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Mechanical Properties of Superposition Composites of Natural Materials (grape seeds , peach nuclei)

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ABSTRACT

In this research, some mechanical properties of epoxy compounds supported with natural materials such as grape seeds and peach nuclei were studied and prepared by the manual molding method by weight ratios (0, 0.11, 0.15, 0.19) %. The hardness test and the bending test were shown and laboratory results showed that whenever The strengthening ratio increased, the shore hardness increased for grapes and peaches. As for the bending resistance, we find the highest value for it at the weight ratio (0.11%) if its value reaches(108.37N / mm^2)for the carp and for peaches we find the highest value at (87.87N/mm^2).

1- Introduction

Now adays, the accumulated material has become essential. In modern industries it was used from scratch due to its high mechanical properties, which are suitable from many modern industries. The accumulated materials entered the industry with equality technology comparable to other materials, such as alloys and metals. [1].

One of the modern sciences is the science of polymeric materials, which man still researches and develops in order to obtain useful materials. Scientists have found that when studying the properties of materials (metals, ceramics, polymers) represented by durability, hardness, wear and thermal conductivity, electrical, etc. The researchers found a discrepancy in the properties of these substances [2].

The need for materials that compensate for metals and alloys in many industries has been the motivation to find what is blocking polymeric composites[3].

Accumulated materials are defined as materials formed by combining two or more substances to obtain a new material with a multi-phase with physical properties that differ from the materials used in its composition. [4].

In (2002) the epoxy was mixed with nickel minerals and its mechanical properties studied were studied [5]

In (2017) The researcher Adnan Raad and others formed a polymeric component consisting of an epoxy resin with rubber for the liquid polyurethane. The two components were mixed in a regular mixing method and a study of some mechanical and physical properties such as (hardness, shock resistance, tensile strength, compression resistance, bending, thermal conductivity Absorptivity) The study showed that there is a direct relationship between increasing immersion time from (0-28) days and between tensile strength, shock resistance and thermal conductivity, and also showed that the greater the immersion time, the lesser the hardness values [6]

The characteristics of overlapping materials(high performance,good durability,its soup is high,high resistance to temperature and pressure.[7.3].

The overlapping materials with a polymeric basis are considered new materials that are applied in the field of modern technology and engineering applications, as well as industrial production because they have several characteristics, namely:

(It is easy to form with precise dimensions, and it has different shapes and sizes, light weight and high durability, characterized by that it has a high resistance to rust and environmental degradation, poor thermal conductivity, it resists vibrations and sounds well, low cost, it is distinguished that it has a high and great resistance to chemicals and weather factors) [8,9].

The accumulated material consists of two main par

They are the materials that bind two Stiffeners such as minutes and fibers, where they are housed and preserved from damage, and they are the base material. They are of three types, ceramic , metal or polymeric

Polymers are the most used species because they have good mechanical properties. Resins are the base material and the best of them are epoxy resin [10].

It is the substance that works to strengthen the base material by acquiring new and good qualities that improve its properties.[11].

The main reason for using a reinforcement material is to improve mechanical properties such as hardness and toughness of composite materials [12].

The materials are metallic of high resistance that depend on the type of material and the purpose for which they are used. They can be category pounds ized by shape and distance to (particles, flake, fibers) or as a network of materials [13]

its achemical one of the non-thermoplastic elastom ers, it has two com pound : a rrsin and hardener .which is highly adherent and resistant to frication and chemical substant,whether acids bases or solvents, as it forms an onsulatiog layer when dried and used as acoatiog or mixed with other material[14]

2. Experimental Part

(2-1) Matrix Material :

We used epoxy resin and considered it as a base material and be in the form of a transparent viscous liquid and be well mixed with the support material and the ratio of the addition of the epoxy resin to the hardener is (1: 2) i.e. all (1gm) from hardener to (2gm) of epoxy when Laboratory temperature In a bowl, we add by hand the mixture for a period of (2-5) minutes until the mixture is homogeneous.

(2-2) Reinforcement material:

Grape seeds and peach kernels were collected, washed well, and then dried at a temperature(50c°) for an hour. After that, they were ground and sifted into a granular size (150µ m).

vv(2-3) Preparing the mold:

The hand lay-up method was adopted to produce the models in a small percentage, as a(30 * 22cm^2) glass plate was used as a base.

(2-4) Preparing samples:

The grape seed powder and peach nuclei were weighed at weight ratios (0%, 0.11% 0.15%, 0.19%) respectively. These proportions are added to the epoxy resin until the mixture is homogeneous and poured into special molds. The samples were in a thermo oven for one hour at (50C°), as they were prepared according to ASTM international standards.

