

PERFORMANCE ANALYSIS OF NON METALLIC OXIDIZED CATALYTIC CONVERTOR

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Abstract— Nonmetallic convertors are generally used for the purpose of adsorption to reduce NO_x of the automobile exhaust. The present investigation is based on the adsorption and reduction of NO_x over silica gel generated from RHA. Samples of different concentrations like 0.5M, 1M, 2M, and 3M were produced by using analytical grade NaOH. Samples A and B (A-without adsorption and B-after adsorptions) were then characterized by FTIR. 0.5 M was then tested by chemical process under guideline of GPCB.

Key words-RHA, FTIR, SILICA GEL, NO_x, Reduction

I. INTRODUCTION

Rice is a primary source of food for billions of people and it covers 1% of the earth's surface. Globally, approximately 600 million tons of rice are produced each year. The main benefits of rice generates as by-product rice husk that corresponds to about 23% of its initial weight. This husk can be used as a fertilizer in agriculture or as an additive for cement and concrete fabrication. It is estimated that for every 1000 kg of paddy milled, about 220 kg (22%) of husk is produced. Rice husk (RH) is therefore an agricultural residue abundantly available in rice producing countries. Much of the husk produced from the processing of rice is either burnt or dumped as waste. Even though some of this husk used in cement industry and bricks industry



Figure 1: RHA from industrial waste

II. GEL PREPARATION

(1) Material :-Rice HuskAsh(RHA),Distionized water /distilled water, HCl,(3M HCl), NaOH

(2) Method:-

(a) Silica Extraction:-

- ✓ Rice husk ash was collected from Kaveri Traders ,GIDC Bavla Gujarat.
- ✓ Washed with distilled water and dried over hot air oven at 110° c for 24 Hr.
- ✓ Dried RHA was than leached with 3M HCl at 100° c for about 1 Hr.
- ✓ After acid leaching the ash was rinsed with distilled water,dried in oven at 110°C overnight
- ✓ and then calcined in muffle furnace at 650 °C for about 4 Hr.
- ✓ Calcined ash was treated with different conc. of NaOH like 0.5M , 1.0M, 2M, 3M . Alkaline RHA was than heated till boiling with constant agitation for 2 Hrs. Then solution was allowed to cool at room temperature. The solution was then filtrated. Neutral pH=7.0 of filtrate was maintained by concn.HCl and allowed to 24 hrs. for gelenation.

(NaOH(aq) concentration and volume)	Time (min)	MuffelFurnace 600 W	Parameter	specification
0.5 M, 660 ml	5	0.000	Engine type	single cylinder 4-stroke diesel engine AV1 KIRLOS KER
	10	2.060	Brake power	3.7kw
	30	_**	Speed	1500 rpm
	60	_**	Bore	80 mm
1.0 M, 330 ml	5	2.961	Stroke	110 mm
	10	6.340	Types of Loading	Rope Brake Dynamometer
	30	_**	Injection pressure	185 bar
	60	_**	Fuel type	Diesel
2.0 M, 165 ml	5	4.994		
	10	8.959		
	30	_**		
	60	_**		
3.0 M, 85 ml	5	6.694		
	10	10.959		
	30	_**		
	60	_**		

TABLE 1.1



Fig. 2 Single cylinder 4 stroke diesel engine

III Application

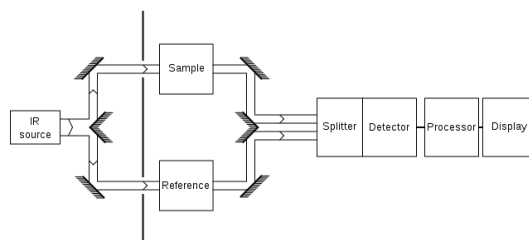
The engine is a completely self-contained test bed incorporating electrical dynamometer, with panel board consists of ammeter and voltmeter fuse carries. The electrical dynamometer which is capable for 30 hp @ 1500 rpm. As shown in Fig. 6.1, four stroke four cylinder diesel engine is coupled with flywheel and rope break dynamometer. Power produced by engine will be supplied to generator by means of coupling joint to produce electrical power. A amount of power generator in to the generator will be supplied to load bank which has heaters which will consume that power. A probe is mounted a of engine which will supply sample of exhaust gas to the exhaust gas analyser. Amount of HC, CO & CO, Nox present in exhaust can be read at indicator panel of exhaust gas analyser.



Fig. 3 Gas pass in gel

Infrared spectroscopy (IR spectroscopy or Vibrational Spectroscopy) involves the interaction of infrared radiation with matter. It covers a range of techniques, mostly based on absorption spectroscopy. As with all spectroscopic techniques, it can be used to identify and study chemicals. Sample may be solid, liquid, or gas. The method or technique of infrared spectroscopy is conducted

with an instrument called an infrared spectrometer (or spectrophotometer) to produce an infrared spectrum. An IR spectrum is essentially a graph of infrared light absorbance (or transmittance) on the vertical axis vs. frequency or wavelength on the horizontal axis. Typical units of frequency used in IR spectra are reciprocal centimeters (sometimes called wave numbers), with the symbol cm^{-1} . Units of IR wavelength are commonly given in micrometers (formerly called "microns"), symbol μm , which are related to wave numbers in a reciprocal way. A common laboratory instrument that uses this technique is a Fourier infrared (FTIR) spectrometer. Two-dimensional IR is also possible as discussed below.



Results & Discussion

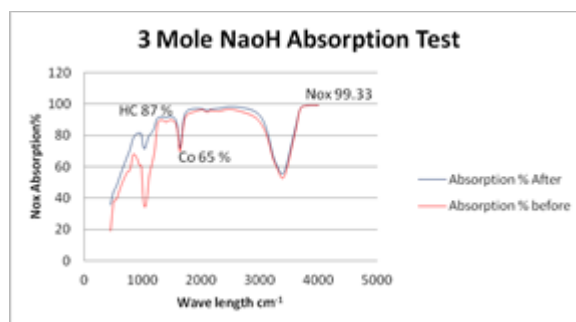


Fig. 4 3 mole NaoH graph

The test was carried out at IIT gandhinagar under the Guidance of Dr. Shudhanshu Sharma on IR spectrometer. FTIR graph plotted as shown in graph at the wavelength of 4000 cm^{-1} the absorbtivity of silica gel reaches at almost near 100 %. There are two sample tested for 3Mole NaoH the small tunnel made for the testing in which the gel was placed and gas was passed through the gel After that sample were sent to the Laboratory for checking the absorbtivity of the Sample. The Nox absorption at 3M shows highest pic at 4000 cm^{-1} .

IV CONCLUSIONS

- (1) From the graph it is concluded that 3M NaOHgel absorbed Nox Efficiently between 3700 cm^{-1} to 4000 cm^{-1}
- (2) The NOx absorption process By RHA is more efficient and prepared at low price.compared to the Nobel metal and Rare earth metal based catalytic converter.
- (3) The Material used in the catalytic activity is Green and can be recharged at low cost.

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