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Place:.....

Enrollment No.....

Date:.....

Seat No.....

**Subject Teacher**

**Head of Department**

**Principal**



Seal of Institute

**SMDR GOVERNMENT POLYTECHNIC, DHULE**  
**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION,**  
**MUMBAI**



**A report of micro project on**  
**Insulators used in every day life**

**Prepared by**

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**For partial fulfillment of the course ‘Basic science (Chemistry)’ of First Semester Diploma program in ...Computer ..Engineering during the academic year 2020-21.**

**MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION,  
MUMBAI.**

**Evaluation Sheet for the Micro Project**

**Academic Year: 2020-21      Name of Faculty: Dr. S V Jadhav**



**Course-** Basic Science [Chemistry] **Course Code:** 22102

**Semester:** First

**Title of the Project:**

**COs addressed by the Micro Project:**

1. To Correlate Practical Findings about given Project with theoretical learning's.

**Major Learning Outcomes achieved by students by doing the Project:**

- a) Practical Outcomes - To collect, analyse, various sample data for given project
- b) Unit Outcomes (Cognitive Domain) - Describe the reasons for variation in application, properties and methods with reference to different characteristics
- c) Outcomes (Affective Domain) - Follow ethical lab practices and safety precautions.

**Comments / Suggestions about team work / leadership / inter-personal communication**  
(if any) .....

Roll No	Name of Student	Marks out of 6 for performance in group activity (D5 Col. 8)	Marks out of 4 for performance in oral/ presentation (D5 Col. 9)	Total out of 10
145	Mr .Hitesh Patil			
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150	Mr. Vishal Pawar			
151	Miss. Hemangi Rajput			
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# **INSULATOR**

## **Introduction :**

An insulator is a material that does not conduct electrical current, or does not easily transmit energy. Material of such low conductivity that flow of current through it is negligible. Insulating material, often glass or porcelain, in a unit form designed so as to support a charged conductor and electrically isolate it. Insulating materials include paper, plastic, wood, ceramics, rubber, glass and air. Such as a material that is poor conductor as of electricity or heat. Vacuum is also an insulator, but is not actually a material. Most of the electrical conductor are covered by insulation. Magnet wire is coated with an extremely thin layer of insulation so that more turns or larger wire may be used in the winding of transformers etc.

Insulators are generally rated at hundreds of volts, but some that are used in power distribution are rated as high as hundreds of thousands of volts. Insulators support and/or keep electrical conductors from making unintended contact with each other. Insulators are material whose atoms have tightly bound electrons. These electrons are not free to roam around and be shared by neighboring atoms.

Insulators are used to protect us from the dangerous effects of electricity flowing through conductors.

## **Insulators**





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### **TYPES OF INSULATOR**

1) Sound Insulator

2) Thermal Insulator

3) Electrical Insulator

**Sound Insulator** : Insulator That Reduce Sounds Are Used For Soundproofing Rooms Or For Noise Control . Sound Insulators Work To Reduce Sound Energy That Is Reflected By Room Surfaces .

**Thermal Insulator** : A Thermal Insulator Is Used To Prevent Heat From Moving From One Place To Another . Typically Thermal Insulators Prevent Conduction Through A Material That Prevents Heat From Moving Through Them Easily .

**Electrical Insulator** : A Electrical Insulator , Also Know As A Noncunductor , Is Used To Prevent The Flow Of Electric Current. Materials That Work As Noncunductors Lack Movable Electric Charges .

## • Classification of Insulating Materials

Insulating Materials can be classified in two ways :

1. Based on their state and material.
2. Based on their thermal stability.

### 1. Based on their state and material :

State	Materials	Examples
1.Solid insulating materials	Fibrous materials.  Impregnated fibrous materials.  Non-resinous materials  Ceramics  Glass  Natural and synthetic rubber	Wool, paper, cardboard, Insulating textiles, glass, wool. Impregnated paper, varnished or impregnated textiles. Asphalts and bitumens, waxes. Porcelain, alumina, titanate etc. Fused quartz or silica glass, Pyrex, fiber Glass. Natural rubber, hard rubber, butyl rubber, neoprene, silicon rubber, Mica, asbestos and its products.
2.Liquid insulating material	Oils  Varnishes	Mineral oils,silicon liquids refined hydrocarbons. Synthetic varnish and spirit
3.Gaseous insulating materials		Carbon dioxide (CO <sub>2</sub> ), dry air, argon, nitrogen etc.



