CHARACTERIZATION OF FISH BONE CATALYST FOR BIODIESEL PRODUCTION

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INTRODUCTION

- ✓ Homogeneous catalysts leads to soap production.
- ✓ It is used up in reaction hence reducing the catalytic efficiency
- ✓ After the reaction, the removal of catalyst is difficult, and consumes a large amount of wastewater
- ✓ Crude glycerol, consists of by-products which have very low value due to high impurities (catalysts, soap, methanol and water)
- ✓ Catalyst is corrosive to equipment
- ✓ Purification of the crude glycerol is costly.
- ✓ Total cost of the biodiesel production using a homogeneous catalyst, is not competitive as compared to the cost of diesel production.

OBJECTIVES

- To characterize fish bone waste catalyst from local fish (XRD and SEM)

LITERATURE REVIEW

CATALYSTS

The driving source of a transesterification reaction is the type of catalyst used during the reaction. Catalysts can be of three types.

- **Homogeneous-** Homogeneous catalysts are catalysts which are in the same phase as that of the reactants.
- **Heterogeneous -** These catalysts are present in a different phase as that of the reactants. Heterogeneous catalysts are usually present in the form of solids.
- **Biocatalyst -** Biocatalysts also called as enzymes are large biological protein molecules of colloidal size.

Differences between homogeneous and heterogeneous catalyst

Homogeneous catalyst

- The catalysts that are in the same phase as the reactants
- The process requires a lot of purification steps as large amounts of glycerol is produced and hence increases the cost
- It cannot be reused.
- Not very costly
- Mild reaction conditions
- Time consuming and costly process
- They run in batch mode process.
- E.g. KOH, NaOH

Heterogeneous catalyst

- The catalysts that are not in the same phase as the reactants
- The process setup is simple as there are no purification steps
- It can be reused.
- Requires high reaction temperatures
- Reduced reaction time and cost effective process
- E.g. CaO, MgO

Waste Heterogeneous catalysts

Source of catalyst	Yield (%)
Mussell shell	>90
Biont shell	97.5
Pomacea shell	95.61
Waste eggshell	>95
Waste fish scale	97.73
Snail shell	87.28
Animal bone	96.78
Oyster shell	>70

METHODOLOGY

Collection of fish bone waste from cafeteria and canteen.

Fish bone waste was soaking into boiling water for several hours and then rinsed with distilled water several times

The fish bone was dried in the drying oven at 70^{o}C for 24 hours to remove water and moisture.

The fish bone was milled and crushed with miller until it become into powder form

Calcinations process at different time and temperature in the muffle furnace.

Sample characterization using Scanning Electron Microscope (SEM) and X-ray Diffraction (XRD)

RESULTS AND DISCUSSIONS

SEM RESULT

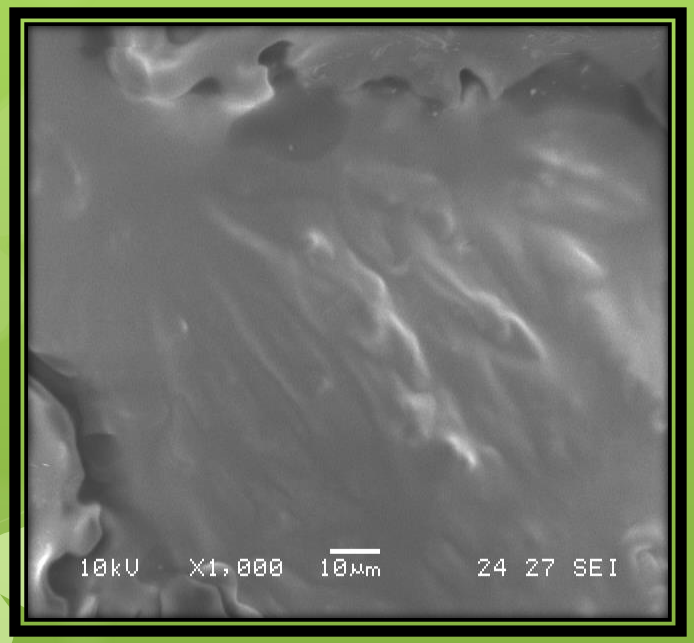

Figure 1: Uncalcined fish bone (original fish bone)

