



(86) Date de dépôt PCT/PCT Filing Date: 2010/01/08
(87) Date publication PCT/PCT Publication Date: 2011/04/22
(45) Date de délivrance/Issue Date: 2012/09/11
(85) Entrée phase nationale/National Entry: 2010/03/24
(86) N° demande PCT/PCT Application No.: CN 2010/000030
(30) Priorité/Priority: 2009/10/22 (CN CN200910154406.4)

(51) Cl.Int./Int.Cl. *C08L 67/06* (2006.01),
B29C 45/00 (2006.01), *C08J 3/20* (2006.01),
C08K 3/26 (2006.01), *C08K 7/02* (2006.01)
(72) Inventeur/Inventor:
CHI, LIQUN, CN
(73) Propriétaire/Owner:
SHANGHAI HUDA INVESTMENT & DEVELOPMENT
CO., LTD., CN
(74) Agent: NEXUS LAW GROUP LLP

(54) Titre : ARTICLE SANITAIRE FAIT D'UN MATERIAU COMPOSITE A BASE DE RESINE ET METHODE DE
PREPARATION CONNEXE
(54) Title: A RESIN-BASED COMPOSITE SANITARY WARE AND PREPARATION METHOD

(57) **Abrégé/Abstract:**

The invention discloses a resin-based composite sanitary ware, which is characterized in that: the sanitary ware is made by mixing up and injecting the raw materials and then solidifying the mould; and the ingredients of the raw materials and their weight ratios are as follows: unsaturated polyester resin 14%~30%; polyester anti-shrinking medium 6%~14%; reinforcing fiber 11%~37%; scale stone 10%~20%; calcium carbonate 25%~40%; initiator 0.8%~2.4%. And this invention also discloses the preparation method of the sanitary ware. Compared with the current technology, the invention has the advantages of strong strength, high tenacity, perfect self-cleaning capacity and low energy consumption.

Abstract

The invention discloses a resin-based composite sanitary ware, which is characterized in that: the sanitary ware is made by mixing up and injecting the raw materials and then solidifying the mould; and the ingredients of the raw materials and their weight ratios are as follows: unsaturated polyester resin 14%~30%; polyester anti-shrinking medium 6%~14%; reinforcing fiber 11%~37%; scale stone 10%~20%; calcium carbonate 25%~40%; initiator 0.8%~2.4%. And this invention also discloses the preparation method of the sanitary ware. Compared with the current technology, the invention has the advantages of strong strength, high tenacity, perfect self-cleaning capacity and low energy consumption.

A RESIN-BASED COMPOSITE SANITARY WARE AND PREPARATION METHOD

FIELD OF THE INVENTION

This invention relates to a sanitary ware, in particular to a composite sanitary ware with resin and scale stone as main raw materials, and to a method of preparing the sanitary ware.

BACKGROUND OF THE INVENTION

Common sanitary wares include bathtub, basin, toilet, urinal and bidet which are made of ceramics. However, ceramics are made by burning in a kiln which is not good for the environment and requires a lot of rare earth mineral resource which is rather scarce. Therefore, the mineral resource will definitely be under stress if the situation continues this way.

Recently, some people have made sanitary wares with man-made agate or acrylic, as taught in China Invention and Patent 'Acrylic Toilet Made by Pouring Process' with patent No. ZL200410040962.6 (No. of Approval: CN126923C). This patent relates to toilets produced with components made by pouring a mixture of resin and agate powder into the empty shell of the interlayer. Although the product made this way has the general characteristics of ceramics products, the process is complicated with rather high cost, restricted thickness and low self-cleaning capacity. On the above basis, another toilet with composite structure of acrylic and glass fiber reinforced plastic is made known to the public; see China Utility Model Patent 'Toilet with Composite Structure of Acrylic and Glass Fiber Reinforced Plastic' with patent No. ZL200620034821.8 (No. of Approval: CN2926350Y).