# Electrical insulator

## Definition:

An electric insulator is a material in which the electron does not flow freely or the atom of the insulator have tightly bound electron whose internal electric charges do not flow freely; very little electric current will flow through it under the influence of an electric field.

## Uses:

- 1) It prevent the passing of high voltage in an electric circuit.
- 2) It helps in reducing the cost of energy.
- 3) It helps in saving the environment by controlling the emission of pollutants.
- 4) It improves process performances.
- 5) It protect from electric shock or electrocution.

## Examples

- 1) Plastic    2) Rubber    3) Glass    4) Wool    5) Cotton
- 6) Dry air    7) Diamond    8) Oil    9) Fur and feathers    10) Dry wood .





### Application of insulator in daily life:

Since the electrical insulator materials bind the electrons tightly, it prevents the electrons from floating from atom to atom. Thus, they prevent the conduction of electric charges. Given the benefits of there are multifold applications of the electrical insulator. They are applied to--

- 1) Circuit boards
- 2) Coating of electric wires
- 3) High voltage appliances
- 4) Coating of cables
- 5) Coating for electric poles on the streets.



## Sound insulator

### Definition:-

**Sound insulator** is a kind of measure to prevent the **sound** waves from permeating. It is demonstrated by the **sound** transmission loss which is expressed by the different decibel between the incident **sound** and permeated **sound**. The higher the numeral is, the better **sound insulator** properly is.

### Uses:

**Sound insulator:** prevent the transmission of noise by the introduction of mass barrier. Common material have high. Density properties such as brick, concrete, & metal, sound absorption process material that acts as a "noise spongy" by converting the sound energy into heat within the material.

### Examples:

Typical examples of pronounced sound absorbed are different fabric materials like curtains, blanket, carpets and also open cell forms mineral wool insulator glass fiber act. as you have seen most of our examples of sound absorption material also belong to this type.



### Applications of sound insulator in every day life :

Hence, we use them in making thermoplastic bottles. They are also used in fireproofing and ceiling and walls. Sound insulators help in controlling noise levels as they are good in absolute sound. Thus, we wear them in buildings and conference halls to reduce noise...



