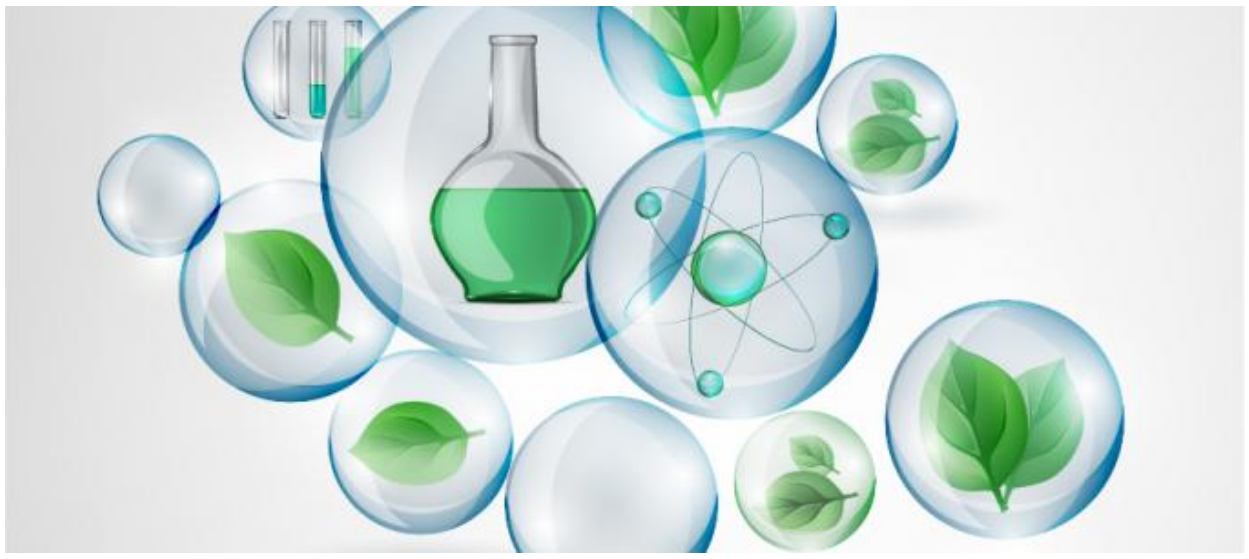
Bioeconomía y Desarrollo Productivo
Innovación y Tecnología

Ficha del catálogo dinámico de tecnologías para la bioeconomía

Method to produce biofuel from plant-derived biomass.



Brief description

The biomass used in the present method is not particularly limited but is preferably plant-derived biomass. Plant-derived biomass refers to plant-derived organic resources, including wood, dried vegetation, agricultural or forestry waste. Examples thereof include cut vegetables, fruits, shavings, straw, rice straw, and paddy husks. Among these plant-derived biomasses, it is preferable to use woody biomass from the viewpoint of abundant resources.

The biomass fuel obtained by the method of this embodiment can be used as a fuel in various situations. The biomass fuel obtained by the production method of the present embodiment is extremely useful in industry because it has extremely high strength and excellent moldability as compared with the conventional biomass solid fuel.

Process detail

The biomass raw material may be crushed in advance. Pulverization can be performed using, for example, a blender, a mortar, a cutter mill, a ball mill, or the like. It is preferable to pulverize the product to a degree such that the major axis is about 1 mm or less.The biomass raw material may be subjected to the semi-carbonization treatment as it is, but, if necessary, it may be used after being crushed to an appropriate size by a crushing means. Semi-carbonization may be carried out in an inert atmosphere in a temperature range of 200 to 300 ° C. for about 10 to 60 minutes. The inert atmosphere here refers to a gas that does not react with the biomass raw material, such as nitrogen or carbon dioxide. Moreover, superheated steam may be used in order to raise the temperature rapidly to the carbonization temperature.

Next, at least one of the formic acid aqueous solution and the acetic acid aqueous solution is added to the semi-carbohydrate. The addition amount (addition rate) of at least one of formic acid and acetic acid is preferably about 1 to 26 wt%/db (dry base) with respect to the semi-carbide. If the amount added is less than 1 wt%/db, the strength improvement rate of the molded product is small, and the required strength (for example, strength that can withstand transportation) may not be obtained. On the other hand, if it exceeds 26 wt% / db, Since the liquid content of the semi-carbide increases too much, the strength tends to decrease, which is not preferable. The lower limit of the more preferable addition amount is 4 wt% / db, and the more preferable upper limit is 22 wt% / db.

When an aqueous solution of formic acid is used, the concentration of formic acid may be about 30 to 70% by weight, and when an aqueous solution of acetic acid is used, the concentration of acetic acid may be about 30 to 70% by weight. Either one of the formic acid aqueous solution and the acetic acid aqueous solution may be used alone, or both may be used in combination. After adding at least one of the formic acid aqueous solution and the acetic acid aqueous solution, stirring is preferably performed in order to mix with the biomass semi-carbide. The semi-carbide obtained in the semi-carbonization step is preferably added after cooling to about 100 ° C. or lower before adding at least one of the formic acid aqueous solution and the acetic acid aqueous solution. After adding the formic acid aqueous solution and / or the acetic acid aqueous solution, hot pressure molding is performed.

The hot pressure molding is preferably performed in a temperature range of more than 100 ° C. and 200 ° C. or lower. The lower limit of the more preferable temperature range is 120 ° C., and the upper limit of the more preferable temperature range is 180 ° C. The temperature of the hot pressure molding described above means the temperature of the mold used for molding. The temperature of the mold can be obtained by directly attaching the thermocouple to the mold and measuring, or the set temperature (target temperature) of the constant temperature bath containing the mold is set and the mold temperature is set in relation to the heating time. The shape and size of the molded product may be appropriately adjusted to a desired size. For example, biomass fuel can be granulated or molded by extrusion molding using a ring die or flat die type pelletizer, or briquette molding using a roll molding machine.

Details

Country:
Japan

Actors:
Private company

Process type:
Semi-carbonization

Chain:
Mixed

Raw material:
Mixed

Final product:
Solid biofuels

Experience period:
2021

Scale:
Industrial

Contact data
Kobe Steel Ltd

Reference link
https://worldwide.espacenet.com/patent/search/family/077291509/publication/WO20…