China Invention and Patent Application Publication 'Artificial Marble Products and the Preparation Method' with Application No. 96106392.0 (Publication No.:

CN1167741A) relates to products made by a pouring process with marble dust, unsaturated polyester resin, aluminum hydroxide and scale stone as main raw materials, where both the product performance and the preparation process have been improved.

SUMMARY OF THE INVENTION

The invention is to provide a resin-based composite sanitary ware with high tenacity, strong strength and low cost in view of the above-mentioned technical condition.

The invention is also to provide a low cost, energy-saving and environment-protecting preparation method for a resin-based composite sanitary ware.

The invention uses the following technical resolution to work out the above technical problems: a resin-based composite sanitary ware and its characteristic is that it is made by mixing up and injecting the raw materials into, and solidifying them in, a mould. The ingredients of the raw materials and their weight ratios are as follows:

Unsaturated polyester resin	14%~30%;
Polyester anti-shrinking medium	6%~14%;
Reinforcing fiber	11%~37%;
Scale stone	10%~20%;
Calcium carbonate	25%~40%;
Initiator	0.8%~2.4%.

For subsequent homogenized mixture, the unsaturated polyester resin is made by diluting unsaturated resin with styrene, and the weight ratio between the styrene and the unsaturated resin shall be as follows:

Styrene	60%~65%;
Unsaturated resin	35%~40%.

The unsaturated resin can be either o-type unsaturated polyester resin or m-phthalic

acid type unsaturated polyester resin.

For subsequent even mixture, the polyester anti-shrinking medium is made by diluting anti-shrinking polyester with styrene, and the weight ratio between the styrene and the polyester shall be as follows:

Styrene	33%~37%;
Polyester	63%~67%.

The reinforcing fiber can be either nylon fiber or polyphosphazenes macro fiber.

The raw materials also contain color paste with weight ratio of 1%~4% for preparing sanitary wares of different colors.

The raw materials also contain aluminum hydroxide with weight ratio of 6%~10% for improving the quality and flame-resistant capacity of the product.

Preferably, the initiator contains tert-butyl peroxybenzoate and benzoyl peroxide and the weight ratio between the tert-butyl peroxybenzoate and the benzoyl peroxide is 1:2.

A method for preparing a resin-based composite sanitary ware, which includes the following steps:

- (1) taking the raw materials and mixing them evenly into agglomerate composites;
- (2) pouring the composites into the injection device of the thermosetting plastic injection machine;
- (3) injecting the composites into the mould which will be heated to a temperature of between 130°C and 150°C, and maintain the pressure for the solidification;
- (4) opening the mould and taking out the finished product.

Preferably, in step (3) vacuum extraction will be carried out to the mould with a vacuum degree of between minus 0.06Pa and minus 0.09Pa. Preferably, the composites are injected into the mould by applying a high-pressure injection with injection pressure of 100 kg per square centimeter and the pressure for solidification is maintained for over 2 to 3 minutes after the injection.

In another aspect, the present invention provides a resin-based composite sanitary ware, wherein said sanitary ware is made by mixing up and injecting raw materials into, and solidifying them in, moulds. The ingredients of said raw materials and their weight ratios are as follows: Unsaturated polyester resin 14%~30%; Polyester anti-shrinking medium 6%~14%; Reinforcing fiber 11%~37%; Scale stone or Wollastonite 10%~20%; Calcium carbonate 25%~40%; Initiator 0.8%~2.4%; and the unsaturated polyester resin comprises by weight, Styrene 60%~65%; Unsaturated resin 35%~40%. The polyester anti-shrinking medium is comprised of polyester and styrene.

In yet another aspect, the present invention provides a method for preparing the resin-based composite sanitary ware, the method including the following steps: (1) taking the raw materials and mixing them evenly into agglomerate composites;(2) pouring the composites into an injection device of a thermosetting plastic injection machine;(3) injecting the composites into a mould which will be heated to a temperature of between 130 °C and 150 °C , and maintaining pressure for solidification, said solidification comprising vacuum extracting the mould with a vacuum degree of between minus 0.06 Pa and minus 0.09 Pa; applying high-pressure injection with injection pressure of 100 kg per square centimeter, and maintaining the pressure for solidification for over 2 to 3 minutes after injection; and (4) opening the mould and taking out a finished product.