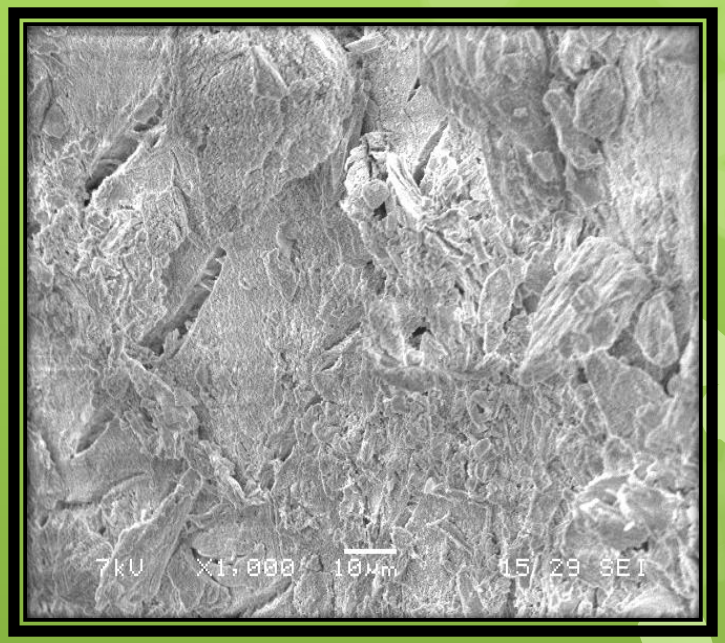

Figure 2: After calcination (900°C, 2hours)

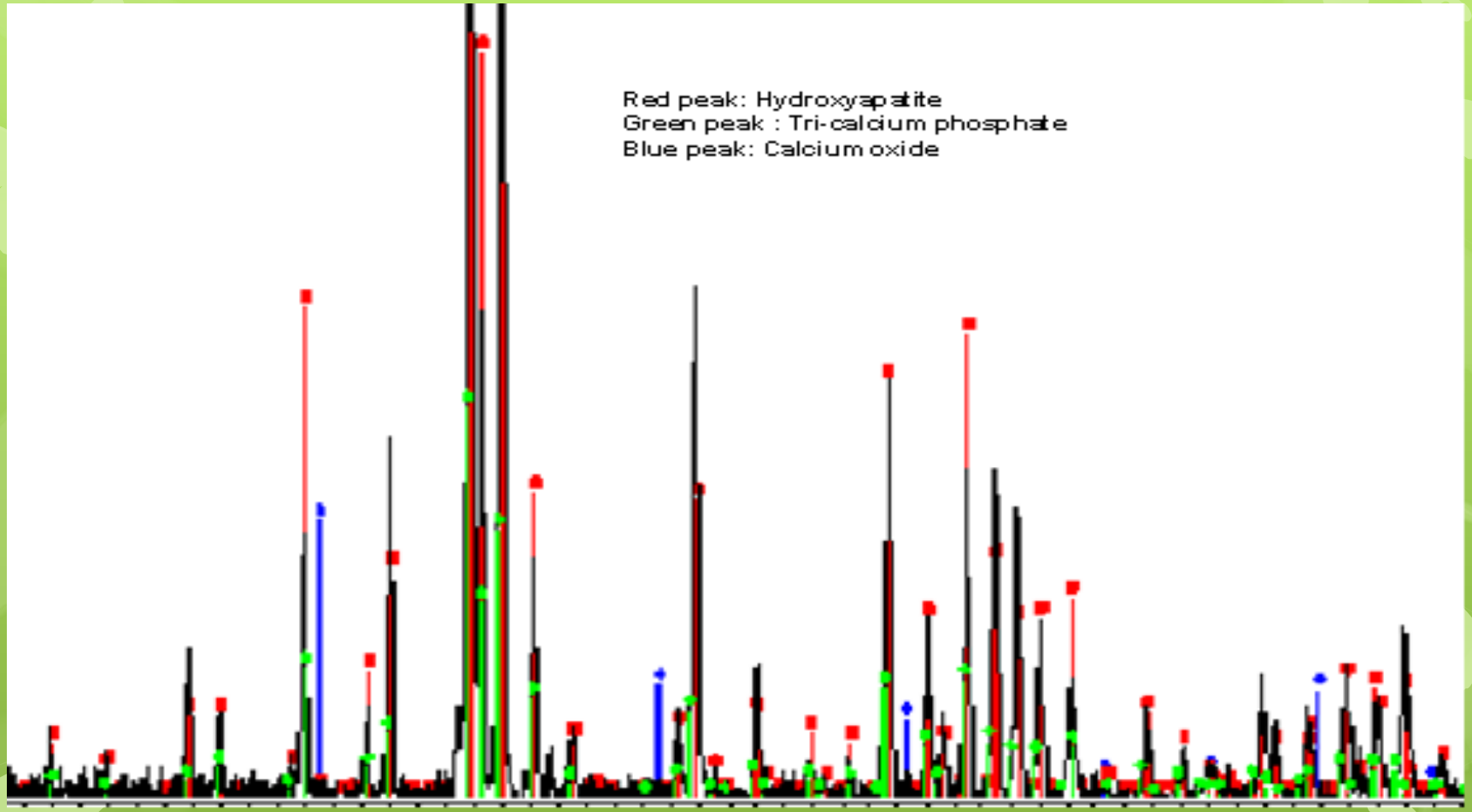

Figure 3 XRD pattern at 900°C, 2Hours

CONCLUSION

- Employment of waste resources in biodiesel production lowers the **cost of production.**
- **Lowers** the steps of purification
- Making synthesis of biodiesel **environment friendly**
- **Solid waste management** by utilizing waste materials being released from dining outlets around the world.
- **Reusability and stability** of the catalyst is economical and viable to employ these catalysts for high scale production

THANK YOU