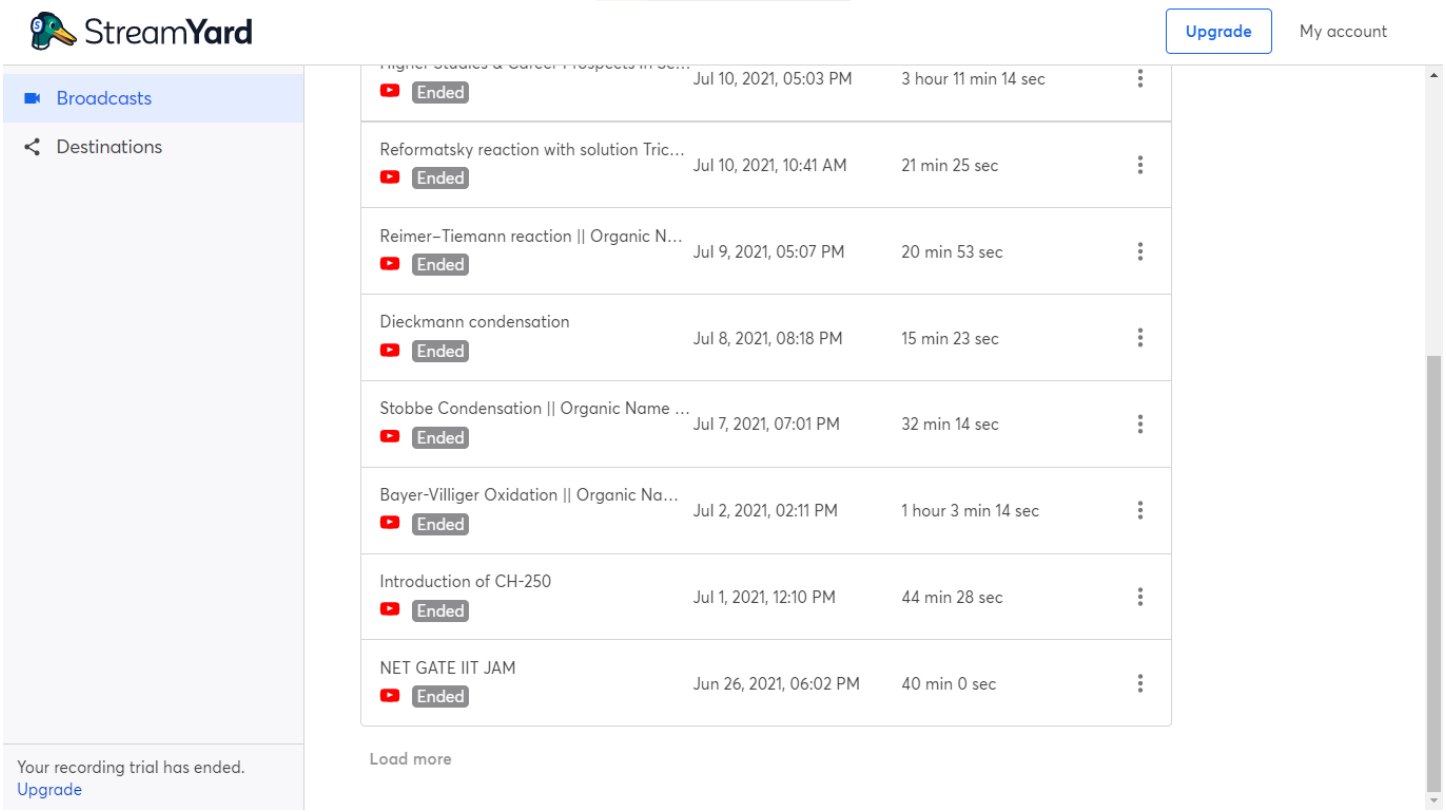
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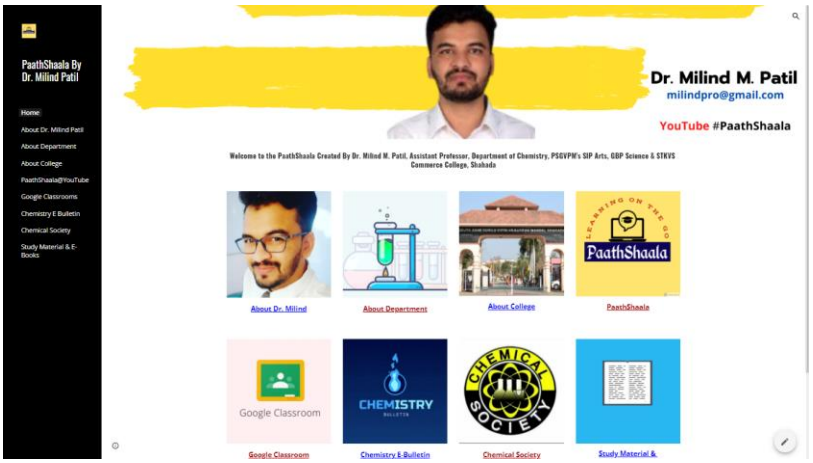

