

Study and Analysis of Materials Characterization and Techniques in Bio Polymer

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ABSTRACT: Now a days many composite materials are not compostable in nature. These materials can cause some defects to the environment. But our natural filler reinforced composites are being developed to save environment. Natural fillers are more abundant and easily available in nature. So there was no restriction in manufacturing of these materials.

I. MATERIALS AND METHODS

Chitosan and Starch are purchased from chemical agent. The hardness of the composites are evaluated by Rockwell hardness tester. The tensile strength of the prepared materials are tested by using Universal testing machine (UTM). The test film is cut into uniform shaped according to ASTM D882-02. The five samples were tested for each formulation at both with and without moistures.

II. SAMPLE PREPARATION

The Chitosan and Starch are dried in oven for 24 hours at 80°C before pre-mixing and compounding to remove moistures. The compounding of Chitosan /Starch at different blend ratios were done with addition of palm cooking oil. The compositions are stirred uniformly at rate of 60 rpm. Then, resultant composites are molded as thin films. The samples were prepared by using Chitosan as base and Starch is propositioned as indicated in the table-I. The compounds are tested for physical and mechanical properties.

S No	Samples	STARCH(%)	Chitosan(%)
1	Chitosan	0	100
2	Chitosan/ Starch-I	80	20
3	Chitosan/ Starch-II	60	40
4	Chitosan/ Starch-III	50	50
5	Starch	100	0

Test for tensile

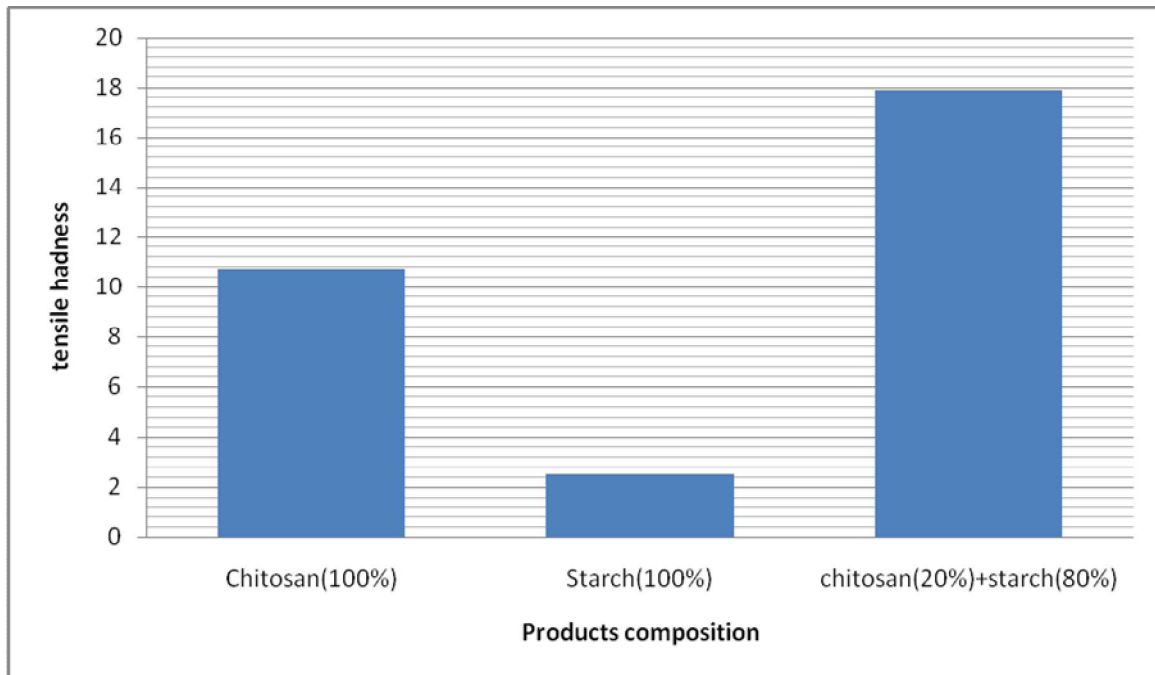
- The tensile property of different products were measured and shown in fig.1 It is observed that the composite products of Chitosan/Starch -I breaks at 17.9kN. The individual Chitosan and Starch are breaks at 10.7 kN and Starch has 6.2 kN respectively. The high viscosity character of Starch get brittle when it used at 100%.
- It is noticed that the addition of 20% Chitosan into Starch has improved the elongation properties of the products.

