

# Synthesis of starch maize (corn)/PVA/Polystyrene composites by casting method

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## Abstract

Polystyrene/corn starch/PVA blends were prepared by melt blending. The demand of the biodegradable polymer products in the market is increasing day by day. The biodegradable composites are greatly used as packaging material. The Addition of starch/PVA/Polystyrene in high proportion increased the expansion and mechanical resistance of studied foams. The mixing of corn starch and polyvinyl alcohol and polystyrene in organic solvents such as chloroform and melt mixing of compatibilized polystyrene/corn starch/polyvinyl alcohol blends are some of the methods that have been studied.

**Keywords:** Polystyrene, Corn starch, PVA

## 1.0 Introduction:

The term polymer was coined by Jons Jakob Berzelius in 1833. The word Polymer is derived from a Greek word where Poly means “many” and mers means “parts”. The parts constituting polymer, essentially a molecules of lower relative molar mass. The final yields rising through the link of units by covalent bonding that is the prime motivation for macromolecules. Polyisoprene based gum is the model of natural polymeric material and polystyrene [1]. Today polymeric materials are an intact component of everyone’s life due to their outstanding attributes such as low price, light weight, flexibility, hardness, corrosion resistance, ease of processing, are used for different applications [2]. The mechanical recycling of the material is a deep-rooted tools to recover conventional plastics for example polystyrene (PS), Polypropylene.

It is stated that monomeric unit and its polymer is having unique composition that contains in pure self -addition and is particularly to unsaturated molecules, Therefore it has been appeared that not only these condition is essentially fulfilled by the involved reaction that are commonly documented for polymerisation [3]. Though the elastic materials could be reprocessed nonetheless the quantity of waste made by polymeric is a problematic. In new years, normal renewable means have positively used to yield polymer that are recyclable under assured humidity and temperature conditions [4].

The combination of different different material that contains two or more different phases separated by a different interface. The dissimilar systems are joint sensibly to attain a system with more valuable physical or functional properties with non-attainable by any of the component alone [5]. The mixed material, the miracle

materials are flatter an vital portion of today resources due to the benefits such as, corrosion resistance, low weight, faster assembly and high fatigue strength. They are broadly used as things in creation of, electronic packaging, aircraft structures for the medicinal apparatus along with space vehicle for the construction of home [6]. The principal valuable materials used in our day-to-day life are ceramics, concrete, and wood so on. Unexpectedly, the greatest essential polymeric mixtures are originated in nature and these are recognized as mixture of natural materials [7].

## 2.0 Experimental section

### Apparatus and chemical used:

**Apparatus used:-** beaker, glass rod, hot air oven, heating mantle, measuring cylinder, weighing machine.

**Chemical used:-** Starch maize (corn)98-99%, Polyvinyl alcohol (PVA) 4%Polystyrene (PS),citric acid, glycerol, CTAB(n-cetyl-N,N,N-trimethyl ammonium bromide 98%), Chloroform (CHCL<sub>3</sub>),Distilled water.

### 2.1 Preparation of starch maize(corn)/PVA/Polystyrene

The above composites of Corn Starch/PVA/Polystyrene blend films were prepared by solution casting method. First Starch was gelatinized by heating the starch powder with distilled water under stirring at 60°C. PVA was used to form blend with starch maize (corn). PVA solution was prepared by dissolving PVA in hot water at 90°C. This solution was then mixed with gelatinized starch solution and continuously stirred well to form a homogeneous solution. Citric acid a natural organic acid was blends selected to introduce plasticization and phase miscibility in starch and PVA blends. Citric acid is used as plasticizers because of it are a non-toxic in nature. CTAB was used as a surfactant. After that polystyrene is dissolved in chloroform. Chloroform is used as a solvent, then mixed this blend with starch/PVA blended solution and stirred well to form homogeneous solution. This homogeneous solution was casted into smooth glass and placed at room temperature. After 24 hours the blended film was prepared.

## 3.0 Conclusion

Polystyrene and starch maize (corn) blends were obtained by melt mixing and subsequently compression moulded. The result suggested that only physical interaction between polystyrene and starch maize (corn) took place. Polystyrene glass transition temperature was not affected by the starch maize(corn) concentration in the blends. Blending polystyrene with starch maize(corn) decreased the mechanical properties.

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