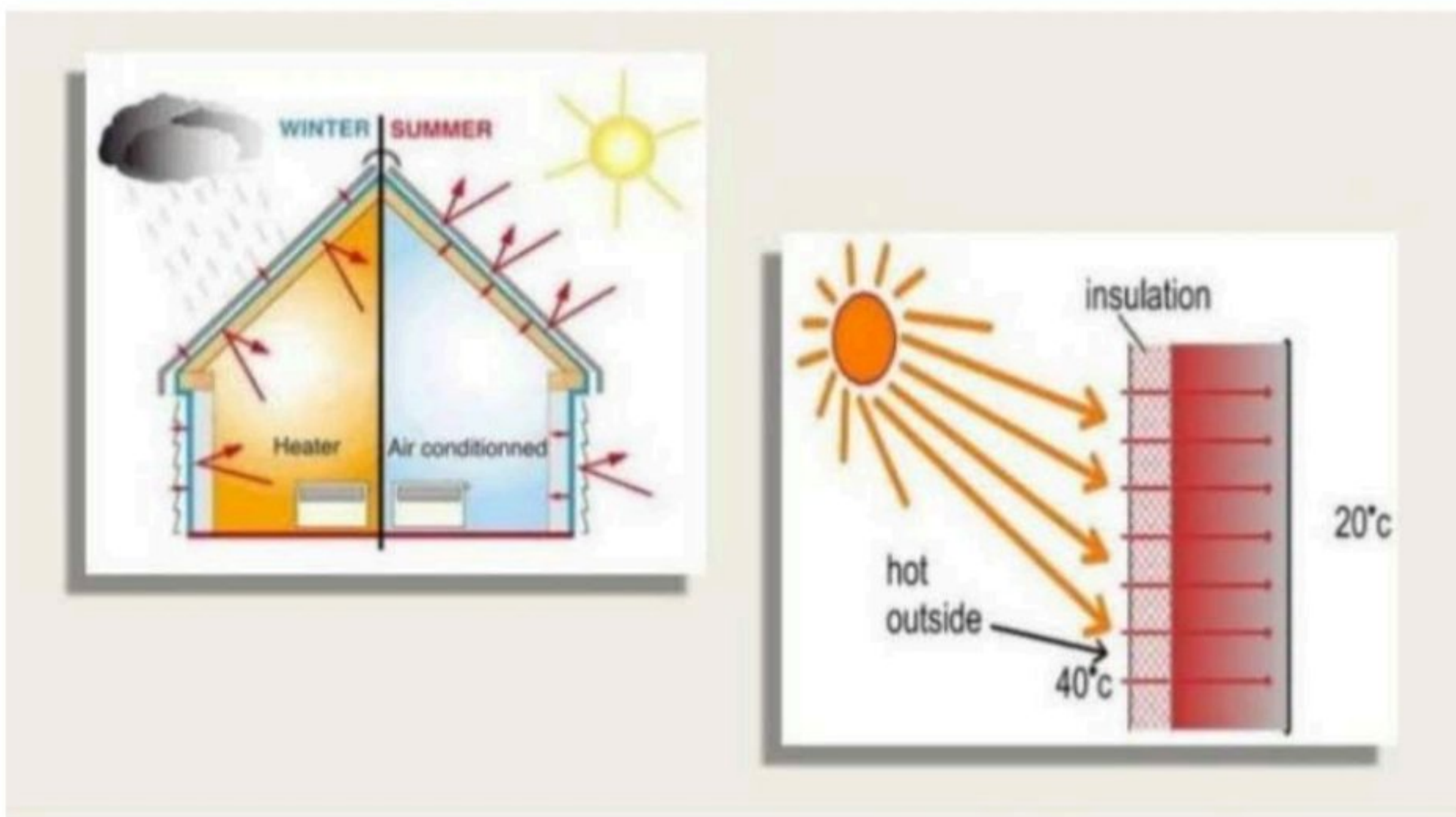
## Thermal Insulator

Define :- The process of insulating against transmission of heat . Material of relatively low heat conductivity used to shield a volume against loss or entrance of heat by radiation, convection or conduction.

Uses :- It is used to prevent the flow of heat. These are used to keep our homes warm inside when there are cooler temperatures outside . The most common type of thermal insulator is fiberglass , but other forms of plasti

sheets or natural materials can also be used .

Example :- Mineral wool , Fiberglass , Polystyrene , cellulose , polyurethane foam , wood , plastic , diamond , silver , silver , gold etc .



Application Of Thermal Insulator In Life:- Thermal insulation is the reduction of heat transfer between objects in thermal contact or in an range of radioactive influence . Thermal insulation can be achieved with specially engineered methods or process as well as with suitable object an shapes and materials.



A thermal Insulator is something that prevents heat moving from one place to another . There are three main ways that heat can travel is convection conduction and radiation. Typically the phrase thermal insulator refers to a material the blocks conduction .

Heat flows is an inevitable consequence of contact between object of different temperature. Thermal insulation provides a region of insulation in which thermal conduction is reduced or thermal radiation is reflected rather than

absorbed by the lower – temperature body. The insulating capability of a material is measured as the inverse of thermal conductivity (K). Low thermal conductivity is equivalent to high insulating capability ( Resistance Value ).

Gases posses poor thermal conduction properties compared to liquids and solids and thus make good insulation material if they can be trapped. In order to further argument.

the effectiveness of a gas , it may be disrupted into small cells , which cannot effectively transfer heat by natural convection . Convection involves a larger bulk flow of gas driven by buoyancy and temperature differences and it does not work well in small cells where there is little density differences to drive , it and the high surface to volume ratios of the small cells regards gas flow in them by means viscous drag.

