



## UNIT V

# THERMOSETTING POLYMERS

**Engineering Materials and Metallurgy**

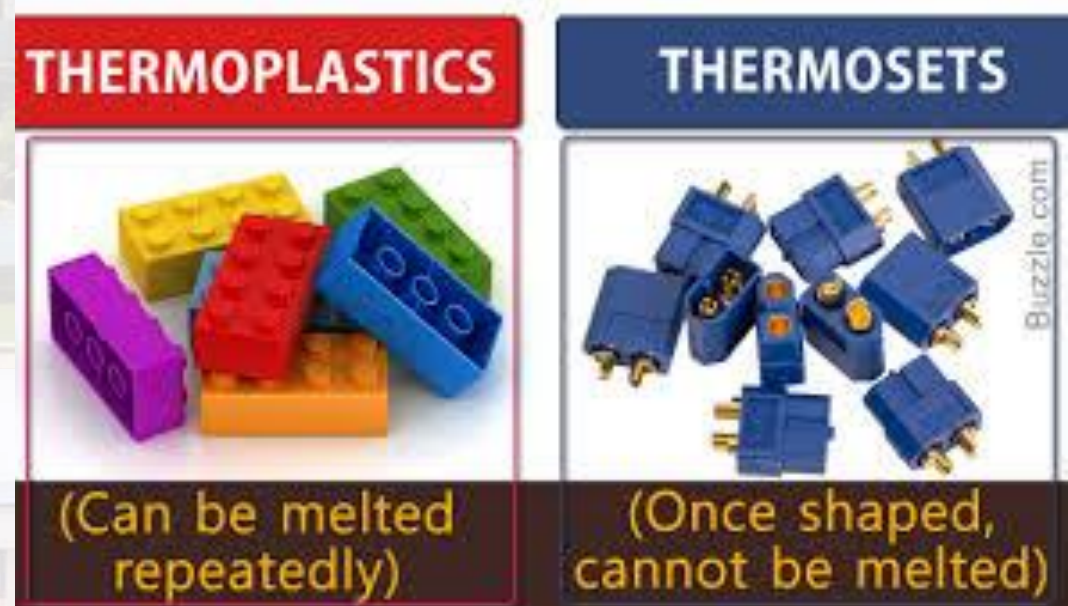
**KARTHICK B**

**ASSISTANT PROFESSOR / MECHANICAL ENGG**



# Thermosetting Plastics

- Thermosetting plastics undergo a chemical change during moulding and hardening and, therefore, cannot be softened again by heating





# Differences Between Thermoplastic And Thermosetting Polymers



S.No	THERMOPLASTIC	THERMOSETTING
1.	Long, straight chained carbon compounds	Cross-linked compounds
2.	Formed by addition polymerization	Formed by condensation(step growth) polymerization
3.	Low strength compared to thermosets	More strength compared to thermoplastics
4.	Can be processed again and again	Cannot be processed again or recycled Eg . Bakelite, epoxy
5.	Eg . Polyethylene	

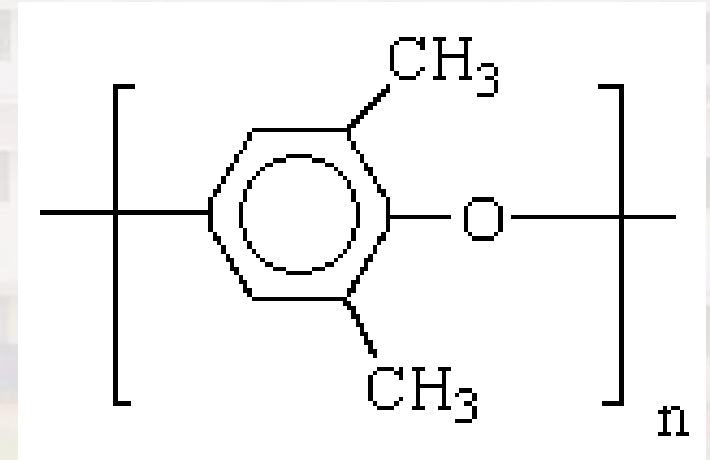


# Thermosetting polymers – Poly Phenylene Oxide PPO



## Properties:

- High Heat Resistance
- Excellent Impact Strength
- Exceptional dielectric and dissipation characteristics
- Flame Retardancy
- Exceptional low moisture absorption





# Thermosetting polymers – Poly Phenylene Oxide PPO



## Applications:

- Fenders, dash- boards,
- Head lamp systems,
- Instrument and Control Panels,
- Mud-guards,
- Wheel Covers &
- Fuse Blocks etc.