(2-5)Tests:

The mechanical tests that are studied in the overlapping materials are:

1-Bending test:

The three-point bending test samples were prepared with standard dimensions according to the American specifications in length (100mm) and width (10mm) and thickness (4mm) .

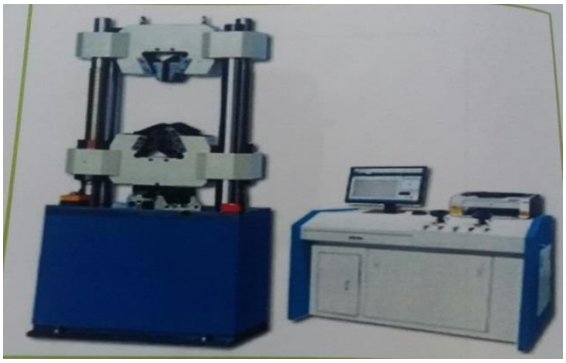

Fig. 1: showing the bending test device

2- Hardnesstest

Sure D type hardness test samples are prepared .

Fig. 2 : showing shore hardness tester

3. Results and Discussion

Some mechanical properties of samples were studied (hardness, bending)

From tables and Shapes (1 and 2),it is noticed that the lowest hardness value was at the first model, which is (72.5kg/m^2).This value increases as the percentage of support increases for grapes and peaches. The explanation for this is that the work on filling holes, gaps and voids, leads to the occurrence of alignment and interlocking among them, which reduces the movement of particles and leads to increase the hardness of the sample surface for sorting and deformation where an interaction occurs between the particles and the polymeric material. This reaction gives an increase in the density increase, and this is what the researcher performs [15.3]

Notice from Table and shape (1), shows the highest value of grapes which is (79.0kg/m^2), and for peaches it is (80.2kg/m^2) .i.e. at the fourth model of grapes and peaches, and that the hardness expresses a measure of the plasticity under the influence of external stress that the material complains of, and therefore when adding, the hardness of the material increases and its resistance to plasticity increases [15.16]

Notice from Tables and Shapes (3 and 4) that the lowest value of bending was for the first model,

which was (49.5N/mm^2) and this explains that the epoxy vibrates as a soft material and it is fragile[17]
And it turns out also that the highest value of bending resistance with respect to grapes was for the second model at the rate of (0.11%) which is(108.37N/mm^2) strong between the base material and the booster or grape[18]
As for the models that had the average value, they are the third model, and the reason is that the grape of minute grains had little ductility and had high fragility and hardness. The fourth value at the ratio is (0.19%) decreased when the ratio increased. The reason is that the base material and the reinforcement material did not penetrate well and therefore the bonding space between the two substances decreased. With the value of grapes, it is noticed from table (4) that the highest value was at the rate of (0.19%) which is (87.87N/mm^2) and the reason for this is that there is very strong correlation between the base material and the reinforcement material which had a great impact on its occupation of the highest value of bending resistance with respect to peach[18]
As for the rest of the models, the average values of bending resistance is at the rate (0.15,0.11)% and the reason for this is due to the minutes having little brittleness and elongation and hardness relative to peach.

Table 1: shows shore hardness results (D)

The sample number	Stiffening material	Reinforcement ratio%	Shore hardness (kg/m^2)D
1	Grape seed	0	72.5
2	Grape seed	0.11	75.6
3	Grape seed	0.15	77.6
4	Grape seed	0.19	79.0

Table 2: shows the results of hardness by shore method (D)

The sample number	Stiffening material	Reinforcement ratio%	Shore hardness (kg/m^2)D
1	Peach nuclei	0	72.5
2	Peach nuclei	0.11	76.9
3	Peach nuclei	0.15	78.7
4	Peach nuclei	0.19	80.2

Table 3: shows the results of the bending test values

Materials			
Matrix	Reinforced	Weight ratios %	Bending resistance N/mm^2
Epoxy	Grape seed	0	49.5
Epoxy	Grape seed	0.11	108.37
Epoxy	Grape seed	0.15	104.44
Epoxy	Grape seed	0.19	59.47

Table 4: shows the results of the bending test values

Materials			
Matrix	Reinforced	Weight ratios %	Bending resistance N/mm^2
Epoxy	Peach nuclei	0	49.5
Epoxy	Peach nuclei	0.11	62.83
Epoxy	Peach nuclei	0.15	72.85
Epoxy	Peach nuclei	0.19	87.87