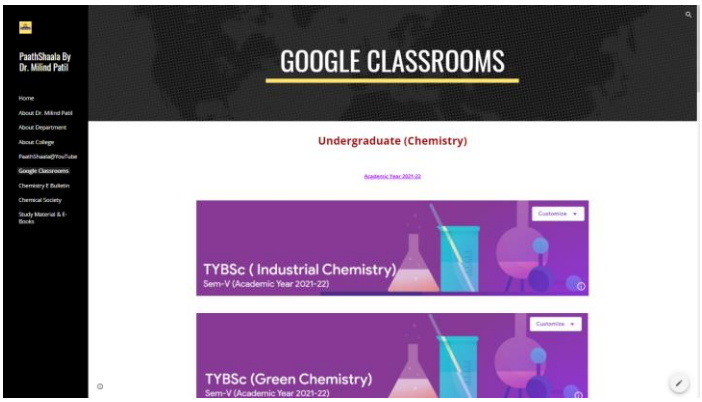

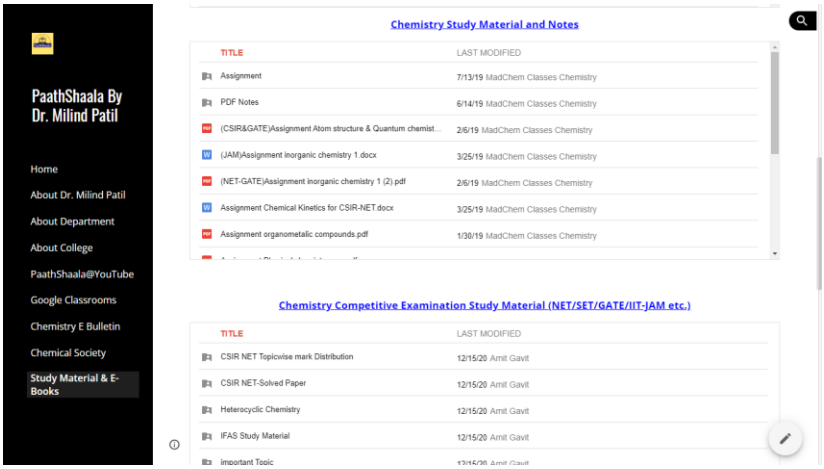

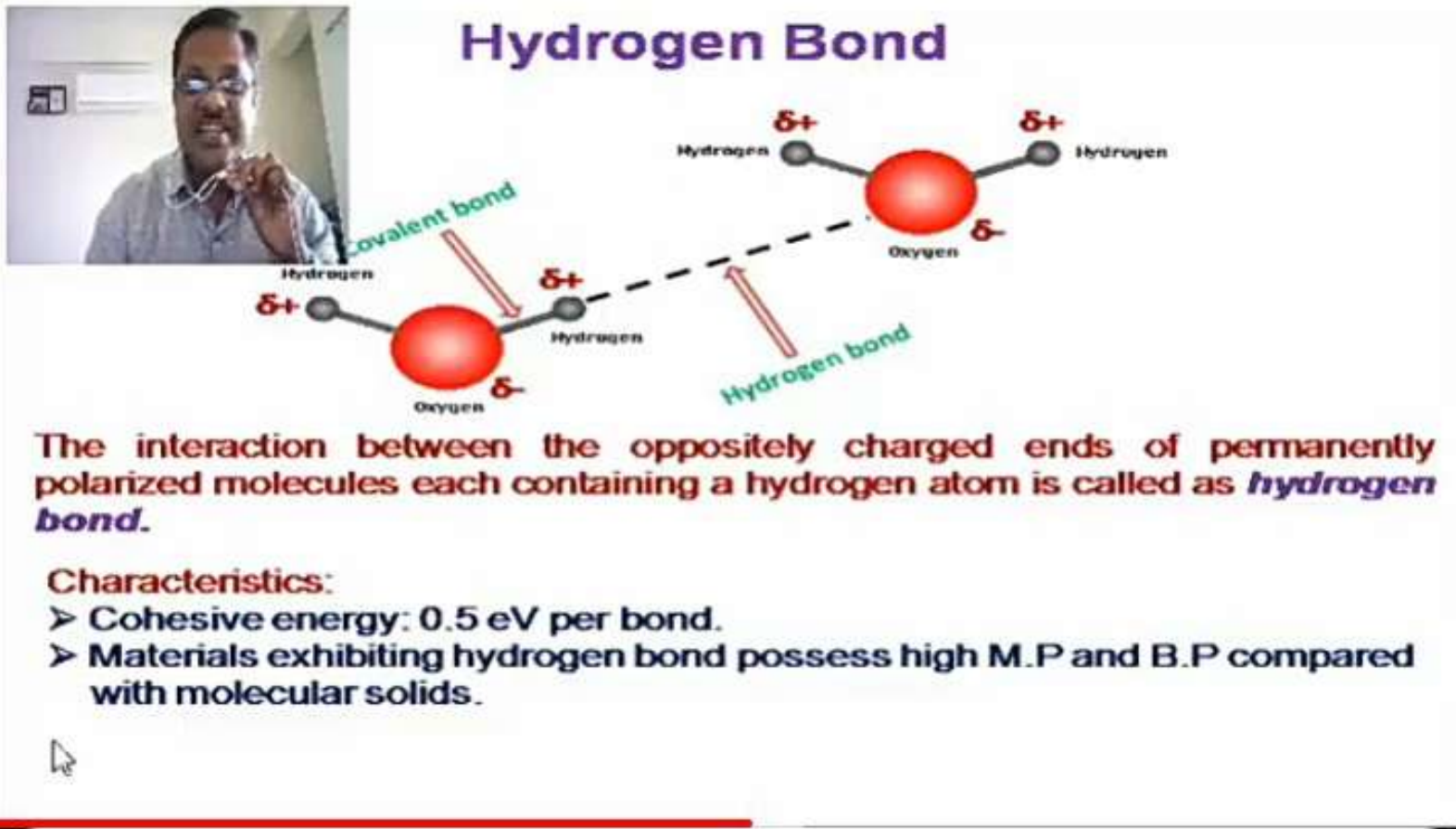

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PHY 502 Unit 3 Lecture 4

Prashant Jagtap

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Calculation of Ripple factor