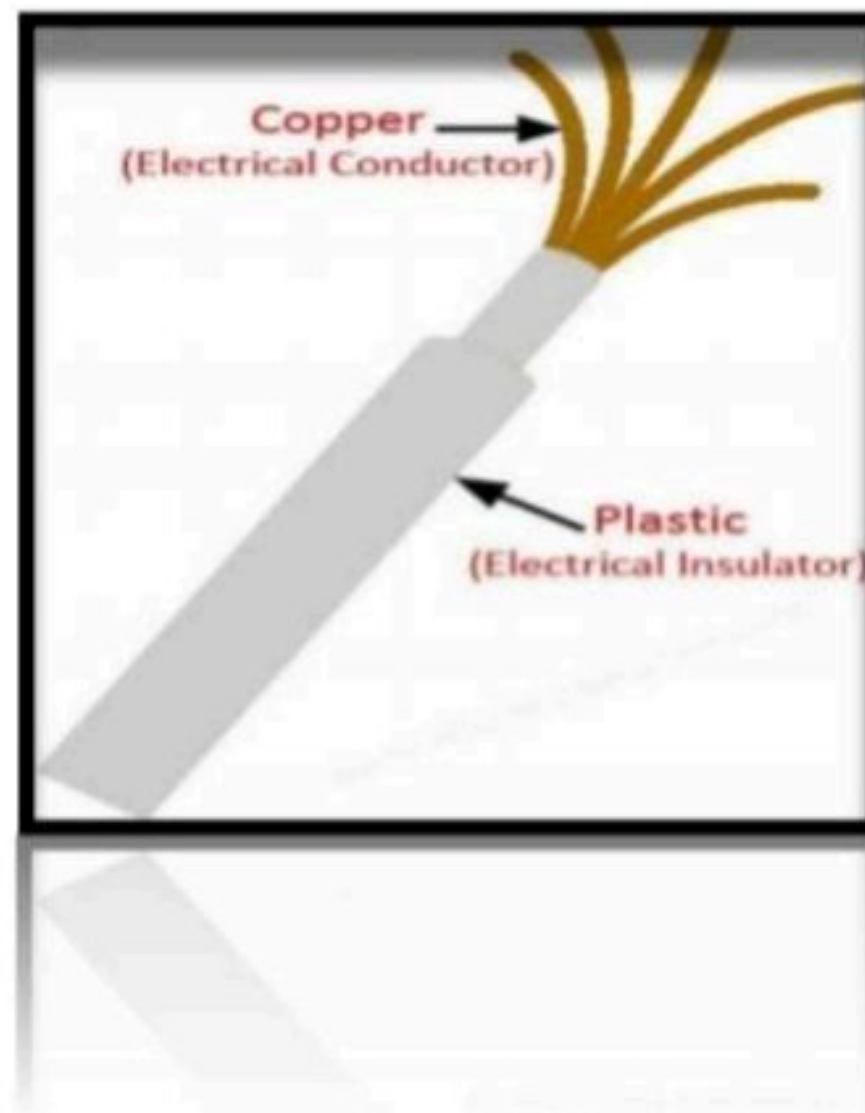


## **Insulators used in daily life**

Wood, cloth, glass, mica, and quartz are some good examples insulators

### **1)Plastic**

Plastic Insulator Becomes a Heat Conductor. This new form of plastic could prevent laptops, mobile phones, and other electronics from overheating. Plastics are excellent insulators, meaning they efficiently trap heat—a quality that is an advantage in something such as a coffee cup sleeve.



### **2) Wood**

Wood, especially dry wood, is an insulator. An insulator prevents the flow of electricity while conductors allow electricity flow. The size of the material and temperature also affect the ability of a material to become an insulator or a conductor.

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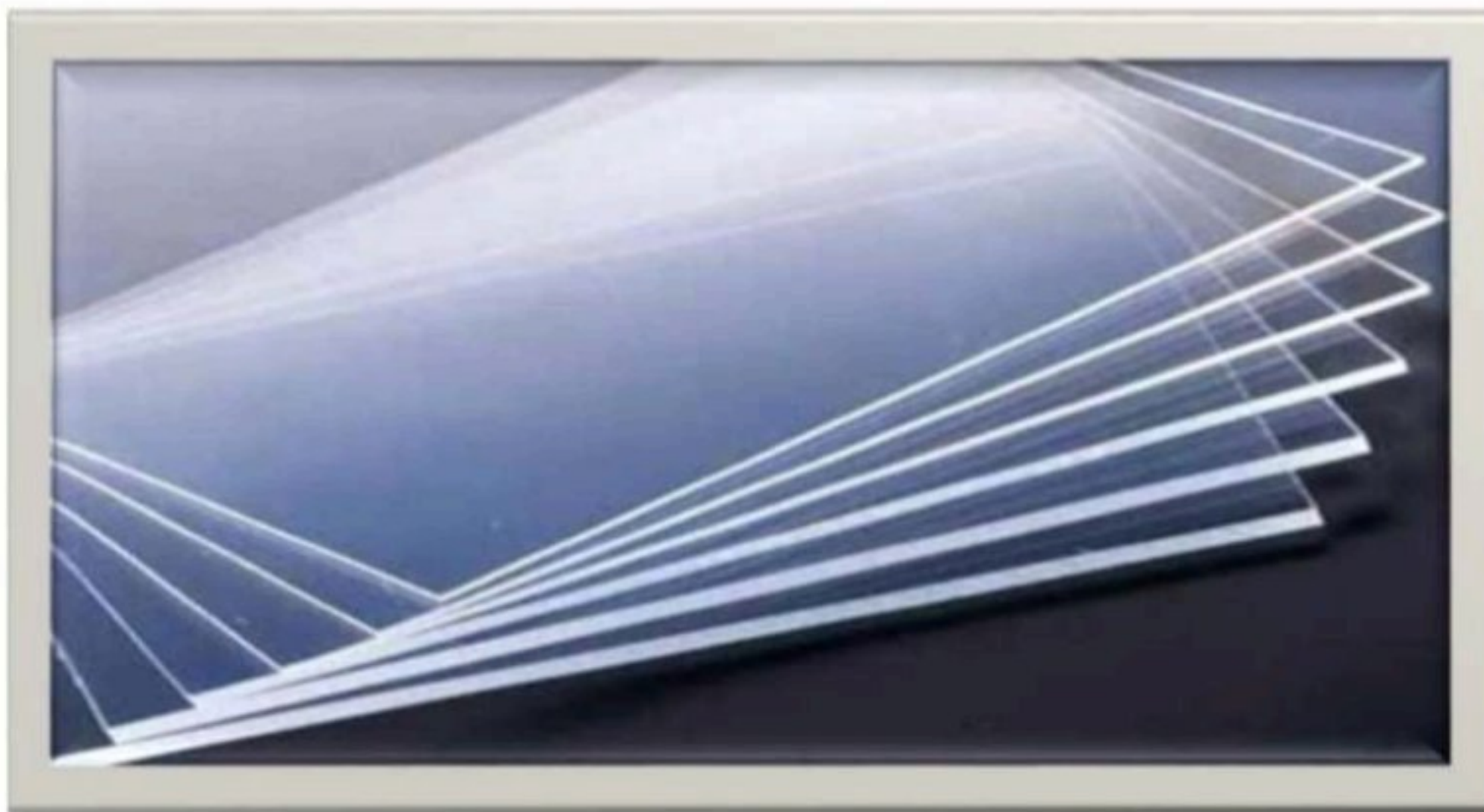


