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SOUND ABSORPTION BY CHARCOAL COATING

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ABSTRACT

This paper is intended to study the influence of different factors on the sound absorption properties of different materials with activated charcoal layer on it. The treatment elements are activated charcoal, cardboard, wooden plank and metal sheet. Activated charcoal layers were prepared and later combined with different materials (cardboard, wooden plank and metal sheet) to form three different composite sound absorption structures. For the conduction of experiment, a sound source was covered with these composite sound absorption structures one by one to observe the change (decrease) in sound intensity. Analysis was made to discuss the influence of different materials used, on the sound absorption properties. The results demonstrated that the composite structure containing activated charcoal layer on wood material shows maximum absorption of sound.

Keywords: Activated Charcoal Layer, Composite Sound Absorption Structure, Sound Absorption, Sound Intensity, Sound Source.

I. INTRODUCTION

Number of vehicles is increasing with every single day and so is sound that is causing pollution. Moreover, India being very rich and diverse culturally we celebrate various festivals. Festivals only make this sound pollution problem worse. This is a major problem that troubles senior citizens, infants and mainly students. There are various measures available in market but most of them painfully stings your pocket. This problem has driven us to find a better and economically feasible alternative for sound proofing and we are going to introduce you to those techniques through this paper.

II. THEORY

Activated charcoal, activated coal, carbo activates or an "AC filter", is a form of carbon processed to have small, low-volume pores that increase the surface area available for adsorption or chemical reactions . Granular activated carbon materials have been studied for some years and are now well-known for their ability to absorb sound. This is attributed to the presence of sorption processes (adsorption and desorption) in nanopores. Activated carbon fibres also contain a considerable amount of nanopores but are light-weight and easier to use as they do not need containers. Regarding the ability of activated charcoal to effectively absorb sound, two factors contribute to this. (i) They have three scales of heterogeneities: millimetric grains, micrometric and

nanometric inner-grain pores. (ii) The presence of sorption in nanometric pores leads to a decrease of static bulk modulus and, consequently, of the effective low-frequency sound speed. Activated charcoal felts also show promising low-frequency sound absorption but have simpler microstructure. They do not contain inner-fibre micrometric pores, but still have inner-fibrenanometric pores. This, combined with a relatively regular fibre arrangement, makes them ideal for studying the effect of sorption on their acoustical properties.

III. FIGURES , TABLES AND FORMULA

Formula: % of sound absorbed = $\frac{\text{Audible volume of sound}}{\text{Incident volume of sound}}$ *100

SERIAL NO	MATERIALS	INCIDENT VOLUME	AUDIBLE VOLUME	% OF SOUND ABSORBED
1	Cardboard	15	2	13.34
2	Wood	15	4	40
3	Metal	15	5	33.33

Fig1.1 Cardboard coated with charcoal black powder

Fig1.2 Wood coated with charcoal black powder

Fig1.3 Metal coated with charcoal black powder

IV. CONCLUSION

From all of the above description it is clear that penetration of sound waves decreases significantly when a coat of activated charcoal is applied. This is mainly due its absorbing properties, which is maximized due to its fine nature. Sound absorption percentage changes with change in base material. When base material was wood absorption percentage was found to be highest.

Moreover, activated charcoal being easily available it is cheap and economically viable. Hence it has fulfilled our aim of providing a economic sound proofing alternative. Using activated charcoal also has its own additional benefits. It is insulator and will not conduct electricity from any open wire. Due to the property of adsorption of charcoal it also acts as deodorizer and purifies air giving us clean, fresh air.

Limitations – It is not a self sufficient tool and acts as a supplementary tool to glass. It is carbon black in color and not transparent so it blocks vision.

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