- **Ripple factor** is defined as the ratio of root mean square (r.m.s) value of a.c. component to the value of d.c. Component.

$$\therefore \text{Ripple factor} = \frac{\text{rms value of a.c. component}}{\text{value of d.c component}}$$

$$\therefore \text{Ripple factor} = \frac{I_{a.c.}}{I_{d.c.}} \quad \text{——————} \quad (1)$$

By definition, the r.m.s value of load current is given by

$$I_{rms} = \sqrt{I_{a.c}^2 + I_{d.c}^2}$$

$$I_{rms}^2 = I_{a.c}^2 + I_{d.c}^2$$

$$I_{a.c}^2 = I_{rms}^2 - I_{d.c}^2$$

$$\therefore I_{a.c} = \sqrt{I_{rms}^2 - I_{d.c}^2}$$

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PHY 302A Unit 2 Lecture3

Prashant Jagtap

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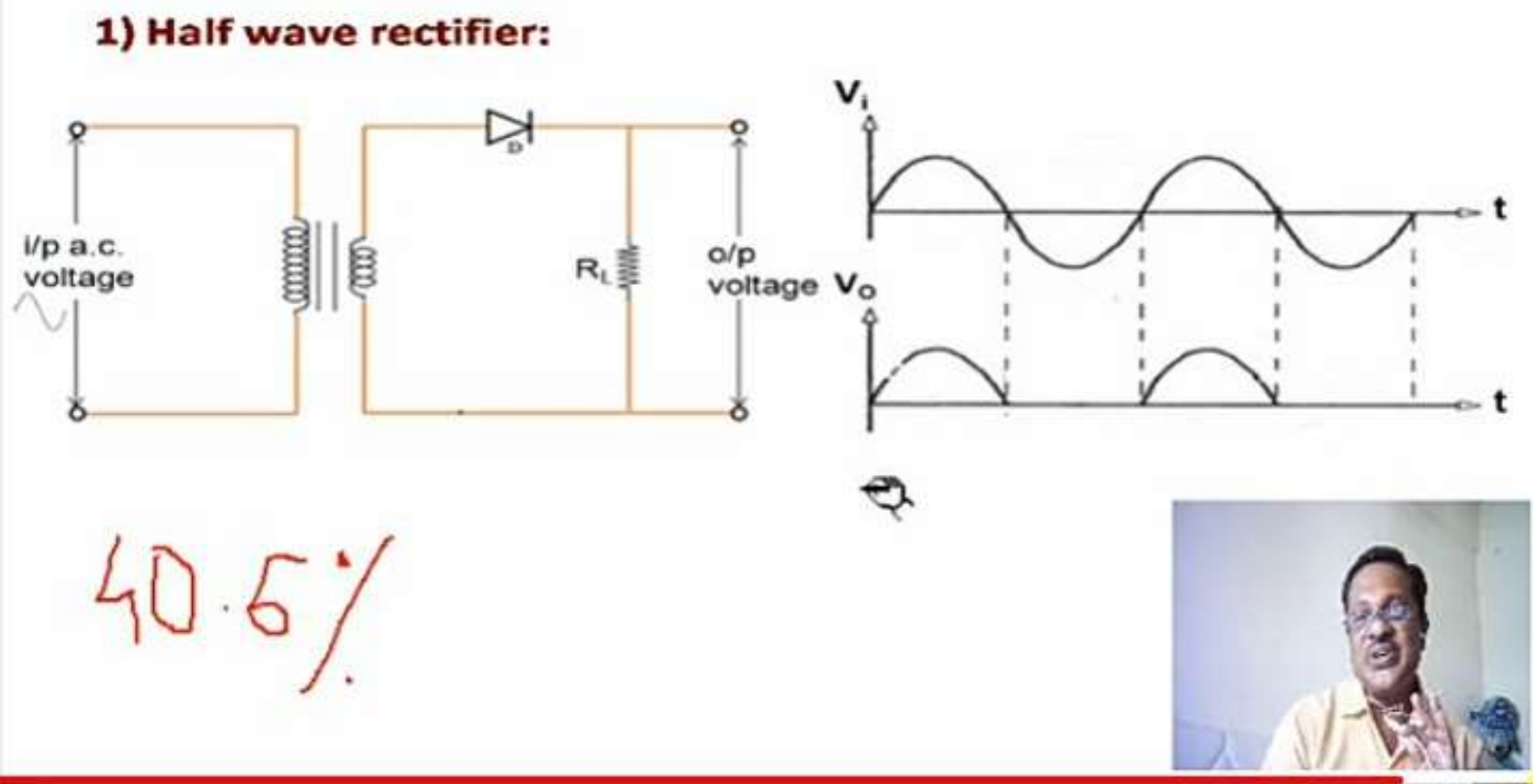