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Fig. 1. Graph of tensile properties of composites Vs Compositions



Displacement

- The loads were applied on the prepared composites. The displacement of the compounds Chitosan/Starch -I, chitosan and Starch are measured by using UTM and results are plotted in graph fig.2. The Chitosan/Starch-I deformed at 4.8mm after breaking of the film. The Starch and Chitosan deformed to 1mm and 6.9mm respectively. The addition of Chitosan could improve the deformation of the film Chitosan/Starch-I.
- But no significant improvement was observed while applying the similar procedures for the composites Chitosan/Starch-II and Chitosan/Starch-III.

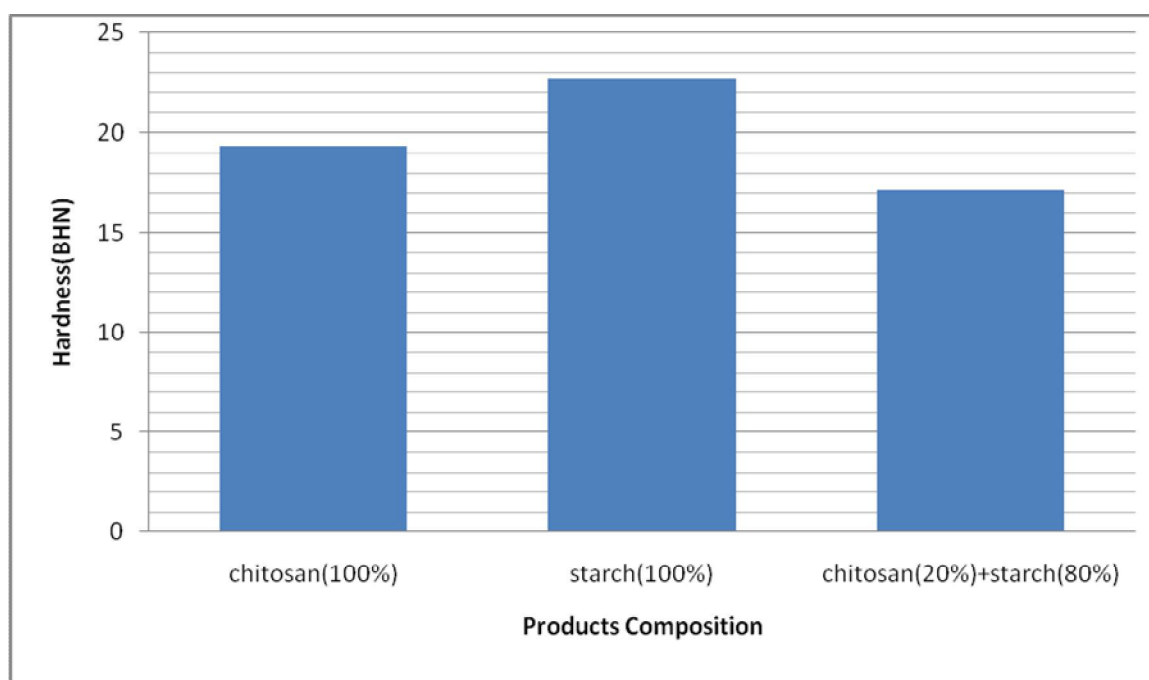
Hardness

The hardness of the composites chitosan and Starch -I, chitosan and Starch by Rockwell hardness tester and results are plotted in graph (fig.3). A constant load of 150Kgf is applied on the products, as specification of ASTM. The Chitosan have gained the hardness of 19.33, whereas Starch for 22.67 in B scale. The 80% blended Starch /Chitosan performed very low hardness of 25.77 against the applied load.

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III. RESULT AND DISCUSSIONS

The chitosan is dissolved in acetic acid. Natural fillers are more abundant and easily available in nature. So there was no restriction in manufacturing of these materials.

1. When the tensile strength of starch is less than the chitosan, so we want to increase the tensile strength by the mixer of chitosan and starch.
2. Then the displacement also increases.
3. But the hardness is less compare to other material.

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