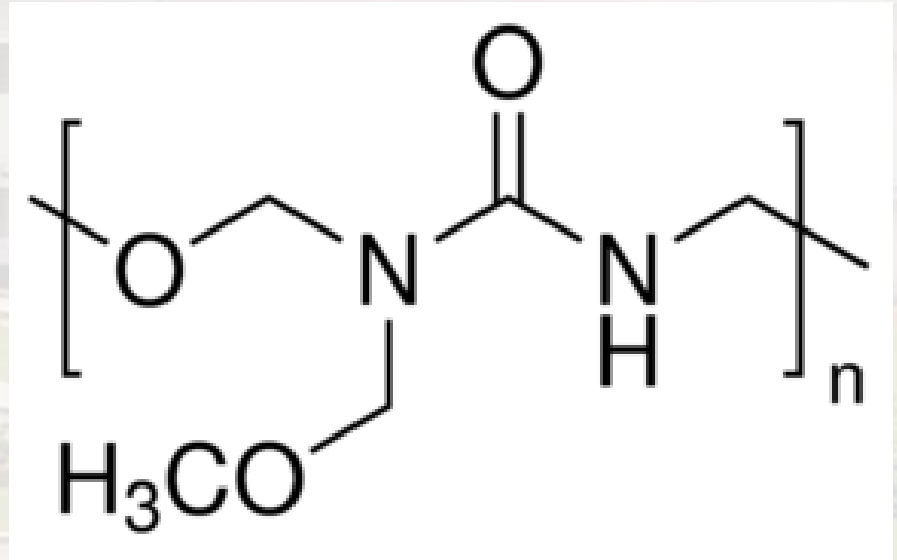


# Thermosetting polymers – Urea Formaldehyde



## Properties

- ❖ Very high tensile strength.
- ❖ Property of flexural modulus.
- ❖ Property of heat distortion temperature.
- ❖ Capacity of low water absorption .
- ❖ The property of mould shrinkage.
- ❖ Property of high surface hardness.



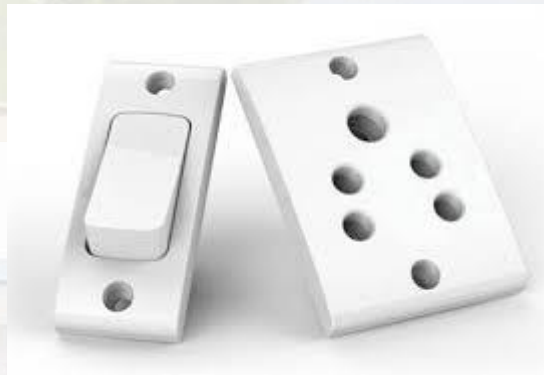


# Thermosetting polymers – Urea Formaldehyde



## Applications:

- Electrical Casings
- Tableware
- Decorative worktop laminates
- Plug & switches Buttons
- Paints
- Surface coating





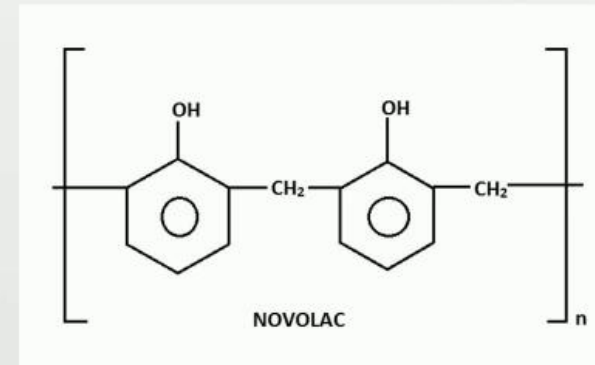
# Thermosetting polymers – Phenol Formaldehyde



## Properties:

- Available as solids and solutions
- Solubility depends on the structure of the solution
- Decomposition temperature range is 120-250°C
- Electrically insulating
- Good dimensional stability on heating
- Poor conductor of heat
- Retain properties at freezing temperature

## Phenol formaldehyde resin



<https://en.wikipedia.org/wiki/File:Novolac.jpg>



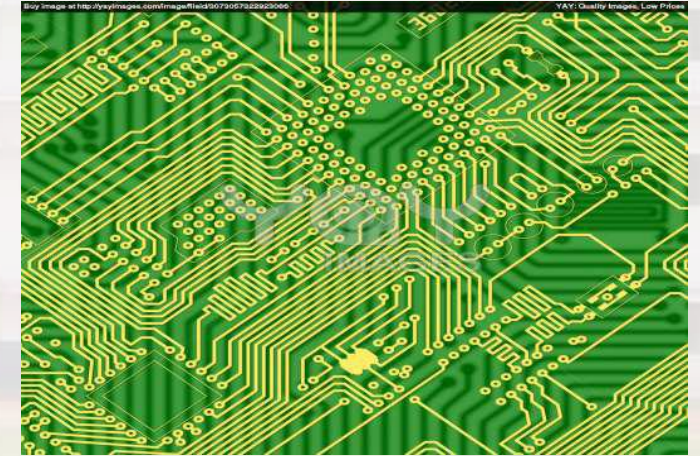


# Thermosetting polymers – Phenol Formaldehyde



## Applications:

- making circuit board like PCB
- Radio cabinet
- Engine ignition equipment
- Camera
- Aerospace application





**THANK YOU**

**Assessment:**

<https://play.kahoot.it/v2/?quizId=b3ab0100-2c5d-4213-8304-600214ae41e7>