Compared with the current technology, the advantages of the invention are numerous. The main raw materials are low-cost scale stone and calcium carbonate which are easy to get. It is made by solidifying the raw materials injected into the mould under high pressure; therefore, the cost is low and without burning with high heat energy can be saved and the labor intensity can also be reduced. Efficiency is improved by

introducing the thermosetting plastic injection machine, as products can be easily manufactured in mass production with low defective rates; moreover, the surface of the product is clean and as smooth as a mirror with a high self-cleaning capacity. The whole product is rather light with advantages of high tenacity and strong strength and can be maintained at normal temperature without having a cold feeling.

DETAILED DESCRIPTION OF THE INVENTION

Further detailed description will be made to the invention with the following example.

The method for preparing Kunlun rock crystal mainly includes the following steps:

- (1). Mix the modified unsaturated polyester resin of high performance into the Kunlun rock crystal powder (with scale stone as primary ingredient), particles of various sizes, polyester fiber, nylon fiber, pigment and initiator, and knead them into agglomerate composites with kneading machine;
- (2). Pour the agglomerate composites into the charging basket of the specially-made injection device;
- (3). Input the material quantity of a single sanitary product into the computer control program of the thermosetting plastic injection machine, and the quantitative injection machine will inject the materials into the metal mould of the sanitary product with piston barrel and high pressure;
- (4). The metal injection mould of the sanitary product will be heated by importing oil and the temperature will be maintained between 130°C and 150°C. Extract vacuum from the metal mould with vacuum degree of between minus 0.06 and minus 0.09 Pa so that there will be no air hole in the sanitary product;
- (5). After the composites have been injected into the metal mould, they will be heated to high temperature for solidification and the pressure will be maintained for 2 minutes, which will prevent the product from shrinking or deforming;
- (6). After the solidification, the metal mould will be opened with a machine, and the product will be pushed out by the push out system and taken out from the mould with a mechanical hand and placed on the product testing and packaging production line.

Embodiments of different ingredients are as follows:

Embodiment 1: unsaturated polyester resin 18%, polyester anti-shrinking medium 10%, nylon fiber (with length of 3-5mm) 20% (reinforcing fiber); polyester fiber (with length of 5-10mm) 10% (also reinforcing fiber), scale stone particulates of category 1200 13%, calcium carbonate powder of category 1000 27%, color paste 3% and initiator 1%. The initiator contains tert-butyl peroxybenzoate (TBPB) and benzoyl peroxide (BPO) and the weight ratio between the tert-butyl peroxybenzoate and the benzoyl peroxide is 1:2. Products made in this embodiment will be thin and light with smooth lines and arcs, and its tensile strength can reach 70 Mpa and both the compressive strength and bending strength can be over 100 Mpa.

Swancor 928 produced by Swancor Ind. Co., Ltd. is adopted to be the unsaturated polyester resin in the embodiment with fixed purity of the unsaturated resin of between 35% to 40% and the rest is styrene; and Swancor 7310 produced by Swancor Ind. Co., Ltd. is adopted to be the polyester anti-shrinking medium with fixed purity of the polyester of between 63% to 67% and the rest is styrene.

Embodiment 2: unsaturated polyester resin (Swancor 928) 16%, polyester anti-shrinking medium (Swancor 7310) 12%, polyphosphazenes macro fiber (with length of 3-6mm) 5%, polyester fiber (with length of 5-10mm) 10%, scale stone particulates of category 1200 15%, calcium carbonate powder of category 1000 32%, aluminum hydroxide powder 8%, color paste 3% and initiator 1%. Sanitary products made in this embodiment have excellent flame-resistant capacity reaching UL94V-0 grade and characteristics of high temperature resistance and corrosion resistance and can be maintained at normal temperature without cold feeling. The polyphosphazenes macro fiber used in the embodiment is reinforcing fiber which will improve the strength and the tenacity of the products.

