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AL-CR-FE OXIDE CATALYSIS IN PYROLYTIC GASIFICATION

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ABSTRACT

The Al-Cr-Fe oxide catalysts were synthesized with their four different percentage concentrations using co-precipitation method. Reagent grade Aluminum nitrate, Chromium nitrate and Ferrous nitrate were used for preparing starting solution and co-precipitation using ammonia solution. The catalysts were prepared in the form of pellets and tested in the pyrolytic gasification, the change in the composition of gas was observed. The results will be represented in the paper.

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MATERIAL INDEX

Al-oxide, Cr-oxide, Fe-Oxide, Keywords- Catalyst co-precipitation method, spray pyrolysis method pellets and thin films.

Variety of catalysts are used in various industrial processes like ammonia synthesis detergent production, fertilizer production and methanol synthesis. Recent studies on Al-Cr-Fe oxide are reported for improvement of biogas quality with the view of to improve the quality of pyrolytic gas and biogas. Al-Cr-Fe oxides were studied.

EXPERIMENTAL

In the present investigation, Al-Cr-Fe Oxide catalysts were proportion by Co-precipitations and spray pyrolysis method. Nitrates of corresponding chemicals were take for the preparation of Al-Cr-Fe oxide catalysts in pellet form by Cr-Fe oxide catalysts were also synthesized in the form of thin films using stainless steel as a substrate. The experimental details can be found elsewhere (Pawar and Chavan, 1996; Maruyama and Nalkai;1991).

The catalysts were tested for conversion of carbon dioxide into carbon monoxide and oxygen. The catalytic reaction were carried out using tubular furnace, reactor, capable of working at high temperature. The test gas was passed over the catalysts in the controlled flow rate and the change in gas composition was studied.

RESULT AND DISCUSSION

The Al-Cr-Fe oxide catalysts were tested for the conversion of carbon dioxide into carbon monoxide and oxygen in biogas and pyrolytic gas. The percentage was measured before and after catalytic reactions. The reactions were carried out at 600°C temperature. The variation of concentration of carbon dioxide in biogas and pyrolytic gas was recorded and is shown in Fig. 2A and 2B. It is seen that the percentage of carbon dioxide has been changed considerably in biogas from 39 to 3.1% but the poisoning of catalysts was observed after 10 minutes. The poisoning was rapid with increase in gas flow rate. The conversion was list in pyrolytic gasification. Carbon dioxide was found to be changed from 28.2 to 26.9. The rapid poisoning of

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catalysts was recorded after 2 minutes. This was attributed to carbon content, ash content and other contaminants present in catalysts. Hence it needs to study in depth using gas cleaning system. Catalysts Bed

CONCLUSION

The Al-Cr-Fe Oxide catalysts can play an important role in the improvement of biogas and pyrolytic gas, by reducing the percentage of carbon dioxide. Thus the high calorific value fuel gas can be obtained by means of catalysts due to conversion of carbon dioxide to carbon monoxide and oxygen.

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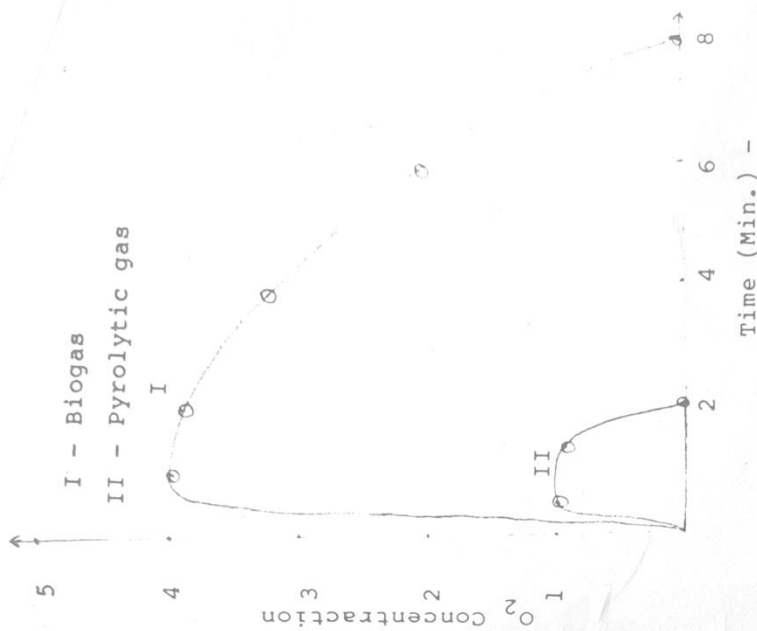


Fig. 2 B- Variation of O₂ concentration in biogas & Pyrolytic gas at 600°C.

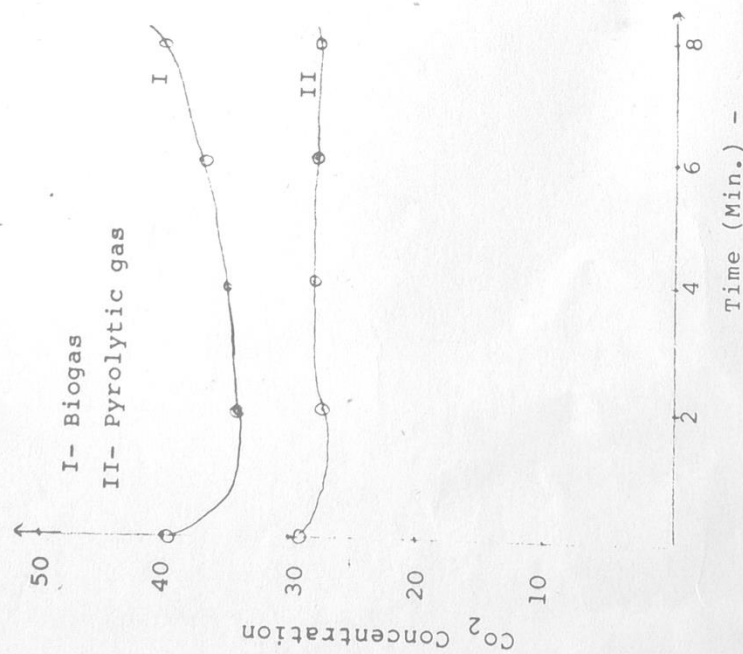


Fig. 2 A - Variation of CO₂ concentration in biogas & Pyrolytic gas at 600°C.