

Production of mixtures on a laboratory scale often an extreme challenge

Mixed were solid with solid substances, solid with liquid substances and liquids with solids. As solid phases mostly fine powders are used, which during the mixing process should not be further reduced. The liquid phases include mercury to saline solutions up to resins.

Comminution with the Mortar Grinder

Probably one of the most difficult tasks was the fine distribution of pure liquid mercury in a mixture of fine solid metal powders. Already, during the manual mixing with a spatula, with careless work methods, without a problem up to 3 mm large amalgam grains were produced. The solution was added to the Mortar Grinder PULVERISETTE 2, with an agate grinding set and special adjustments for the minimizing of the application of energy found.

Production of pastes

From the area of mixtures **liquid – solid** is the production of filled pastes to be mentioned. Especially challenging here is to add as much as possible solids in the high viscosity organic phase. An additional example for this is, when one has to add to organic binder (for example synthetic resin or varnish or in the simplest case oil) fine metallic, ceramic or inorganic powders. High viscosity pastes evolve which can be compared which shoe polish in a tube. Experts often talk about filled composite materials. Often the increase of the degree of the solid content is the goal of all activities.



Fig. 1: Mortar Grinder PULVERISETTE 2

The task

In this concrete case, was a metallic powder to be added to a synthetic resin of high viscosity. Chosen was the Mortar Grinder PULVERISETTE 2, equipped with a grinding set of hardened steel. With processing times of up to 30 minutes, the successive addition of the powder and supported by the slight warming from the applied comminution energy, up to 80% of the mass percentage of the solid was homogeneously mixed in.

From the areas of mixtures **solid – liquid** the contamination of ceramic powders with very little amounts of solved in liquid substances are to be mentioned. For the test the **Mortar Grinder PULVERISETTE 2** with an agate grinding set was chosen. The iron nitrate solution was used as the model-solution coloured and therefore the homogeneity of the mixture was very easily visually evaluated. While the mill was grinding, approximately 1 ml liquid in 50 g powder were instilled. Afterwards it was further homogenized. After 5 minutes a visual consistent system was created.

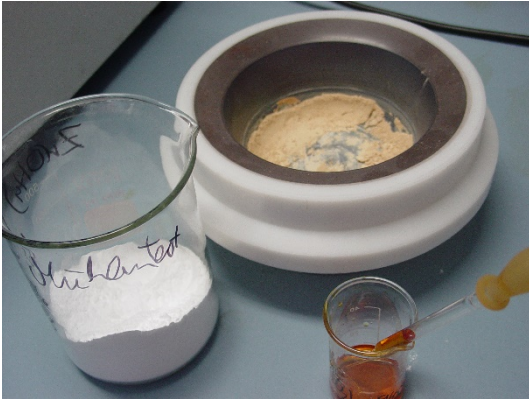


Fig. 2: Iron nitrate solution, sample and liquid



Fig. 3: The result an uniform system

Author: Dipl. Chem. Wieland Hopfe,
Fritsch GmbH, E-Mail: info@fritsch.de