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AN EXAMINATION OF SOME WOOD PROPERTIES USED IN JEWELRIES

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ABSTRACT

In order to improve the quality of jewelries there is need to know some properties of woods used as jewelries either synthetic or locally, this study intend to find out the properties of woods used as jewelries, three (3) wood samples were selected base on their physical, mechanical, and chemical properties found. Two (2) different test were conducted which are permeability test compression test, and visuals. The three samples were found to be of good properties in making jewelries. The rate of absorption water is slow and has the ability to withstand attack by organism. It *vas* observed that the wood samples were durable in terms of strength, the physical properties of the wood samples were found based on their nature, aromatic smell and grain pattern. The wood samples were found to have absorption rate of 33wc%. 47wt% and 56wt%.

INTRODUCTION

Wood according to Swartz, 2008; Collins, 2003; Bayard, 2010; Garfinkel, 1981; Cone, 1979; Ralph, 1957; Feirer, 1978, Finlay, 1975; are different species widely used in furniture, decorative art, jewelries and buildings and on structurally fence. Wood is one of the most natural and comfortable material available for jewelries, it is remarkable, beautiful, visible, strong, durable and workable and has high strength to weight ration. It is flexible and performs well but with low electrical and thermal conductivity and resist the deteriorating destructions action of many chemicals and other corrosive materials. Wood in jewelry has come along way with technology advancement. Wood can be processed treated, dyed, and polished. Among thousands of wood Black Afara (Terminalina ivorensis) Gmelina (gmelina arorea) and Bush masonia (masonia altissina) are selected based on their natural colour, aromatic properties and grain patterns. Like Black Afara (Terminalina ivorensis) is known, also for natural color and good smell and Bush, masonia is also known for its good grain pattern and fine texture in addition woods with knot may be desirable to add visual interest in jewelries. Furthermore, this is geared at revealing some properties of wood which make it possible to be used as jewelry materials with a better understanding of woods properties now possible ,the availability of sound jewelry design and manufacturing processes; wood can be used in making earrings, bracelets, and necklaces. Aside from jewelry in pure wood beads can be combined with other materials such as glass, and plastics beads are assembled using nylon string thread or elastic string larger pieces of wood with unique shape and intricate grain pattern are made in pendants as is or glued to other materials like metals and clays. Despite the variation of woods species, some have the same characteristic but are used for a different purposes in terms of (strength and sizes) .therefore woods is one the finest material used in jewelries, so let take the advantage of their natural aesthetic value.

MATERIALS AND METHOD

Methods, procedures and materials used in the collecting data for this research which is the determination of the properties of wood (porosity) as one of the characteristic used as jewelries. Three samples of wood A,B,C respectively were selected.

Sample *A: (Black Afara)*
Sample B: (Bush Masonia)
Sample C: (Gmelina)

Materials

The materials used are Black Afara, Bush Masonia and Gmelina. Most of the woods sample are processed and dried before used. Wood (dried) content the range of 8-13% of water content that are processed and the sample are good to be used, based on their good qualities and strength.

Equipment

The equipment used included digital weighing balance, beaker of 250m1, distilled water, a crusher (machine used for compression test).

Method

The woods samples were obtained from the timber market in Bauchi state, Nigeria. The samples were cut and smooth into 50mm square each, to obtain good surface the weight of each wood samples (dried) was taken to determine the rate at which it absorbs water.

The beaker were place in 200m1 of water and the wood samples (dried) are place in the beaker to soak for the period of 24 (hours). After the period of 24 (hours) the wood samples absorbed water and the weight of each samples were taken to determined the rate at which each absorbs water. The faster the rate of absorption the more porous the sample was, and the slower the rate of absorption the less porous the sample was. The ratio at which the weight varies determined the rate of absorption. The strength of wood is associated with good durability, and permeability is one of the few properties of woods that provide a measure of durability. The test for compression strength of objects or cubes to quote BS 1881 (1970,) is the predominant method of determining and checking wood strength or concrete.

TEST PROCEDURES

Tests carried out include; Permeability Test and Compression test Permeability test was meant to measure the flow characteristics of liquid or gas through wood because of the total pressure gradient. Permeability was influenced by the anatomy of the wood cells, the direction of the flow (radial, tangential and longitudinal), and the properties of the fluid being measured. The woods sample (dried) A, B, C were measured to take their weight w_1.

