

## Methanol



- Methanol the simplest alcohol (CH<sub>3</sub>OH) is a chemical building block for hundreds of everyday products, including plastics, paints, car parts, and construction materials.
- Methanol also is a clean energy resource used to fuel cars, trucks, buses, ships, fuel cells, boilers, and cook stoves.
- Methanol was formerly produced by the destructive distillation of wood.
- The modern method of preparing methanol is based on the direct combination of carbon monoxide gas and hydrogen in the presence of a catalyst.
- Increasingly, syngas, a mixture of hydrogen and carbon monoxide derived from biomass, is used for methanol production.
- It is also used in automotive antifreeze, in rocket fuels, and as a general solvent.

- Methanol is also a high-octane, clean-burning fuel that is a potentially important substitute for gasoline in automotive vehicles.

### THE HINDU

#### DEFAULT BAIL

- The right to statutory bail, often known as default bail, is available to accused persons in cases when the investigating agency fails to complete its investigation within the stipulated time. Under Section 167(2) of the Code of Criminal Procedure (CrPC), the maximum time available to investigators is 60 or 90 days, depending on the seriousness of the offense.
- Methanol is a colorless liquid that boils at 64.96 °C (148.93 °F) and solidifies at -93.9 °C (-137 °F).
- It forms explosive mixtures with air and burns with a nonluminous flame. It is completely miscible in water.
- If the authorities are unable to complete the investigation within this time period, the accused can seek to be released from custody by applying for default bail under the first proviso to Section 167(2) of the CrPC.
- Notably, the 'default' characteristic of this bail comes from the fact that the application is unrelated to the

merits of the case, and is designed to prevent long-term detention of the accused.

- The right to default bail has been characterized by the Court in multiple judgments as an indefeasible right, flowing from Article 21 of the Constitution which guarantees the right to life and personal liberty.
- Therefore, in cases where the investigating authorities attempted to circumvent this procedure, the Court rightly called out these tactics and refused to extend custodial detention of the accused.
- In Achpal vs State of Rajasthan (2018), the Court held that an investigation report, albeit complete, if filed by an unauthorized investigating officer, would not bar the accused from availing default bail.
- The Supreme Court's decision in Ritu Chhabaria delegitimised such illegal practices and held that incomplete charge sheets filed by the police would not bar an accused from applying for default bail.
- The Court emphasised that the preliminary or incomplete nature of these police reports revealed that the investigation was not complete.



**THE HINDU**

### **DNA Profiling**

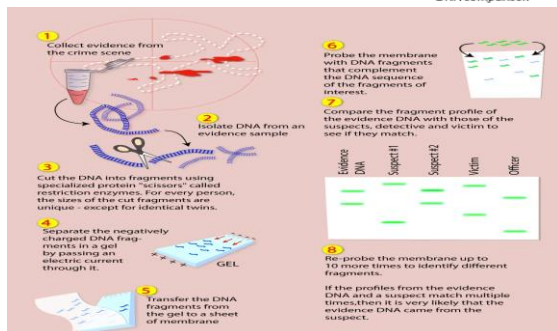
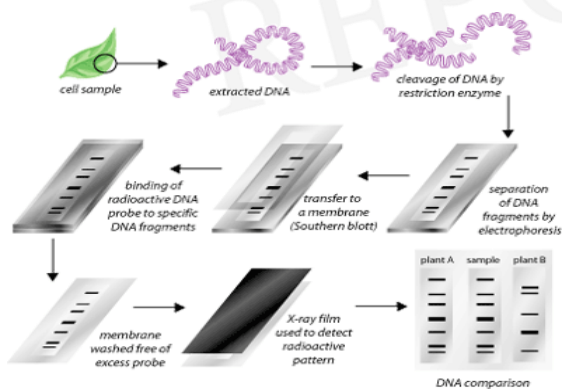
- Its recent judgments, the Supreme Court has been critical of admitting DNA report as clinching evidence in criminal cases. In Rahul v. the State of Delhi, Ministry of Home Affairs (2022), the Court said “the collection and sealing of the samples sent for examination were not free from suspicion.”
- It objected to the fact that the Delhi High Court and the trial court did not examine the underlying basis of the findings in the DNA reports and also did not examine whether the expert reliably applied the techniques

### **DNA SAMPLING**

- The first responder on the scene of a crime needs to ensure that the biological sample is dried at room temperature and sealed in a paper, and not a plastic, bag.
- The sample should be free from any contamination due to humic acid,

which is a primary constituent of the soil.

