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COMPOSITION OF MATTER AND METHOD OF PREPARATION

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This invention relates to improved amalgam preparations and the method of preparing the same.

The production of amalgams is usually effected by mixing the desired metals with mercury shortly before their use. As for example, a dentist triturates silver or silver alloys with mercury and employs the resulting mass while it is still in a plastic state for filling cavities in teeth. In mirror manufacture amalgams are similarly prepared and employed while still in a plastic state. For substantially all uses the components of the amalgam must be exactly proportioned and weighed with a view to the properties necessary for the desired purpose.

There is now a great demand for a simplified process for the preparation of amalgams in which it is, for example, not necessary to weigh out the mercury each time the amalgam is prepared. In dentistry, the necessary exact weighing or measuring takes up a great deal of time, but is very essential for the preparation of tooth fillings which are durable and do not cause mercury poisoning.

It is an object of the present invention to provide for the production of amalgam preparations whereby the many inconveniences previously encountered are overcome.

A further object of the invention resides in the provision of preparations which already contain the mercury and the metal or metals to be amalgamated in the proportions desired, which preparations are converted into the desired amalgams only shortly before their intended use.

These objects are achieved in accordance with the invention with the aid of suitable auxiliary substances which may be removed from the preparations when desired.

The purpose of the auxiliary substances is to aid in the production of a stable amalgam preparation in which the existence of the amalgam in its final form is prevented until such auxiliary substances are removed. Auxiliary substances may be employed which may be removed by chemical, physical solution or other simple means of removal. The only qualifications of such auxiliary substances are that they may be easily removed from the preparation to leave the preparation in the desired plastic state for use and that they do not attack the components of the desired amalgam.

Suitable metals are preferable auxiliary substances but auxiliary substances other than metals may be employed.

Stable amalgam preparations which may be transformed into the plastic amalgams desired for use may be prepared in accordance with the invention with the aid of alkali metals. As for example, stable preparations containing mercury and silver, tin, gold or the like metals and an auxiliary alkali metal may be prepared which when treated with water or dilute acids are transformed into the desired plastic amalgam preparations which subsequently harden, suitable for filling cavities in teeth.

The advantages of such preparations are obvious, for a plastic amalgam preparation is obtained which contains the necessary components in accurate proportions without necessitating the usual careful proportioning of the components before each use. The composition of such preparations may be greatly varied depending upon the intended use, and the length of the desired hardening period of the final product. Calcium, magnesium, zinc or in short all metals which may be easily removed from the preparations to give the desired amalgam may be employed instead of the alkali metals. Preferably the auxiliary metals are first amalgamated with the required proportion of mercury. The resulting amalgam is then mixed with the finely divided metals or alloys, which are to be present in the final amalgam. For example, a potassium or sodium amalgam is prepared and this amalgam, in pulverized form, is then mixed with finely divided silver until a homogeneous preparation is obtained. It is, however, also possible to compound the new stable preparations employing a different sequence of steps.

When the preparation is to be used, it is treated with alcohol, water or dilute acids, whereby the auxiliary metal is removed by solution, and the desired amalgam is obtained.

Other auxiliary materials which may be removed from the preparations either by chemical or physical solution may be employed in the place of auxiliary metals. Metallic auxiliary materials bind the mercury in the preparation by the formation of an amalgam therewith, whereas non-metallic auxiliary materials serve to coat or separate the components of the amalgam preparation and thereby prevent their interaction to produce the final amalgam until such auxiliary material is removed. It is obvious that many substances may be employed for such auxiliary materials. Examples of auxiliary materials of the type which coat or separate the components of the preparation are as follows: solid paraffin, petroleum jelly, wax, resins, cellulose esters, starches, albumin, suitable in-

organic compounds, and in short, all materials which may serve to separate or coat the components of the preparation in such a manner to prevent the final amalgamation of the components of the preparation which are to be present in the final amalgam. These auxiliary materials may be introduced into the preparation by treating the mercury and/or the metals and preparing a mixture of such treated materials or also by treating all desired components of the amalgam preparation simultaneously therewith. The mercury is preferably divided into droplets but care must be taken that it is not so finely dispersed that it is in too fine a form after the auxiliary material is removed to undergo amalgamation easily. These auxiliary materials may be applied to the surfaces of the components of the amalgam preparation in a powdered, fused or dissolved state (in the latter instance with subsequent removal of the solvent) and are removed from the ensuing preparation only shortly before it is to be employed.

Example 1

One part of a silver-tin alloy containing substantially 70% of silver is intimately mixed with 1 to 1.5 parts (the amount depending upon the desired plasticity and the duration of the hardening of the final amalgam preparation) of a 10% potassium amalgam. The resulting powder is stored in closed containers and is treated shortly before use with water. After the potassium has dissolved and the ensuing mass is rewashed, a plastic mass is obtained by trituration. If a mass is desired which is entirely free from water the material may be treated with alcohol, acetone or the like organic water miscible solvents.

Instead of employing a potassium amalgam, it is also possible to mix all of the components; i. e., mercury, potassium and the silver-tin alloy quickly with one another. However, in this procedure care must be taken that a product is not obtained which hardens upon standing and which does not yield a plastic product when treated with water.

Example 2

One part of an alloy consisting of 60 parts silver, 30 parts tin, and 10 parts copper is mixed with 1.5 parts of a 1% sodium amalgam. This product is prepared for use by treatment with water as described in Example 1 or by treatment with dilute acetic acid.

Example 3

One part of a silver alloy containing 2% of gold or platinum is mixed with 1.3 parts of a 10% sodium amalgam and is prepared for use as described in the previous examples. In this example as well as in the other examples the amount of auxiliary material employed may be varied in accordance with the desired plasticity and the duration of the hardening of the resulting preparation after the auxiliary material has been removed.

