

Libya

Ministry of Higher Education and
Scientific Research

AL-Asmarya Islamic University

Faculty of Engineering



**BARLEY STRAW NATURAL FIBER
REINFORCED STYRENE BUTADIENE RUBBER
COMPOSITE**

A graduation project is submitted to the Chemical Engineering
Department in partial fulfillment of the requirements for the degree
of *B.Sc.* in Chemical Engineering

BY

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Abstract

Industrial and technological development depends largely on progress in the field of materials, and as a result of this great industrial development that the world witnessed in all fields, the need for the production of what are known as composite materials appeared. Synthesized polymers were born in the field of aerospace engineering due to their light weight. Subsequently, these materials spread unparalleled during the short period of their life and entered all fields of engineering due to their excellent mechanical properties compared to their low weight. These materials have proven successful in aerospace, transportation, civil, military, medical, and industrial industries. In this research, composite polymeric materials consisting of styrene-butadiene rubber (SBR) were prepared as a matrix material and barley straw as a filler in different proportions using an extrusion device. The mechanical properties of the prepared composite materials such as tensile strength, elongation and hardness were studied, as well as impact strength and verification of water absorption tests. The mechanical properties such as tensile strength and elongation properties were decreased by adding barley straw, and this decrease was increased by increasing the proportion of barley straw content (from 10 to 40 wt%). On the other hand, the hardness, impact strength, and water absorption increased with an increase in total fiber loading. A water absorption test was carried out by immersion specimens in a water bath at room temperature for a time duration of 240 hours. The process of water absorption of these composites was found to approach maximum water uptake values when evaluated. This type of composite polymer can be exploited in the manufacture of furniture and some products in which the properties of hardness, impact strength, and wetness are very important. The use of these materials will reduce, in one way or another, the cost of manufacturing the products that will be manufactured for their abundance and the ability to assemble them easily and without high costs.