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METHOD OF COOLING TOOLS

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This invention relates to methods of cooling tools and more particularly to a method of cooling a tool used in cutting artificial water soluble crystals of ammonium dihydrogen phosphate.

Artificial crystals grown from soluble materials, such as a solution of ammonium dihydrogen phosphate, are generally subsequently cut into sections by means of a suitable saw. In such cutting operations, it is desirable to cool the saw and crystal in order to perform the operation without deleteriously affecting the crystal or the sections cut therefrom, due to the heat generated in cutting. Since this type of crystal is grown from a very soluble material, it would be easily dissolved if water, for instance, was used as a cooling medium, particularly since the temperature of the saw and crystal rises during the cutting operation. Furthermore, it is desirable to provide a coolant which will not cause corrosion of the metal saw or other metal used in the cutting equipment.

An object of the present invention is the provision of an efficient and effective method of cooling tools used in cutting artificial crystals grown from soluble materials, whereby such cutting may be effected without any appreciable dissolving effect upon the crystal and without appreciable corrosion of metal parts of the cutting equipment.

In order to attain this object, in accordance with the features of the invention, the cutting tool, while in use, is contacted with a cooling fluid consisting of an aqueous solution of ammonium dihydrogen phosphate and diammonium hydrogen phosphate, which is saturated with ammonium dihydrogen phosphate at a temperature of approximately 5° F. below that at which the solution will be used in cutting crystals.

Other objects and features of the invention will be apparent from the following detailed description of a method embodying the invention.

One cooling solution which has proved very satisfactory for use in cutting, for example, artificial ammonium dihydrogen phosphate crystals, by means of a metal cutting saw, consists of the following ingredients mixed in the following manner.

A solution comprising approximately 3.2 pounds of secondary diammonium hydrogen phosphate per gallon of water and having a temperature from 72° to 120° F. is prepared and to which is added a sufficient amount of primary ammonium dihydrogen phosphate, for example, five or six pounds, until a solution is obtained which is saturated with ammonuim dihydrogen phosphate at a temperature approximately 5° F. below the temperature at which the coolant will be used. This

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reduction in temperature to 5° F. below the temperature at which the coolant is to be used is made in order to precipitate out a certain amount of the solute. Thus, when the temperature of the solution is raised 5° F. above ambient temperature, the solution will be fully saturated. This procedure obviates the necessity of making specific gravity tests in order to arrive at the desired degree of saturation.

In use, the coolant is drawn from the supply and deposited in a container in which the crystal is cut by a suitable saw onto which the coolant may be either sprayed or the saw, if it extends into the coolant bath, may carry the coolant with it. During the cutting of the crystal, the coolant is preferably maintained at a temperature of approximately 5° F. above room temperature by heating means installed in the coolant bath and this rise in temperature causes the coolant previously saturated with the primary ammonium dihydrogen phosphate to become slightly less than saturated therewith, thus preventing precipitation of salt from the coolant without appreciably increasing dissolving of the soluble crystal and the sections being cut therefrom during the cutting thereof and at the same time cooling the saw and crystal and the sections being cut therefrom. By having the solution slightly below the saturation point, the precipitation of salts from the evaporation of the coolant, as from the spray of the saw, is prevented. It has been found that with a fully saturated solution, there may be a binding formation in the saw slot.

In addition to the above advantages in the use of the described coolant, it appreciably reduces any tendency of corrosion of metal parts of the cutting equipment. This latter advantage results from the presence of the secondary diammonium hydrogen phosphate in the solution which, being slightly alkaline, acts to neutralize the slight acidity of the primary ammonium dihydrogen phosphate contained in the cooling solution.

What is claimed is:

1. A method of cooling a tool used in cutting artificial water-soluble crystals of ammonium dihydrogen phosphate, comprising contacting the tool with a cooling fluid consisting of an aqueous solution of diammonium hydrogen phosphate and ammonium dihydrogen phosphate in approximately the following proportions: water, one gallon; diammonium hydrogen phosphate, approximately 3.2 pounds; and ammonium dihydrogen phosphate, approximately five to six pounds, sufficient to provide a solution which is saturated with ammonium dihydrogen phosphate at a tem-

perature of approximately 5° F. below that at which the solution will be used.

2. A method of cooling a tool used in cutting artificial water-soluble crystals of ammonium dihydrogen phosphate, comprising contacting the tool with a cooling fluid consisting of an aqueous solution of ammonium dihydrogen phosphate and diammonium hydrogen phosphate which is saturated with ammonium dihydrogen phosphate at a temperature of approximately 5° F. below that at which the solution will be used in cutting crystals.

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