**Bioresin + UF or MUF Formulation Instruction**

**Materials:**

UF/MUF 50g

DIGLUE: 50g

Water: 80g

Curing Agent 10g

**Procedure:**

1 50 g of urea-formaldehyde resin (solid content: 100% by weight) and 50 g (solid content: 94% by weight) of Diglue (200 mesh, water content: 6 wt%) were thoroughly mixed (by solids, the weight ratio of the two was 5:4.7 ), to form a bio-based urea-formaldehyde composite material.

2 80 g of water is added and stirred uniformly, so that the solid content of the bio-based urea-formaldehyde composite material is 53.9 wt%, and then 10 g of a curing agent (solid content: 100 wt%) is added. The amount of the curing agent is 10.3 wt% of the total solids of the bio-based urea-formaldehyde composite material, and the mixture is uniformly stirred.

3 The pressed board/product is manufactured according to the existing/standard process of manufacturing the particle board by the existing urea-formaldehyde glue.

The bio-urea formaldehyde product has a lower formaldehyde content and lower formaldehyde emissions.

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The invention relates to a biology base urea formaldehyde composite for an artificial board. The composite is formed by compounding urea resin or melamine urea-formaldehyde resin with a biological composite reinforcement material, and the weight ratio of urea resin or melamine urea-formaldehyde resin to the biological composite reinforcement material is (2-9):(8-1) by solid; the biological composite reinforcement material is solid powder prepared from, by weight, 8-50% of protein, 1-10% of fat, 40-89% of cellulose and the balance water and has the granularity of 100-200 mesh. The biology base urea formaldehyde composite is used for manufacturing materials of the artificial board or a straw board, the formaldehyde release amount of the artificial board is greatly decreased, the adhesion of urea-formaldehyde glue to wood materials or crop straw is enhanced, the environment protection requirement is met, the raw material source is widened, and remarkable effects are achieved.

PATENT DESCRIPTION

The invention relates to a bio-based urea-formaldehyde composite material for wood-based panels, which is composed of a urea-formaldehyde resin or a melamine urea-formaldehyde resin and a bio-composite reinforcing material, and the weight of the urea-formaldehyde resin or the melamine urea-formaldehyde resin and the bio-composite reinforcing material is calculated by solids. The ratio is 2 to 9:8 to 1; the biocomposite reinforcing material is a solid powder containing 8 to 50% by weight of protein, 1 to 10% by weight of fat, 40 to 89% by weight of cellulose, and the balance being water, and the fineness is 100. ~200 mesh. The bio-based urea-formaldehyde composite material for artificial board of the invention is used for the manufacture of wood-based board or straw board material, which greatly reduces the release amount of formaldehyde in the artificial board and enhances the bonding performance of the urea-formaldehyde glue to the wood material or the crop straw, and not only meets the environmental protection requirements. And the source of raw materials has been expanded, which has obvious effects.

Bio-based urea-formaldehyde composite material for artificial board

Technical field

The invention relates to a bio-based urea-formaldehyde composite material for artificial boards.

Background technique

Wood-based panels are a kind of comprehensive utilization of forestry resources, which are made of synthetic shavings, wood fibers, wood chips and wood pellets through synthetic adhesives, such as MDF, chipboard, and particle board. Multilayer board, oriented strand board (OSB), etc. Among them, commonly used adhesives are urea-formaldehyde glues made of formaldehyde and urea, or urea-formaldehyde glues modified with melamine. Due to the low cost, high bond strength, easy preparation and transportation of urea-formaldehyde glue, it is widely used as an adhesive in the world's wood-based panel industry. Since the volatilization of formaldehyde in the wood itself is minimal, the main culprit affecting the excessive release of formaldehyde from artificial boards and their products is the adhesive. The characteristics of urea-formaldehyde glue determine that it can release free formaldehyde during the production process of the plate, and simply reduce the formaldehyde content in the glue and also reduce the bond strength. Therefore, many plate manufacturers mostly adopt masking, adsorption and sealing in production. And other means to delay the release of formaldehyde, so that the hazards in production are actually transferred to the use, and the hidden hidden dangers of formaldehyde in the board are not fundamentally eliminated. Once the conditions for formaldehyde volatilization are met, this part of the formaldehyde will still volatilize a lot, affecting people's health. The release time of formaldehyde in wood-based panels is about 15 years long. The World Health Organization has confirmed formaldehyde as a class II carcinogen. Therefore, the standards for the release of formaldehyde in wood-based panels are more and more strict. For example, plates conforming to E0 grade. The formaldehyde content must be less than 5mg/100g, which conforms to E1 plate, the formaldehyde content must be less than 9mg/100g; and the artificial board produced by masking, adsorption, sealing and other means can only reach the E2 standard in the release amount of formaldehyde or Reluctantly can reach the E1 standard. Therefore, it is urgent to provide a material capable of reducing the release of formaldehyde, on the one hand, it can enhance the adhesion of urea-formaldehyde glue to wood materials, and in addition, can greatly reduce the release amount of formaldehyde, thereby improving the environmental protection of wood-based panel products produced by urea-formaldehyde rubber products. grade.

