

WOOD ASH AS INSULATOR AND ITS APPLICATIONS

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ABSTRACT

This paper gives how wood ash can be used as an insulator and its applications. Ash is an unwanted substance and often has problems in disposal. To prepare an ash mat we used these materials 1) Wood ash 2) Adhesive. The science behind this is the non-conductive property of wood ash and adhesive used. This mat has been tested successfully at the voltages mentioned in this paper and can be used in industry and households as an insulator.

Keywords—Leachable; Insulator.

I. INTRODUCTION (WHAT IS AN ELECTRIC INSULATOR?)

An electric insulator is a material whose internal electric charges do not flow freely. Almost no current passes through it at room temperature. The property that distinguishes an electric insulator is its electrical resistivity. Electrical resistivity is a fundamental property of a material that quantifies how strongly the material opposes flow of electric current.

II. WOOD ASH MAT

Wood ash mat used by us is a flat mat of thickness 4mm made up of mixture of wood ash and adhesive and then cooled. Wood ash that remains after burning of wood is highly leachable and can contaminate ground water if buried. Thus its use as insulator will help in environment conservation too.



Figure 1: Wood ash mat

III. MATERIALS REQUIRED

- 1) Wood.
- 2) Adhesive(Fevicol).
- 3) A plate.
- 4) Variable dc power supply, ac mains supply.
- 5) Resistor(100K), breadboard, connecting wires, digital multimeter.

IV. PROCEDURE

- Take a piece of wood (size as per ash requirement) and burn it in order to form ash.
- Allow the ash to cool down to room temperature (about an hour) and then take it in a plate.
- Add the adhesive proportionately to form a thick paste and then mould it in a flat spongy mat.
- Allow the mat to cool for an hour , if moisture content is present then heat it slightly so as no moisture gets locked in mat.
- Now construct a simple circuit on breadboard with resistor and the ash mat.
- Apply different voltages across the circuit (5V dc, 0-30V dc, 230V ac).
- Check if any current flows through the circuit.
- Observe the readings of current for various voltages with the use of Digital Multimeter.

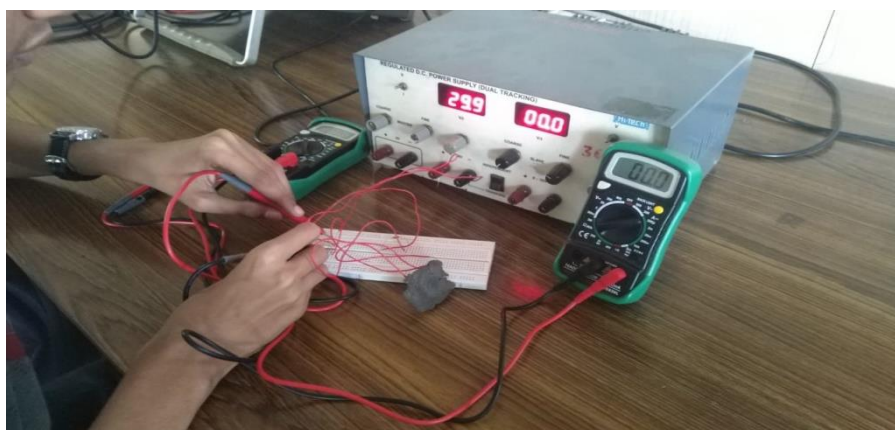
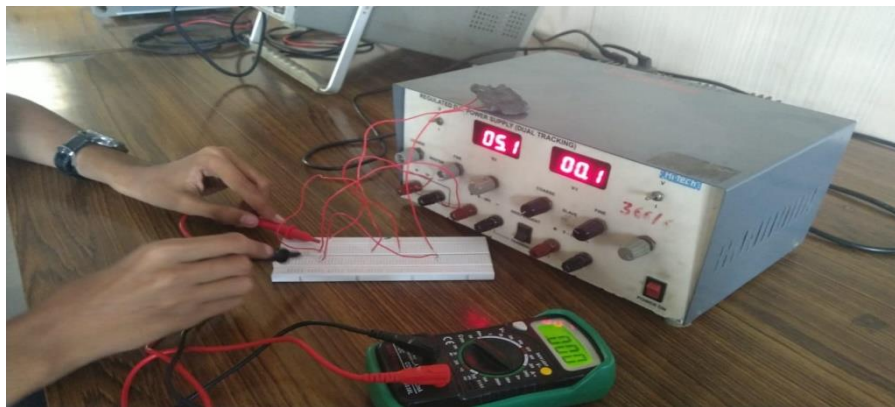


Figure 2: Testing of wood ash mat.

V. INSTRUCTIONS

- The wood ash mat should be completely dry before using is as an insulator.
- The mat should not come in contact with water or any other conductive material during use.

VI. OBSERVATIONS

- When the circuit was turned on at constant 5V dc supply, the current passing through it was recorded as zero, as shown by digital multimeter.
- Later the same circuit was tested on a variable power supply (0 -30V) and current reading was recorded as zero again.
- Then the ash mat was tested for 230V(AC Mains supply) for which again current through it was recorded as zero. All these were carried out at room temperature.

VII. WHY DOES THE ASH MAT WORK AS AN INSULATOR?

The wood ash is non- conductive due to which it can be used as an insulating material. When combined with an adhesive (which is also non-conductive) it can be moulded into a mat (definite shape) which then can be used in various applications. Electric current does not pass through the mat due to the high energy gap between the valence and conduction band (which is a property of insulator)

VIII. APPLICATIONS

- It can be used in shoes/sandals of electricians as soles so that they need not require wooden surface to stand or rubber soled shoes. They can work with these anytime anywhere without risks.
- These mats can be used as floor mats in electrical labs, large industries where continuous electric work is carried. The mats would provide insulation for workers in factories so that the work would be carried more smoothly.

IX. LIMITATIONS

- The ash mat needs to be completely dry, if water content is present then it will start conducting.
- The mats can be used up to a temperature of 80 Centigrade as above it the adhesive loses its binding property. Hence these mats cannot be used at places of higher temperatures.
- The mats should not contain any conductive substance else they would not act as insulators.

X. AREAS OF IMPROVEMENTS

- The ash mats can be made such that they are usable at higher temperatures.
- Wood ash can be used as insulations in forms other than mats.
- Wood ash can be used as insulation in wires in proper form so it may replace PVC,etc.

XI. CONCLUSION

With the help of this project we have demonstrated how wood ash can be used as an insulator in the form of mat. This method is quite easy and can be used by untrained people as well. This mat manufacturing can be brought in a large scale use by various industries as per requirement. Thus the waste ash can be re-used in this form for the betterment of society, providing an alternative for ash disposal. It is also quite cheap than the rubber mats due to plenty of availability of ash.

XII. ACKNOWLEDGEMENT

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