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PHY 302A Unit 2 Lecture 1

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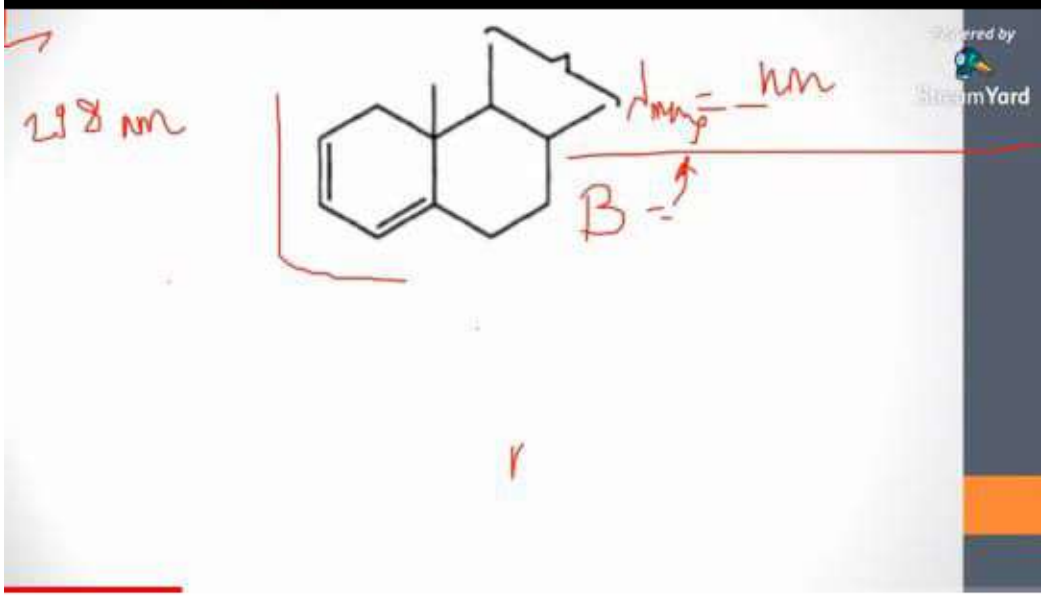

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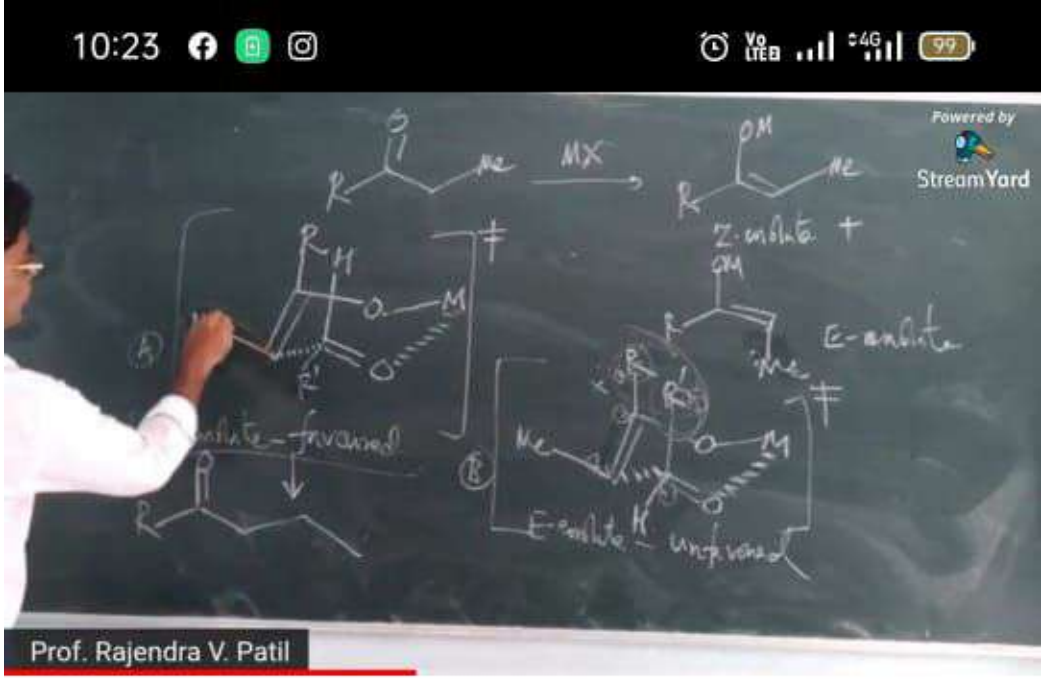