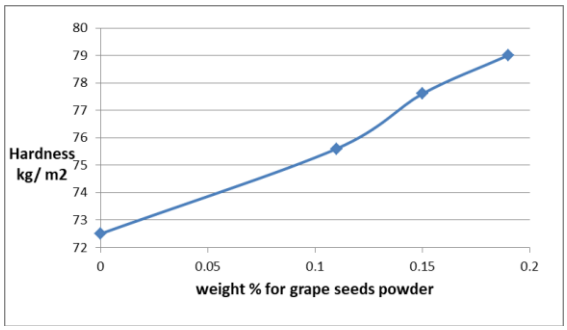

Fig. 1: A char Hardness and weight proportions of grape seed powder

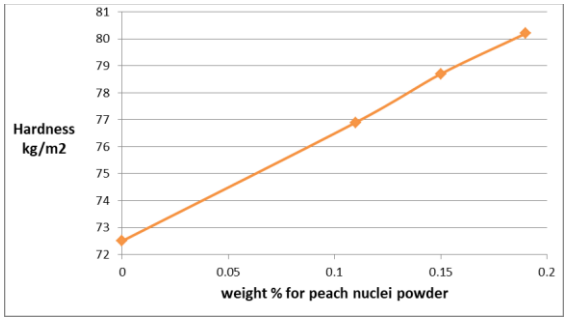

Fig. 2: A char Hardness and weights ratios of the peach nucleus powder

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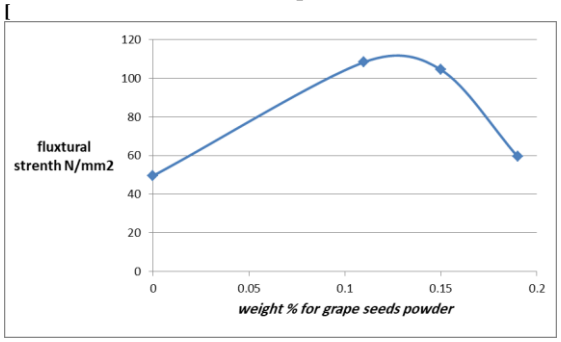

Fig. 3: shows a bending resistance with the gravitational proportions of the grape seed powder

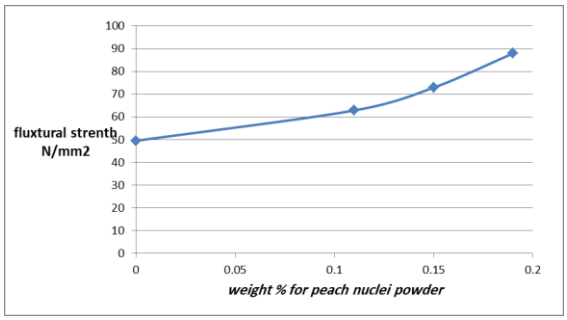

Fig. 4: shows a bending resistance with the weight proportions of the peach nucleus powder

4. Conclusions

We noticed that the highest value of shore hardnesses was at the rate of (0.19%) as it reached (79.0kg/m^2) and the lowest value at the first model as it reached(72.5kg/m^2) in relation to grapes. As for peaches, it was found that the highest value for the fourth model was (80.2kg/m^2) and the lowest value for it in the first model, as it was valued at (72.5kg/m^2). It is noticed that the highest value of

bending resistance was at the rate of (0.11%) at it reached (108.37N/mm^2) and the lowest value at (0%) as it reached (49.5N/mm^2) in relation to grapes. As for peaches, we find that the highest value for them was in the fourth model as it reached(87.87N/mm^2) and the lowest value at the percentage (0%) which was valued at (49.5N/mm^2).

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الخصائص الميكانيكية لمتراكب تدعيم المواد الطبيعية مثل (بذورالعنب , نوى الخوخ)

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الملخص

في هذا البحث تم دراسة بعض الخصائص الميكانيكية لمتراكبات الايبوكسي المدعم بمواد طبيعية مثل بذور العنب ونوى الخوخ وتم تحضيرها بطريقة القولبة اليدوية وبنسب وزنية هي (0,0.11,0.15,0.19)% وتم دراسة اختبار الصلادة واختبار الانحناء واظهرت النتائج المختبرية انة كلما زادت نسبة التدعيم زادت صلادة شور بالنسبة للعنب والخوخ اما بالنسبة لمقاومة الانحناء نجد اعلى قيمة لها عند النسبة الوزنية(0.11%) اذا بلغت قيمتها (108.37N/mm^2) بالنسبة للعنب اما مايخص الخوخ نجد اعلى قيمة لها عند (87.87N/mm^2) .