- Liquid blood samples must be collected using blood collection cards or EDTA (Ethylene Diamine Tetra Acetic Acid) vials in a vaccination box with coolants to maintain low temperature
- Extract DNA material from a sample by separating other elements, such as RNA, proteins, lipids, cell debris, and humic acid. Nowadays, automated machines are used to extract DNA from the biological material depending upon low and high copy number of DNA for further analysis.
- The next step is the quantification of the extracted DNA material using the RT-PCR machine.



THE HINDU

## AePS

### What is AePS?

- The Aadhaar-enabled Payment System (AePS) is a bank-led model which allows online financial transactions at Point-of-Sale (PoS) devices and micro ATMs of any bank using Aadhaar authentication.
- The model removes the need for OTPs, bank account and other financial details.
- It allows fund transfers using only the bank name, Aadhaar number, and fingerprint captured during Aadhaar enrolment, according to the National Payments Corporation of India (NPCI)

### Is AePs enabled by default?

- Neither the Unique Identification Authority of India (UIDAI) nor NPCI mentions clearly whether AePS is enabled by default.
- Cashless India, a website managed and run by the MeitY, says the service does not require any activation, with the only requirement being that the user's bank account should be linked with their Aadhaar number.
- Users who wish to receive any benefit or subsidy under schemes notified under section 7 of the Aadhaar Act, have to mandatorily

submit their Aadhaar number to the banking service provider, according to the UIDAI.

- How is biometric information leaked? While Aadhaar data breaches have been reported in 2018, 2019, and 2022, the UIDAI has denied any breach of data.



**THE HINDU**

## Transformer and Chatgpt

- In the first part of the 2010s, deep neural networks (DNNs) took over ML by storm, replacing the classic pipeline of hand-crafted features and simple classifiers.
- DNNs ingest a complete document or image and generate a final output, without the need to specify a particular way of extracting features.

### What is 'attention'?

- Attention in ML allows a model to learn how much importance should be given to different inputs.
- In the translation example, attention allows the model to select or weigh words from the memory bank when deciding which word to generate next.
- While describing an image, attention allows models to look at the relevant parts of the image when generating the next word.
- A fascinating aspect of attention-based models is their ability for self-discovery, by parsing a lot of data.

### What is transformer??

- Machine learning (ML), a subfield of artificial intelligence, teaches computers to solve tasks based on structured data, language, audio, or images, by providing examples of inputs and the desired outputs.
- This is different from traditional computer programming, where programmers write a sequence of specific instructions.
- Here, the ML model learns to generate desirable outputs by adjusting its many knobs often in the millions.
- Deep neural networks
- A transformer is a two-part neural network. The first part is an 'encoder' that ingests the input sentence in the source language (English) and the second part is a 'decoder' that generates the

translated sentence in the target language (Hindi).

- The encoder converts each word in the source sentence to an abstract numerical form that captures the meaning of the word within the context of the sentence, and stores it in a memory bank. .
- Just like a person would write or speak, the decoder generates one word at a time referring to what has been generated so far and by looking back at the memory bank to find the appropriate word.
- Both these processes use a mechanism called 'attention', hence the name of the paper.
- A key improvement over previous methods is the ability of a transformer to translate long sentences or paragraphs correctly.
- The adoption of transformers subsequently exploded. The capital 'T' in ChatGPT, for example, stands for 'transformer'.



- **THE HINDU**