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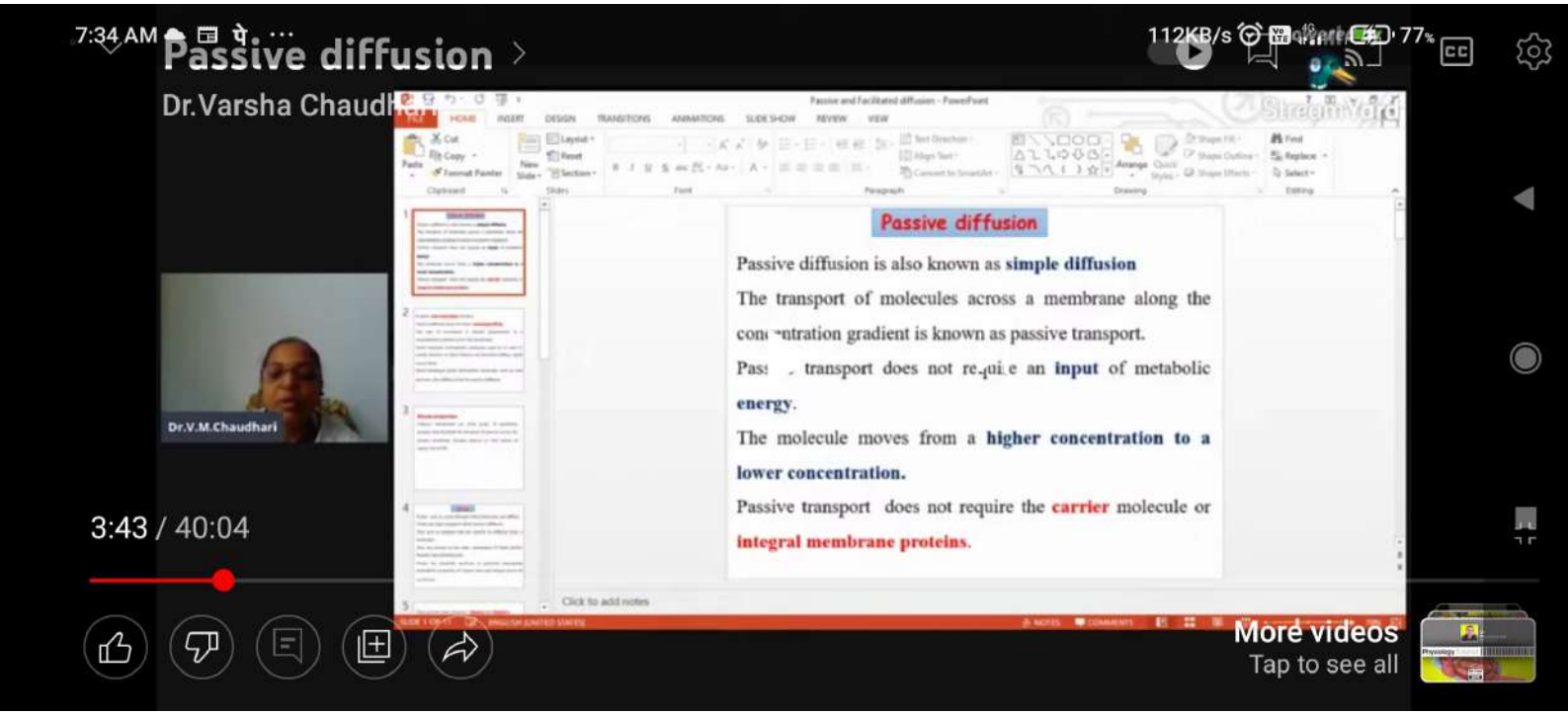
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Passive diffusion
Passive diffusion is also known as simple diffusion
The transport of molecules across a membrane along the concentration gradient is known as passive transport.
Passive transport does not require an input of metabolic energy.
The molecule moves from a higher concentration to a lower concentration.
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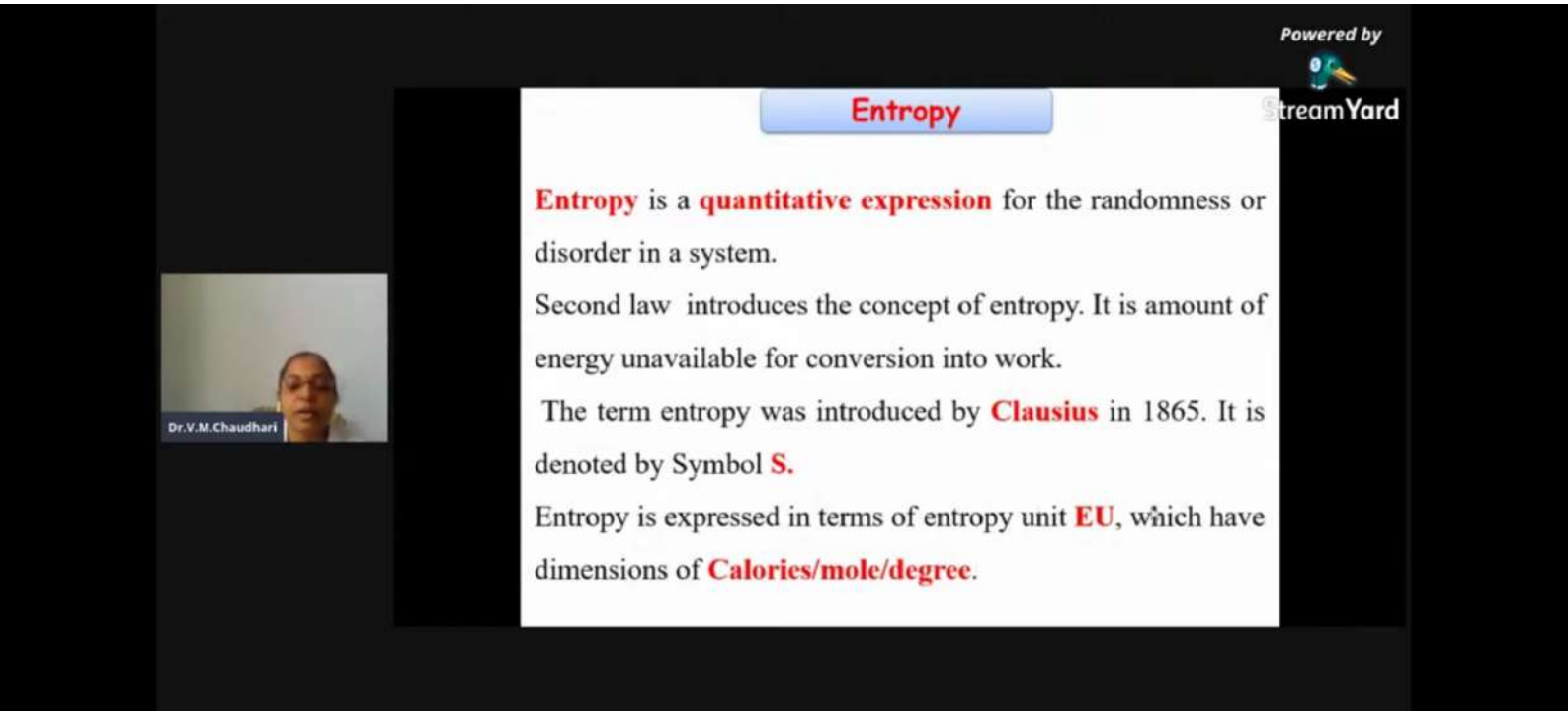
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Entropy
Entropy is a quantitative expression for the randomness or disorder in a system.
Second law introduces the concept of entropy. It is amount of energy unavailable for conversion into work.
The term entropy was introduced by Clausius in 1865. It is denoted by Symbol S.
Entropy is expressed in terms of entropy unit EU, which have dimensions of Calories/mole/degree.
Dr.V.M.Chaudhari

Media

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Starch forms deep blue coloured complex with I_2 but not with I^- ions. Therefore blue colour is absent if solution contains I^- ions.