### 3) Glass

Fiberglass. Fiberglass Insulation. Fiberglass is the most common insulation used in modern times.

Glass conducts electricity when it is hot, but not when it is cold

Glass qualifies as an insulator of heat. When you say that a specific material is an insulator, it merely implies that it conducts heat at a much slower rate. The thickness of a glass cup is about 2 to 3 millimetres. Heat from a hot beverage contained in a glass cup, is conducted from its inner surface to its outer surface in less time because of less thickness of glass. If you have a hot beverage from a metallic cup of the same thickness, you will notice that the cup gets really hot just 1 or 2 seconds after the beverage is poured into it. A glass cup on the other hand will take significantly more time to heat up.





## Difference Between Conductor & Insulator

Basis of comparison	Conductor	Insulator
1 . Definition	Material which permits the Electric current or heat to pass through it.	Restrict the electric current or heat to pass through it.
2 . Electric field	Exist on the surface but remain zero inside the Conductor.	Do not exist on insulator.
3 . Magnetic field	Store energy.	Do not store energy.
4 . Potential	Remain same at all the point on conductor.	Remain zero.
5 . Thermal conductivity	High.	Low.
6 . Covalent bond	Weak.	Stronger.
7 . Conductivity	Very high.	Low.
8 . Resistance	Low.	High.
9 . Electrons	Freely move.	Do not move freely.
10 . Resistivity	Very from high to low.	High.
11 . Temperature coefficient	Positive temperature coefficient of resistance.	Negative temperature coefficient of resistance.
12 . Conduction band	Full of electrons .	Remain empty.
13 . Valence band	Remain empty.	Full of electrons.
14 . Forbidden gap	No forbidden gap.	Large forbidden gap.
15 . Examples	Irons, aluminium, silver, copper, ect.	Rubber, wood, paper, ect.
16 . Application	For making electrical wires & conductor.	As a insulation in electrical cables or conductor, for supporting electrical equipment, ect.



## Conclusion:-

An insulator is a substance or object that does not allow electricity to flow easily.

Conclusion: insulators are used a lot in our daily lives and are important to us.

Insulators are used in electrical equipment to support and separate electrical conductors without

Allowing current through themselves. An insulating material used in bulk to wrap electrical

Cables or other equipment is called insulation.

Choosing a good and effective insulator can assist in lowering energy costs within a household and reduce its carbon footprint. If a poor insulator has been used, it may be more expensive to maintain than the savings earned from smaller bills.



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- Book: Basis Science Chemistry. Narali Prakashan. Writer of the book: S.N.Narkhede. And Mrs.R.S Gangrade.