

## UNITED STATES PATENT OFFICE

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## BINDER COMPOSITION FOR SAND CORES

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1

This invention relates to a composition containing urea formaldehyde resin, and particularly to such composition for foundry and similar practice.

Compositions containing urea formaldehyde resins have been heretofore used as binders in common practice. When used in substantial proportions in binders and incorporated in foundry sand cores or similar compositions, they give off odors sometimes resembling burning flesh due to decomposition products which occur when the hot metal decomposes the urea formaldehyde resin. The odors of these decomposition products have been sufficient to interfere seriously with casting operations and I am familiar with several instances where foundries have refused to use these resins because of such odors.

The principal object of my invention accordingly is to provide a simple composition to do away with the above-mentioned difficulty in the employment of binders containing substantial proportions of urea formaldehyde resin.

The invention accordingly consists of the novel compositions and component mixtures comprised in such compositions, specific embodiments of which are described hereinafter by way of example only and in accordance with what I now consider the preferred manner of practicing the invention.

I have found in accordance with my invention that the use of small quantities of paradichlorobenzene will substantially eliminate the objectionable odors mentioned. I preferably mix this material dry with the other dry ingredients of the binder and the composition is sold as so prepared. On mixing the binder with sand and water in the usual manner and forming a core or other shape for casting, I have found that upon pouring a hot metal on such mixture, the odors are substantially eliminated. The usual temperatures in casting are: for magnesium about 1400° F.; for aluminum about 1800° F.; for brass about 2300° F., and for iron or steel about 2600 to 3000° F. The composition may be used as a binder in casting all of the metals mentioned, as well as various other metals having pouring temperatures above or below the range mentioned.

An action appears to occur between the paradichlorobenzene and the ingredients of the binder, and particularly the urea formaldehyde. I am unable to state exactly what this action is. It appears to be a chemical reaction since the odor instead of being masked, appears to be completely changed. Instead of the odor of

2

burnt flesh, a faint odor of ammonia occurs. This odor is so slight that it is unobjectionable in practice. I have found that my binder composition including the paradichlorobenzene is generally acceptable in foundries. Those foundries which formerly rejected the composition because of the odors mentioned are procuring the composition of my invention in large quantities now that the decomposition odor has been eliminated.

The following is a specific example of the composition as I now prefer to prepare it. This example is illustrative and the invention is not to be considered as limited thereto except as indicated in the appended claims.

*Example*

Fifty-five parts by weight of urea formaldehyde resin, designated as BRU-16570 of the Bakelite Company, being a partly polymerized resin in the A to B stage, occurring as a white powder, are mixed with:

| Parts by weight                              |    |
|----------------------------------------------|----|
| A mineral-organic binder (referred to below) | 40 |
| Urea crystals                                | 4  |
| Paradichlorobenzene                          | 1  |

This dry powder mixture constitutes the core composition and is combined in the proportion of about 1% thereof to 99% of dry sand, which is then moistened with water and molded into the desired shape. Thereafter, the shape is baked at about 350° F. for about two hours to polymerize the binder.

The approximate composition of the mineral-organic binder mentioned above is as follows:

| Percent                                    |    |
|--------------------------------------------|----|
| Fly ash or equivalent inert material       | 45 |
| Dextrine or equivalent cereal              | 35 |
| Bentonite or equivalent                    | 10 |
| Wood flour or equivalent cellulosic filler | 10 |

This material is pulverized to pass a 100-mesh screen.

The proportion of resin binder and other ingredients may be varied according to the purpose for which the sand core or other shape is to be used. Such range of proportions is as follows:

| Percent by weight                                                   |           |
|---------------------------------------------------------------------|-----------|
| Urea formaldehyde resin, preferably in partly polymerized condition | 30.0-70.0 |
| Mineral-organic binder                                              | 67.5-23.7 |
| Urea                                                                | 1.9-4.9   |
| Paradichlorobenzene                                                 | 0.6-1.4   |

The proportion of sand and water used in making cores and other shapes may be varied as

3

follows. The percentage of binder is given on the foundry sand used and also the water added for green strength is given in percentage on the amount of sand used.

| Metal to be poured | Percent Binder | Percent Water | Pouring Temperature |
|--------------------|----------------|---------------|---------------------|
|                    |                |               | °F.                 |
| Magnesium.....     | 0.75-1.0       | 3-5           | Approx. 1,400       |
| Aluminum.....      | 1.0-1.2        | 3-5           | Approx. 1,800       |
| Brass.....         | 1.75-2.5       | 3-5           | Approx. 2,300       |
| Iron or Steel..... | 2.0-2.5        | 3-5           | 2,600-3,000         |

In some foundries some cereal binders are added for additional green strength.

In general, in making these various mixtures, the resin binder is mixed in the dry state with the sand until homogeneous mixture is obtained; the water is then added and the mixing is continued until this has also been thoroughly distributed throughout the sand. When this has been accomplished, the core sand is molded and baked in regulated ovens at temperatures between 350° F.-400° F. but not over 400° F.

What I claim is:

1. A binder composition for forming sand cores in which the sand predominates, said binder consisting of a binder and paradichlorbenzene, said binder containing about 30 to 70% urea formaldehyde resin and said paradichlorbenzene being present in about .6 to 1.4%.

2. A binder composition for forming sand cores in which the sand predominates, said binder consisting of about 30 to 70% of urea-formaldehyde

4

binder, about 67.5 to 23.7% of a combined cereal and mineral binder, and about 1.9 to 4.9% of urea, mixed with up to about .6 to 1.4% of paradichlorbenzene.

3. A core composition consisting predominantly of sand and containing a binder consisting of a binder and paradichlorbenzene, said binder containing about 30 to 70% urea formaldehyde resin and said paradichlorbenzene being present in about .6 to 1.4%.

4. A sand core composition having a binder and a predominant content of sand, the binder constituting about .75 to about 2.5% of the solid material of the core, said binder consisting of about 30 to 70% of partially polymerized urea-formaldehyde resin, 67.5 to 23.7% of cereal and mineral binder, about 1.9 to 4.9% of urea, mixed with about .6 to 1.4% of paradichlorbenzene.

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