Woods sample (dried) A, B, C were place in a beaker into 200ml of water for 1 (hour) to obtained the weight w_2. After the period of 24 hours) the wood samples A, B, C were taken out to measure their weight w2. To find the rate of absorption and porosity of the woods samples (A, B, C) the following relationship were employed:-

$W_2 – W_1/ W_1$ x 100
Where W_1 = weight of (dried) wood sample
W_2 = weight of wood sample that absorb water after one day.
Therefore, sample A (Black Afara)
W_1 = 13 .8g. W_2 = 20.40.g
$W_2 – W_1/ W_1$ x 100
= 47.73wt % (water absorption rate)
Sample B (Bush Masonia)
Where W_1 = 41.70g. W_2 *=55.80g*
Therefore,
$W_2 – W_1/ W_1$ x 100
= 33.813wt % (rate of absorption)

Sample C (Gmelina)
Where,W_l=18.0g,W_2=28.30g
After the period of a 24 (hours) the wood samples A, B, C are taken out to measured their weight W_2. To find the rate of absorption and porosity of the woods samples (A, B, C). Using the relationship,
$W_2–W_1/W_1$x100
Where W_1 weight of (dried) wood sample
W_2 = weight of wood sample that absorb water after one day.
Therefore, sample A (Black Afara)
W_1 =13.8g, W_2 = 20.40.g
$W_2 – W_1/ W_1$ x 100
= 47.73wt % (water absorption rate)
Sample B (Bush Masonia)
Where W_1 =41.70g, W_2 *55.80g*
Therefore,
$W_2 – W_1/ W_1$ x 100
= 33.813wt% (rate of absorption)
Sample C (Gmelina)
Where, W_1 = l8.0g, W_2 = 28.30g
Therefore,
$W_2 – W_1/ W_1$ x 100
= 56.22g (rate of absorption)
> Compression Test
Compression stress shortens or compresses the material parallel to the grain and perpendicular to the ***grain,*** parallel to the grain shortens the fibers in the wood lengthwise.

(B) The samples of wood were selected and the area of the woods was determined .Each woods sample was put in a crusher to determine the strength of the wood that is parallel to the grain in the wood. This shows that wood that crusher into pieces are having poor grain arrangement and are not interlocked with one another.

From the relationship; Compression
of strength = force /area
Where, force = stress of the wood per kilo Newton's, Area is the total dimension per unit area.

Sample A (black afara)
Where, Force =l0kn, *Area = 25mm*
= 0.knmm^2
Samp1e B (Bush Masonia)
Where, force =15kn, area = 14mm
= 1.014knmm^2
Samp1e C (Gmelina)
Where, force = 9kn, Area = l5mm
= 0.6knmm^2

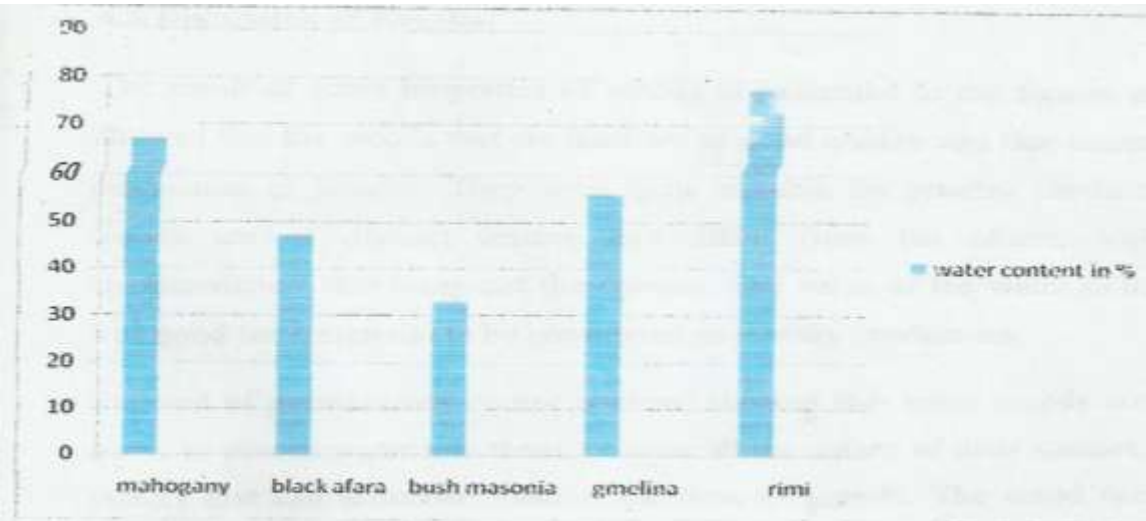

Figure 1a: The rate of absorption of wood species

RESULT

Table 1: The weight (W_1 and W_2) and the rate of absorption of wood.

