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ACETYLENE CONTAINER FILLER AND METHOD

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This invention relates to an improved filler composition of the type adapted for holding dissolved acetylene in containers at elevated pressures and further relates to its method of preparation and use. More particularly, it relates to improvements in said composition and methods which provide increased crushing strength along with shorter preparation times.

The need for the present and related preceding developments is created by properties peculiar to acetylene gas. It is well known that acetylene gas, even in very small amounts, may become violently unstable at pressures in excess of 15 p.s.i., and almost with certainty above 50 p.s.i. This condition is substantially overcome by dissolving the acetylene in acetone. The acetone dissolves as much as six times its own weight of acetylene. Pressures up to 300 p.s.i. or more of dissolved gas may be obtained in this manner if the acetone container is filled with a highly porous material of which the individual pores are minute.

In order to be useable for the above purpose, the highly porous material must be such that it will not settle, shrink or disintegrate so as to leave voids within which acetylene gas under pressure may collect and become unstable. Thus, in addition to the essential characteristic of high porosity, it is most important that the porous material have high compressive (resistance to crushing) strength and dimensional stability.

A number of materials have been developed for use as a filler for the above purpose. The high water mark of these developments is represented by several recent United States patents which teach the use of filler compositions of charcoal and fibrous asbestos dispersed and set in a silica-lime product. In particular, it has been taught that certain ratios of the ingredients are critical, and when preferred limits are observed outstanding products adapted for the above purpose are obtained. In addition, these patents teach certain methods for compounding the product and for using the product in filling suitable containers for holding the acetylene gas and carrier fluid.

The present invention improves upon these recent teachings by way of providing a product having significantly improved crushing strength. In accordance with the present invention, it has been discovered that if the filler composition is made approximately according to the following formula, this advantageous and essential property is obtained:

	Ratio by weight
Water to solids	3.45
Silica to lime	1.75
Asbestos, percent of solids by weight	18.40
Charcoal	18.40

In addition, it has been discovered that these advantageous properties are obtained and time saved in doing so by making a number of modifications in the process for preparing the composition, and in filling the containers with the composition. These changes will be discussed in conjunction with the following detailed description of the practice of the present invention.

As in prior procedures, the acetylene container filler is prepared by initially pre-treating charcoal and lime.

Pulverized lime (any high calcium, commercially available pulverized lime) is hydrated with water to obtain a slurry comprising about 20% by weight of the calcium oxide.

Charcoal, preferably screened to pass through a ½" mesh, is pre-soaked. The pre-soaking procedure utilized herein represents a significant departure from prior practices. Whereas it has previously been the practice to soak the charcoal in water for at least 12 hours, the present method comprises soaking the charcoal in water for not more than about two hours. During the shortened pre-soaking period, the charcoal-water mixture is subjected to a vacuum for at least part of the pre-soaking period. Preferably, the vacuum is applied to the soaking charcoal for about 10 minutes under a pressure of about 28–30" of mercury.

The order and method of combination of the charcoal, lime, asbestos, and water, and the conditions for the combination in accordance with the present invention also represent significant departures from prior procedures. Previously, it has been the practice to add the asbestos first to water and mix the materials until all visible air bubbles were gone. Then pre-soaked charcoal was added with agitation. Following this, silica was mixed into the formula for about 15 to 30 minutes. Finally, the hydrated lime was added and mixed for about 15 minutes following which the formula was ready for charge into suitable cylinders.

In the present improved method, the pre-soaked charcoal (prepared as described above by the new technique) is first added to water, and silica added thereto with agitation. A vacuum is then applied to the charcoal-silica mixture while the lime slurry is added, also with agitation. Following the lime-slurry addition, the vacuum is removed and the asbestos is added. Agitation and mixing is continued for about a half hour or until the entire mass is homogeneous. The improved formula is now ready for charge into suitable cylinders.

In preparing the present formula, the materials are used in the relative quantities as given in the table above. For example, sufficient water is added at the various stages so that the final water-to-solid ratio is about 3.45. In particular, the percent of asbestos is controlled to be about 18.40. This figure represents a significant departure from prior formulas and in part is responsible for the improvements in the end product.

The present filling procedure represents a substantial improvement in product and time saving over prior techniques. Whereas the present procedure is accomplished virtually in one operation and over a relatively short period of time, prior techniques have required complete initial filling of the cylinders, vibration, long settling periods of many hours, subsequent vibration and refilling, and repetition of the entire cycle.

In the present improved method, the completed filler slurry is introduced into suitable empty comercial acetylene containers. In the preferred procedure, the slurry is placed in a hopper from which it is introduced into the cylinders. Preferably, one of the top fuse plugs of each of the cylinders is removed and a vacuum line attached so that filling is carried out while placing a vacuum on the interior of the cylinder. Sufficient slurry is then introduced into each cylinder to completely fill it. The cylinders are vibrated during filling, and while being vibrated additional slurry is added to thereby complete the filling operation in a single rapid step. The cylinders are then indurated in the manner previously employed.

Induration is suitably accomplished by applying heat to the containers while preventing loss of water from the slurry. Preferably the induration is performed promptly after filling of the cylinders. Since water expands during the heating process and should not be allowed to

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escape, suitable hydraulic expansion heads for the containers are provided.

Heating of the containers may be carried out in an oven maintained at a temperature range of from about 350°–375° F. during the heating period. Treatment generally continues over a period of about 15–16 hours after the oven reaches the 350° mark.

Following the induration period, the filler is dried and the water contents driven off. The containers are cooled and are then ready for filling with the acetylene acetone fluid.

To illustrate the advantages of the present product and method, the following test was made. A filler made in accordance with the present invention was analysed and found to have a crushing strength of 337 p.s.i. At the same time, it had a porosity of 90.6% and a density of 0.247 grams per cc.

For comparison, a filler made in accordance with the prior procedures noted herein was analysed. It was found to have a crushing strength of 210 p.s.i., a porosity of 90.7% and a density of 0.257 grams per cc.

It will therefore be seen that the present material exhibits a rather overwhelming advantage in crushing strength while still retaining the desirable high porosity and low density of the prior products.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention as limited only by the scope of the appended claims.

What is claimed is:

1. An improved method for compounding a dimensionally stable acetylene container filler comprising: pre-soaking charcoal in water and subjecting the charcoal-water mixture to vacuum conditions for at least part of the pre-soaking period, adding finely divided silica to said pre-soaked charcoal with agitation and in an aqueous medium, applying a vacuum to said charcoal-silica combination and adding a lime slurry thereto with agitation, removing the vacuum following said lime slurry addition, and adding asbestos with mixing until all of said ingredients form a homogeneous mass, the ingredients in said mass being approximately in accordance with the following formula:

	Ratio by weight
Water to solids	3.45
Silica to lime	1.75
Asbestos, percent of solids by weight	18.40
Charcoal	18.40

2. The method in accordance with claim 1 wherein said charcoal is presoaked for about two hours, during which time the mixture is subjected to a vacuum of about 28″–30″ of mercury for about 10 minutes.

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