Summary of the invention

SUMMARY OF THE INVENTION The object of the present invention is to provide a bio-based urea-formaldehyde composite material for artificial boards which can greatly reduce the amount of formaldehyde released and enhance the adhesion of urea-formaldehyde glue to wood materials.

The technical solution for achieving the object of the present invention is: a bio-based urea-formaldehyde composite material for wood-based panels, which is innovative in that it is a composite of a urea-formaldehyde resin or a melamine urea-formaldehyde resin and a bio-composite reinforcing material, which is solid, urea-formaldehyde resin or The weight ratio of the melamine urea-formaldehyde resin to the bio-composite reinforcing material is 2 to 9:8 to 1;

The biocomposite reinforcing material is a solid powder containing 8 to 50% by weight of protein, 1 to 10% by weight of fat, 40 to 89% by weight of cellulose, and the balance being water, and having a fineness of 100 to 200 mesh.

In the above bio-based urea-formaldehyde composite material, the bio-composite reinforcing material is a mixture of one or two of an alcohol-based aldehyde-free biocomposite reinforcing material and an algae-based aldehyde-free biocomposite reinforcing material.

In the above bio-based urea-formaldehyde composite material, when the artificial board is used, water is added to the bio-based urea-formaldehyde composite material to make the bio-based urea-formaldehyde composite material have a solid content of 45 to 65 wt%, and then a curing agent is added, and the amount thereof is added. It is 0-20% by weight of the total solids of the bio-based urea-formaldehyde composite material, and is uniformly stirred, and can be used for preparing the artificial board according to the existing process, and the formaldehyde content of the prepared artificial board meets the requirements of the EU E0 and the US CARB formaldehyde release limit.

In the above bio-based urea-formaldehyde composite material, the artificial board is one of a density board, a particle board, an oriented strand board, and a multi-layer board which are made of a wood material or a crop straw.

The technical effect of the present invention is that the bio-based urea-formaldehyde composite material for artificial board of the present invention is provided with an appropriate amount of bio-composite reinforcing material, which is 8 to 50 wt% of protein, 1 to 10 wt% of fat, and 40 to 89 wt% of cellulose. The balance is a solid powder of water having a fineness of 100 to 200 mesh. The material itself does not contain formaldehyde, and the protein contained therein has a binding ability to free formaldehyde contained in a urea-formaldehyde resin or a melamine urea-formaldehyde resin. Therefore, the artificial board made of the bio-based urea-formaldehyde composite material of the invention can greatly reduce the release amount of formaldehyde (according to the EU E0 and the US CARB formaldehyde release limit requirement) and enhance the adhesion performance of the urea-formaldehyde glue to the wood material or the crop straw ( See Tables 1-7). In addition, the bio-composite reinforcing material used itself does not contain formaldehyde, and the price is suitable, and the cost of the artificial board is small, so it has a broad market prospect.

Detailed ways

The invention is further described below in conjunction with the embodiments, but is not limited thereto.

The raw materials used in the examples and comparative examples are commercially available industrial articles unless otherwise stated, and are commercially available.

The bio-composite reinforcing material used in each embodiment is a distiller's-based aldehyde-free biocomposite reinforcing material KT-102 produced by Sino-British joint venture Changzhou Kangtian New Material Technology Co., Ltd., or an algae-based aldehyde-free biocomposite reinforcing material KT-103, the fineness of which is 80 to 200 mesh, water content is <10 wt%;

The curing agents used in the examples were polyisocyanates (PMDI), epoxy resins or ammonium chlorides and were all commercially available industrial products.

Example 1 Preparation of Artificial Particle Board

Specific steps are as follows:

1 50 g of urea-formaldehyde resin (solid content: 100% by weight) and 50 g (solid content: 94% by weight) of biocomposite reinforcing material KT-102 (200 mesh, water content: 6 wt%) were thoroughly mixed (by solids, the weight ratio of the two was 5:4.7 ), that is, a bio-based urea-formaldehyde composite material is obtained;

2 In the bio-based urea-formaldehyde composite material prepared in step 1, 80 g of water is added and stirred uniformly, so that the solid content of the bio-based urea-formaldehyde composite material is 53.9 wt%, and then 10 g of a curing agent PMDI (solid content: 100 wt%) is added. The amount of the curing agent is 10.3 wt% of the total solids of the bio-based urea-formaldehyde composite material, and the mixture is uniformly stirred and used;

3 Using the material prepared in the step 2 to prepare the artificial particle board according to the process of manufacturing the particle board by the existing urea-formaldehyde glue.