S/N	SAMPLES	SAMPLES WEIGHT (WI)	WEIGHT(W2)	RATE OF ABSORPTION (%)
I.	Black Afara (A)	13.80g	20.40g	47.83
2.	Bush Masonia	4l.70g	55.BOg	33.82
3.	Gmelina	18.0lg	28.30g	56.4

Table 2: Physical Properties of woods sample

S/N	Wood sample	Colour	Texture	Decay resistance	Types of Wood
I.	Black afara	Dark brown to purple black	Fine coarse	High	Hardwood
2.	Bush masonia	Dark yellow to dark brown	Medium to fine coarse	High	Hardwood
3.	Gmelina	White to reddish brown	Fine coarse	High	hardwood

Table 3: The Compression Strength test of some Woods Sample

S/N	Sample No	Weight W_1 (g)	Crushing load (kn)	Compression strength kn (mm^2)
I.	Black Afara (A)	13.80	10	0.4
2.	Bush Masonia	4l.70	15	1.071
3.	Gmelina	18.0l	9	0.601

DISCUSSION OF RESULTS

The result of the properties of woods as presented in the figures and tables showed that the woods that are used are of good quality and fine material in the production of jewelry. They were quite suitable for jewelry production. The woods are of distinct texture that differ from each others, and unique characteristics' that bring out the colours. The value of the water in the woods was good for a material to be considered in jewelry production. The test of permeability (water content) showed that some woods are slow or quick to absorb water into them, because of the nature of their species, or other factors that can influence them at the time of growth. The wood species that absorb water in *excess* is porous and cannot be used as jewelry materials. The rate of absorption is determined, whether the wood species can withstand attack by bacterial. Some woods species have good absorption rate, but when they absorb water into them or place in a container of water it turn out coloured water as a result of acidity content or nature of the wood species. The weight is been taken to find the *amount* of water absorb by each woods, either in excess or little. Porosity must be uniform to accommodate shrinkage as well as b'3ing strong enough to withstand moderate load. (Hassan, and Adewara, 1994).

From figure 1, showed that the average rate of water absorption is 55% other is less, but when it is higher than that is not advisable for jewelry making or structural wait the rate of absorption of each wood depend. Greatly upon the grain structure and other factors in the cell walls. The result of the strength analysis technique revealed that strength of a wood is associated with durability and the nature of the species of the wood. The strength of the woods, which range from 9kn, 10km 1 Skill shows that such wood can be used in terms of jewelry making and other purposes. The strength of wood determined the nature of it used. If a wood *is* porous or absorb much

CONCLUSION, RECOMMENDATION, AND SUMMARY

Conclusion

From the findings the wood species are good material in jewelry making. By looking at their properties n terms of;- physical, mechanical, and chemical are of good characteristic, which consist of appearance, texture, lustrous when polished and is not easily attack by a bacteria. They are of good weight that can be shape into quality material and the wall of each wood is not porous, that allow excess water into the wood. They have good structure in terms of strength that hold each grains in the wood, which are interlocked to one another.

SUMMARY

The need to improve the quality of a locally or synthetic wood jewelries, cannot be achieved without knowing the properties of the woods.

The three different species of wood samples used revealed that the samples are good material in making of jewelries based on their nature (ability to resist attack by bacteria), good grain pattern and colour. The samples (Black afara) are the best wood among the samples based on their natural properties and uses. the woods samples were less porous and high strength to stress. They are very lustrous when polished; they are also very soft to work upon and not heavy.

RECOMMENDATION

It is recommended that wood Jewelries be encouraged on metallic Jewelries are Costly, therefore, the properties of the wood reveals how they body friendly in term of the water absorption. There is virtually on local production of woods jewelries in Bauchi state they are mostly imported. Thus, there appear to be a profitable investment opportunity in local production of wood jewelry. Due to high cost of metals, these woods can be use.

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