Solution remains colourless upto equivalence point when Iodine (I_2) is used as titrant against a reducing agent. Because I_2 is reduced to I^- ions. But after equivalence point, when excess of I_2 is added, solution becomes deep blue coloured. It is end point of titration.

But when I^- is used as a reducing agent end point is exactly opposite i.e. blue to colourless.

1.4 Titrations involving Iodine : Iodimetry and Iodometry

In many redox titrations either Iodine is used as a titrant or Iodine is liberated during the titrations. In these titrations starch is used as indicator. These titrations involving Iodine are of two types.

1) Iodimetry
2) Iodometry

1.4.1 Iodimetry

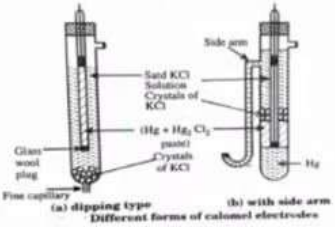
- Titrations in which Iodine (I_2) is used as an oxidizing agent are called Iodimetric titrations or Iodimetry.
- Iodine is a moderately strong oxidizing agent. Hence it is titrated against strong reducing agents. In these titrations starch is used as indicator.
- In presence of a reducing agent, I_2 is reduced to Iodide ions (I^-). I_2 accepts two electrons from reducing agent to form iodide ions.

Calomel Electrode :- Due the difficulties in the use of standard hydrogen electrode leads to the use of secondary reference electrode. The calomel electrode is widely used because it is easily prepared in laboratory and gives constant emf. There are three types of calomel electrodes

1. Saturated calomel electrodes
2. 1N calomel electrode
3. 0.1N calomel electrodes

There are different shapes and sizes of calomel electrodes. The commercially available and commonly used is SCE. It consist of a outer glass tube having fine capillary at the bottom of which is plugged with asbestos fiber for connection. The inner glass tube containing mercury and mercurous chloride paste with closed lower end with glass wool plug. A small amount of mercury is placed over the paste and platinum wire is inserted in it for electrical contact. The outer tube is filled with sat. solution of KCl. Some crystals of KCl are placed are placed in outer tube to keep the solution saturated solution of KCl at all temperatures. In case of 1 N and 0.1 N KCl solutions are filled respectively and crystals of KCl are absent. The cell is represented as

$$Hg \mid Hg_2Cl_2\,(s),\ Cl^-\ (satd,\ or\ 1\ N\ or\ 0.1\ N)$$



(a) dipping type (b) with side arm

Different forms of calomel electrodes

The following reaction takes place at the electrode

$$\frac{1}{2}\,Hg_2Cl_2\,(s) + e^- \longrightarrow Hg\,(l) + Cl^-\,(C)$$

C = saturated or 1 N or 0.1 N

The emf of the electrode is given by the equation,

$$E_C\ (red) = E^0_C\ (red) - \frac{2.303\,RT}{F}\log a_{Cl}$$

$$E^0_C\ (red) = 0.268\ V$$

This equation shows that the emf depends on the concentration of chloride ion. The potential of three different electrodes are

Type	Ec (reduction)	Ec(oxidation)	Temp. coeffient
Saturated	0.2415	-0.2415	7.6×10^{-4}
1N	0.2800	-0.2800	2.4×10^{-4}
0.1N	0.3338	-0.3338	7.0×10^{-4}

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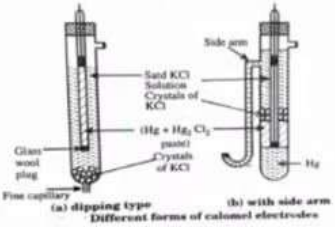

(a) dipping type (b) with side arm

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Derivation of Debye-Huckel limiting law :

For a single i^{th} ion showing ideal behavior, the Gibbs energy is given by an expression, $G_i = G_i^0 + kT \ln C_i$, where C_i is its concentration, k is Boltzmann constant. G_i^0 is Gibbs energy of the ion at unit concentration. If the ion is showing deviations from ideality due to ionic atmosphere, the Gibbs energy is then given by

$$G_i = G_i^0 + kT \ln C_i\gamma_i = G_i^0 + kT \ln C_i + kT \ln \gamma_i \quad \ldots(8.16)$$

γ_i is the activity coefficient. The third term is the additional term due to the presence of ionic atmosphere. The activity coefficient is calculated as follows :

Imagine that we are able to vary the charge on the ions in solution. Suppose that the charge on all the ions is reduced to zero so that the interactions between the ions disappear and solution becomes ideal. Now imagine that the charge of the ions is increased from zero to their values in the solution. Suppose W is the electrical work done on the system in the charging process. This electrical work being non-PV work is the Gibbs energy change of the process. The work done in charging an isolated ion according to Born model is given by $W = \frac{z_i^2 e^2}{8\pi\epsilon_0\epsilon r}$ ...(8.17)

where r is the radius of ion, e is the electronic charge. z_i is the charge of ion. ϵ_0 and ϵ represent permittivity of vacuum and medium respectively.