The formaldehyde content of the conventional urea-formaldehyde wood-based panel without the bio-composite reinforcing material and the artificial particle board prepared in Example 1 was respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results show that the formaldehyde emission of ordinary urea-formaldehyde artificial particle board is 30mg/100g, and the formaldehyde emission amount of the artificial particle board prepared in Example 1 is 1.5mg/100g;

Using the existing wood-based panel testing method, the mechanical properties of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in Example 1 were respectively tested. The results are shown in Table 1.

Table 1

<img class="EMIRef" id="364086449-idf0001" />

As can be seen from the results of the above table, the strengths of the artificial particle board obtained in Example 1 were all strengthened.

Example 2 Preparation of Artificial Particle Board

Specific steps are as follows:

1 80 g of urea-formaldehyde resin (solid content: 100% by weight) and 30 g (solid content: 92% by weight) of biocomposite reinforcing material KT-103 (200 mesh, water content: 8 wt%) are thoroughly mixed (by solids, the weight ratio of the two is 8: 2.76 ), that is, a bio-based urea-formaldehyde composite material is obtained;

2 In the bio-based urea-formaldehyde composite material prepared in the step 1, 70 g of water is added and stirred uniformly, so that the solid content of the bio-based urea-formaldehyde composite material is 59.8 wt%, and then 10 g of a curing agent PMDI (solid content: 100 wt%) is added. The amount of the curing agent is 9.3 wt% of the total solids of the bio-based urea-formaldehyde composite material, and the mixture is uniformly stirred and used;

3 Using the material prepared in the step 2 to prepare the artificial particle board according to the process of manufacturing the particle board by the existing urea-formaldehyde glue.

The formaldehyde content of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in the second embodiment was respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results show that the formaldehyde emission of the common urea-form artificial particle board is 30 mg/100 g, and the formaldehyde emission of the artificial particle board prepared in Example 2 is 2.0 mg/100 g;

Using the existing wood-based panel testing method, the mechanical properties of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in Example 2 were respectively tested. The results are shown in Table 2.

Table 2

<img class="EMIRef" id="364086449-idf0002" />

As can be seen from the results of the above table, the strength of the artificial particle board obtained in Example 2 was enhanced.

Example 3 Preparation of Artificial Particle Board

Specific steps are as follows:

1 50 g of urea-formaldehyde resin (solid content 100 wt%) and 30 g (solid content 94 wt%) biocomposite reinforcing material KT-102 (200 mesh, water content 6 wt%) and 20 g (solid content 95 wt%) biocomposite reinforcing material KT-103 (200 mesh, water content: 5 wt%) is thoroughly mixed (by solids, the weight ratio of the two is 5:4.72, that is, the bio-based urea-formaldehyde composite material is obtained;

2 In the bio-based urea-formaldehyde composite material prepared in the step 1, 100 g of water is added and stirred uniformly, so that the solid content of the bio-based urea-formaldehyde composite material is 48.6 wt%, and then 15 g of a curing agent PMDI (solid content: 100 wt%) is added. The curing agent is used in an amount of 15.4% by weight of the total solids of the bio-based urea-formaldehyde composite material, and is uniformly stirred and used;

3 Using the material prepared in the step 2 to prepare the artificial particle board according to the process of manufacturing the particle board by the existing urea-formaldehyde glue.

The formaldehyde content of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in the third embodiment was respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results show that the formaldehyde emission of ordinary urea-formaldehyde artificial particle board is 30mg/100g, and the formaldehyde emission amount of the artificial particle board prepared in Example 3 is 1.0mg/100g;

Using the existing wood-based panel testing method, the mechanical properties of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in Example 3 were respectively tested. The results are shown in Table 3.

table 3

<img class="EMIRef" id="364086449-idf0003" />

As can be seen from the results of the above table, the strengths of the particle board of Example 3 were all enhanced.

Example 4 Preparation of wheat straw artificial board

Specific steps are as follows:

1 and 2 are identical to Embodiment 3;

3 The material obtained in the step 2 is prepared according to the process of manufacturing the straw artificial board by the existing urea-formaldehyde glue, and the wheat straw artificial board is obtained.

The formaldehyde content of the conventional urea-formaldehyde straw artificial board without bio-composite reinforcing material and the wheat straw artificial-made board prepared in Example 4 were respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results showed that the formaldehyde emission of the common urea-formaldehyde straw artificial board was 40 mg/100 g, and the formaldehyde release amount of the wheat straw artificial board prepared in Example 4 was 1.2 mg/100 g;

The mechanical properties of the conventional urea-formaldehyde straw artificial board without the bio-composite reinforcing material and the wheat straw artificial board prepared in Example 4 were respectively tested by the existing artificial board detecting method, and the results are shown in Table 4.