Embodiment 3: polyphosphazenes modified unsaturated polyester resin (diphenyl oxide polyphosphazenes) 16%, polyester anti-shrinking medium (Swancor 7310) 12%,

nylon fiber (with length of 3-5mm) 6%, polyester fiber (with length of 5-10mm) 12%, scale stone particulates of category 1200 20%, calcium carbonate powder of category 1000 32%, color paste 3% and initiator 1%. The water contact angle of the sanitary products made in this embodiment reaches 95 degree, which has significantly improved the waterproof capacity; and the surface is clean with self-cleaning capacity, rather high hardness and quite perfect impact resistance and abrasion resistance capacity.

The percents referred to in the above embodiments are all mass percents, and the sanitary products can be washbasin, bathtub, toilet, bidet, urinal and shower tub, etc.

Claims

1. A resin-based composite sanitary ware made by mixing up and injecting raw materials into moulds, the raw materials solidifying in said moulds, wherein the ingredients of said raw materials and their weight ratios are as follows,

Unsaturated polyester resin	14%~30%;
Polyester anti-shrinking medium	6%~14%;
Reinforcing fiber	11%~37%;
Wollastonite	10%~20%;
Calcium carbonate	25%~40%;
Initiator	0.8%~2.4%;

and wherein the unsaturated polyester resin comprises by weight,

Styrene	60%~65%;
Unsaturated resin	35%~40%;

and wherein the polyester anti-shrinking medium comprises polyester and styrene.

2. The resin-based composite sanitary ware of Claim 1, wherein the unsaturated resin is o-type unsaturated polyester resin or m-phthalic acid type unsaturated polyester resin.
3. The resin-based composite sanitary ware of Claim 1, wherein the polyester anti-shrinking medium is made by diluting anti-shrinking polyester with styrene, and wherein the weight ratio between the styrene and the polyester are as follows,

Styrene	33%~37%;
Polyester	63%~67%.
4. The resin-based composite sanitary ware of Claim 1, wherein the reinforcing fiber is nylon fiber or polyphosphazenes macro fiber.
5. The resin-based composite sanitary ware of Claim 1, wherein the raw materials also contain color paste with a weight ratio of 1%~4%.
6. The resin-based composite sanitary ware of Claim 1, wherein the raw materials also contain aluminum hydroxide with a weight ratio of 6%~10%.

7. The resin-based composite sanitary ware of Claim 1, wherein the initiator contains tert-butyl peroxybenzoate and benzoyl peroxide and the weight ratio between the tert-butyl peroxybenzoate and the benzoyl peroxide is 1:2.

8. A method for preparing the resin-based composite sanitary ware according to any one of Claims 1~5, which is characterised in that the method includes the following steps,
 - (1) taking the raw materials and mixing them evenly into agglomerate composites,
 - (2) pouring the composites into an injection device of a thermosetting plastic injection machine;
 - (3) injecting the composites into a mould which will be heated to a temperature of between 130°C and 150°C, and maintaining pressure for solidification;

wherein said solidification comprises vacuum extracting the mould with a vacuum degree of between minus 0.06 Pa and minus 0.09 Pa; applying high-pressure injection with injection pressure of 100 kg per square centimeter, and maintaining the pressure for solidification for over 2 to 3 minutes after injection; and

 - (4) opening the mould and taking out a finished product.

9. A method for preparing the resin-based composite sanitary ware according to any one of claims 1-5 comprising:
 - a) taking the raw material and mixing them evenly to form an agglomerate composite;
 - b) pouring said agglomerate composite into an injection device of a thermosetting plastic injection machine;
 - c) injecting said agglomerate composite into a mould, said mould heated to a temperature of between 130°C and 150°C, and said agglomerate composite solidifying in said mould; and
 - d) opening said mould and taking out a finished product.

10. The method of claim 9, wherein said injection device providing a high-pressure injection at an injection pressure of 100 kg per square centimeter, said injection pressure being maintained for 2 to 3 minutes after injecting said agglomerate composite into said mould to allow solidifying of said agglomerate composite in said mould.