Now we require the expression for work of charging the ionic atmosphere which is obtained by replacing r by $1/\kappa$, the radius (thickness) of ionic atmosphere and changing the sign because the net charge of the atmosphere is opposite to that on the ion. Thus,

$$W = -\frac{z_i^2 e^2 \kappa}{8\pi\epsilon_0\epsilon} = \Delta G \quad \ldots(8.18)$$

This is the required correction to the Gibbs energy. It is therefore equal to the third term on the right of equation (8.16). We then write

$$kT \ln f_i = -\frac{z_i^2 e^2 \kappa}{8\pi\epsilon_0\epsilon} \quad \text{or} \quad \ln f_i = -\frac{z_i^2 e^2 \kappa}{8\pi kT\epsilon_0\epsilon} \quad \ldots(8.19)$$

Hence, $\log_{10} f_i = -\frac{z_i^2 e^2 \kappa}{8 \times 2.303\, \pi kT\epsilon_0\epsilon}$ ...(8.20)


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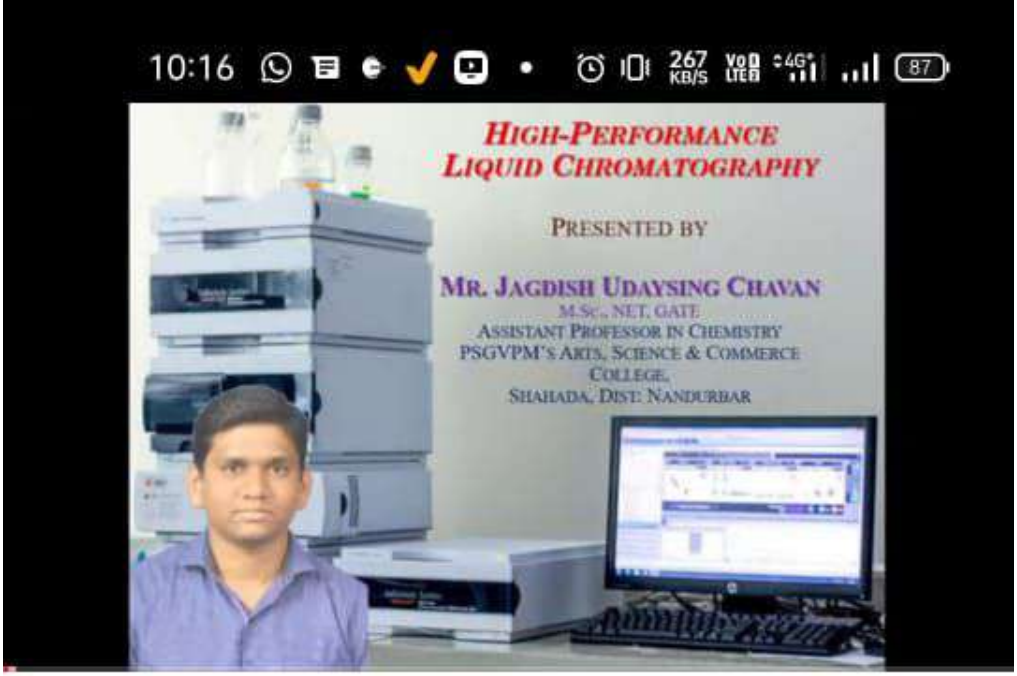

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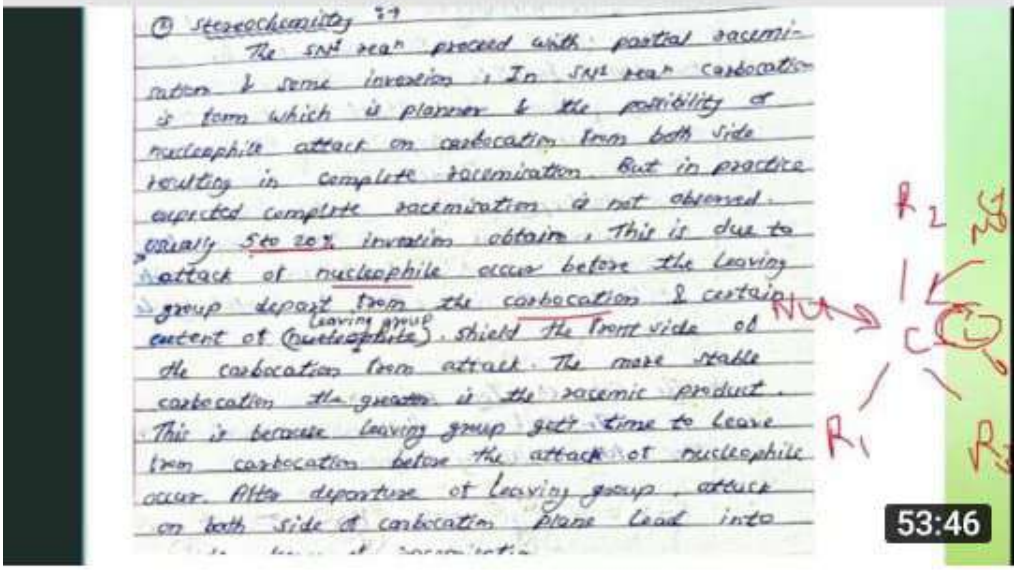