Table 4

<img class="EMIRef" id="364086449-idf0004" />

It can be seen from the above results that the strengths of the wheat straw artificial boards prepared in Example 4 were all strengthened.

Example 5 Preparation of Artificial Particle Board

Specific steps are as follows:

1 is identical to Embodiment 3;

2 In the bio-based urea-formaldehyde composite material prepared in step 1, 50 g of water is added and stirred uniformly, so that the solid content of the bio-based urea-formaldehyde composite material is 64.8 wt%, and then 15 g of a curing agent ammonium chloride (solid content: 100 wt%) is added. The curing agent is used in an amount of 15.4% by weight of the total solids of the bio-based urea-formaldehyde composite material, and is uniformly stirred and used;

3 Using the material prepared in the step 2, the artificial particle board is prepared according to the process of manufacturing the artificial particle board by the existing urea-formaldehyde glue.

The formaldehyde content of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in Example 5 was respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results show that the formaldehyde emission of ordinary urea-formaldehyde artificial particle board is 30mg/100g, and the formaldehyde emission amount of the artificial particle board prepared in Example 5 is 1.5mg/100g;

The mechanical properties of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in Example 5 were respectively tested by the existing artificial board detecting method, and the results are shown in Table 5.

table 5

<img class="EMIRef" id="364086449-idf0005" />

As can be seen from the results of the above table, the strengths of the artificial particle board obtained in Example 5 were all enhanced.

Example 6 Preparation of Artificial Particle Board

Specific steps are as follows:

1 is identical to Embodiment 3;

2 The same amount and operation are the same as in Example 3 except that epoxy resin is used as a curing agent instead of the curing agent PMDI of Example 3.

3 Using the material prepared in the step 2, the artificial particle board is prepared according to the process of manufacturing the artificial particle board by the existing urea-formaldehyde glue.

The formaldehyde content of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the particle board prepared in Example 6 was respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results show that the formaldehyde emission of ordinary urea-formaldehyde artificial particle board is 30mg/100g, and the formaldehyde emission amount of the particleboard prepared in Example 6 is 1.5mg/100g;

The mechanical properties of the conventional urea-formaldehyde artificial particle board without the bio-composite reinforcing material and the artificial particle board prepared in Example 6 were respectively tested by the existing artificial board detecting method, and the results are shown in Table 6.

Table 6

<img class="EMIRef" id="364086449-idf0006" />

As can be seen from the results of the above table, the strengths of the artificial particle board obtained in Example 6 were all strengthened.

Example 7 Preparation of Oriented Particle Board

Specific steps are as follows:

1 500 kg of urea-formaldehyde resin (solid content 100 wt%) and 300 kg (solid content 94 wt%) biocomposite reinforcing material KT-102 (200 mesh, water content 6 wt%) and 200 kg (solid content 95 wt%) biocomposite reinforcing material KT-103 (200 mesh, water content: 5 wt%) is thoroughly mixed (by solids, the weight ratio of the two is 5:4.72, that is, the bio-based urea-formaldehyde composite material is obtained;

2 In the bio-based urea-formaldehyde composite material prepared in step 1, 1000 kg of water is added and stirred uniformly, so that the solid content of the bio-based urea-formaldehyde composite material is 48.6 wt%, and then 150 kg of curing agent PMDI (solid content: 100 wt%) is added, and the curing agent is added. The dosage is 15.4% by weight of the total solids of the bio-based urea-formaldehyde composite material, and the mixture is evenly stirred and used;

3 Using the material prepared in step 2, the oriented particle board is prepared according to the process of manufacturing the oriented particle board by the existing urea-formaldehyde glue.

The formaldehyde content of the conventional urea-formaldehyde artificial oriented particle board without bio-composite reinforcing material and the artificial oriented particle board prepared in Example 3 were respectively detected by the method for detecting the formaldehyde content of the artificial board. The test results show that the formaldehyde emission of ordinary urea-formaldehyde artificial oriented strand board is 30mg/100g, and the formaldehyde emission amount of the oriented strand board prepared in Example 7 is 0.5mg/100g;

The mechanical properties of the conventional urea-formed artificial oriented strand board without the bio-composite reinforcing material and the artificial oriented strand board prepared in Example 7 were respectively tested by the existing artificial board detecting method, and the results are shown in Table 7.

Table 7

<img class="EMIRef" id="364086449-idf0007" />

As can be seen from the results of the above table, the strengths of the artificial oriented strand board prepared in Example 7 were all strengthened.

According to the above embodiments, the bio-based urea-formaldehyde composite material for wood-based panels provided by the invention can greatly reduce the release amount of formaldehyde in the artificial board and enhance the bonding performance of the urea-formaldehyde glue to the wood material or the crop straw, not only meets the environmental protection requirements but also expands the raw materials. Source, with obvious effects