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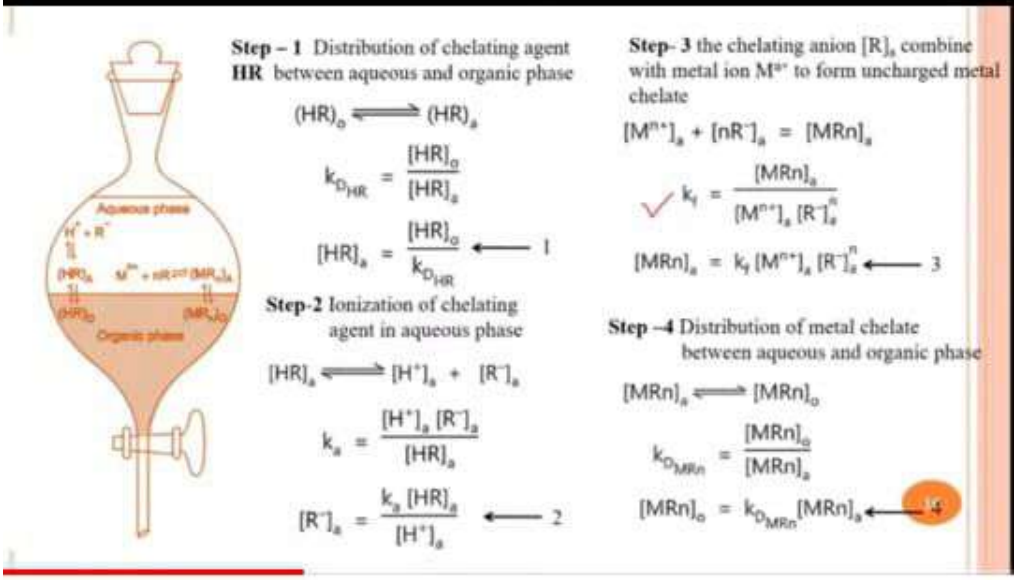

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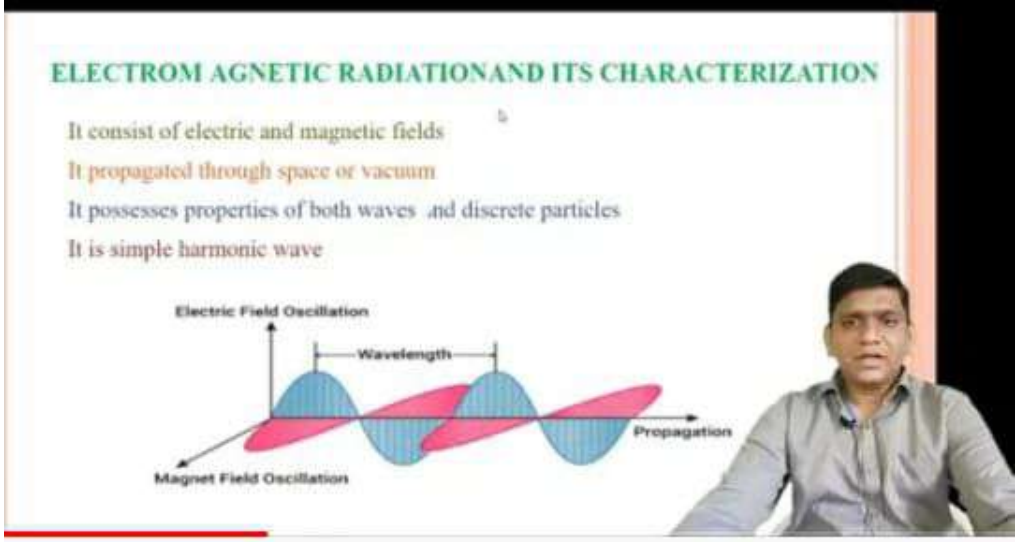

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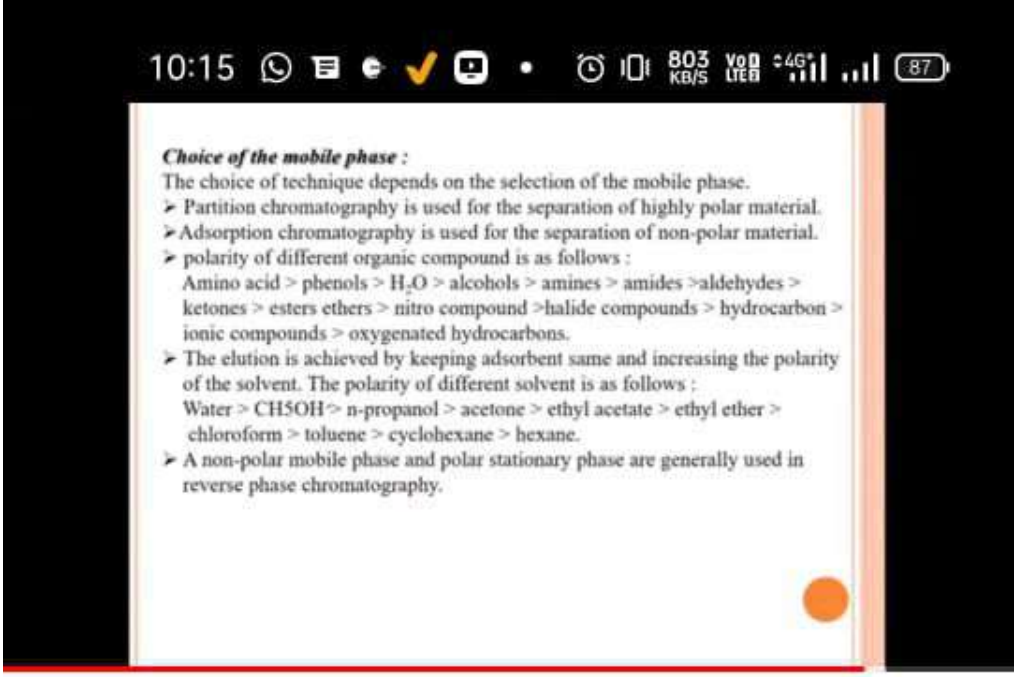

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