Example 4

Three parts of 10% sodium amalgam are mixed with 1 part of precipitated copper and 1.5 parts of precipitated tin. Before use the auxiliary material is removed as previously described.

Example 5

One part of a silver-tin alloy containing 70% silver is mixed with 1.6 parts of a 20% calcium amalgam. Before use the calcium is removed from the preparation by treatment with dilute acetic acid.

Example 6

One part of precipitated copper is mixed with 1.3 parts of a 10% potassium amalgam. The resulting preparation is prepared for use as previously described.

Example 7

One part of a powdered alloy containing 70 parts of silver and 30 parts of tin are triturated in a petroleum jelly having a high melting point with the addition of 1.3 parts mercury. Care must be taken that the mercury is not too finely dispersed. When amalgam is needed, a sufficient portion of the resulting paste is treated with organic solvents for the petroleum jelly. The components of the preparation when freed from the petroleum jelly amalgamate in a normal manner when triturated. The other auxiliary materials specified in the specification may be employed in place of the petroleum jelly.

In the claims the term "dental silver alloys" is intended to mean such silver alloys which are employed in dentistry in the preparation of plastic amalgam preparations which harden and are employed for filling cavities in teeth.

While I have described my invention with reference to several specific examples, it will be apparent to those skilled in the art that my invention has broader applications and I do not intend to limit myself to the specific examples shown herein, but only insofar as set forth in the appended claims.

I claim:

1. In the preparation of amalgams, the steps comprising incorporating an auxiliary substance in a composition comprising mercury and a metallic component capable of amalgamation, said substance substantially preventing the amalgamation of the metallic component to be amalgamated and being removable from the resulting preparation to leave the mercury and the metallic component capable of amalgamation and shortly before use removing the auxiliary substance from the preparation.

2. In the preparation of amalgams, the steps comprising incorporating an auxiliary metal in a composition comprising mercury and a metallic component capable of amalgamation, said auxiliary metal amalgamating with the mercury and substantially preventing the amalgamation of the metallic component to be amalgamated and being removable from the resulting preparation to leave the mercury and the metallic component capable of amalgamation and shortly before use removing the auxiliary substance from the preparation.

3. In the preparation of amalgams, the steps comprising preparing a subdivided alkali metal amalgam, admixing such amalgam with a subdivided metallic component capable of amalgamation selected from the group consisting of metals and alloys, said metallic component being less soluble than the alkali metal and shortly before use dissolving the alkali metal from the preparation.

4. In the preparation of amalgams, the steps comprising incorporating an auxiliary non-metallic substance in a composition comprising mercury and a metallic component capable of amalgamation, said substance separating the mercury particles from the metallic component and thereby substantially preventing the amalgamation of the metallic component and being removable from the ensuing preparation by solu-

tion to leave the mercury and the metallic component capable of amalgamation and shortly before use removing said auxiliary substance.

5. A preparation comprising mercury, a subdivided metallic component capable of amalgamation, and an auxiliary material substantially preventing the amalgamation of the metallic component with said mercury and capable of removal from the preparation to leave the mercury and the metallic component capable of amalgamation.

6. A preparation comprising an intimate mixture of mercury, a subdivided metallic component capable of amalgamation and an auxiliary material substantially preventing the amalgamation of the metallic component with said mercury and capable of being dissolved from the preparation to leave the mercury and the metallic component capable of amalgamation.

7. A preparation comprising an intimate mixture of mercury, a subdivided metallic component capable of amalgamation and an auxiliary metal amalgamated with said mercury substantially preventing the amalgamation of the metallic component with said mercury and capable of being dissolved from the preparation to leave the mercury and the metallic component capable of amalgamation.

8. A preparation comprising an intimate mixture of particles of mercury and a subdivided metallic component capable of amalgamation and a non-metallic auxiliary substance capable of removal by solution to leave the mercury and the metallic component capable of amalgamation, said auxiliary substance separating the mercury particles from the metallic component to prevent amalgamation of such metallic component.

9. A preparation comprising an intimate mixture of particles of an alkali metal amalgam and a subdivided metallic component capable of amalgamation and less soluble than the alkali metal, said alkali metal amalgam containing a sufficient amount of alkali metal to prevent substantial amalgamation of the metallic component.

10. A preparation comprising an intimate mixture of particles of mercury, particles of a metallic component capable of amalgamation and petroleum jelly, said petroleum jelly separating the mercury particles from the particles of the metallic component.

11. A preparation comprising mercury, a subdivided metallic component capable of amalgamation selected from the group consisting of silver and dental silver alloys, and an auxiliary material substantially preventing the amalgamation of said metallic component and being capable of removal to leave the mercury and the metallic component.

12. A preparation comprising mercury, a subdivided metallic component capable of amalgamation selected from the group consisting of silver and dental silver alloys, and an auxiliary metal amalgamated with said mercury substantially preventing the amalgamation of said metallic component and capable of being dissolved from the preparation to leave the mercury and the metallic component.

13. A preparation comprising mercury, a subdivided metallic component capable of amalgamation selected from the group consisting of silver and dental silver alloys, and an auxiliary non-metallic material substantially preventing the amalgamation of said metallic component and capable of being dissolved from the preparation to leave the mercury and the metallic component.

14. A preparation comprising an intimate mixture of particles of an alkali metal amalgam and particles of a metallic component capable of amalgamation selected from the group consisting of silver and dental silver alloys, said alkali metal amalgam containing a sufficient amount of alkali metal to prevent substantial amalgamation of the metallic component.

15. A preparation comprising an intimate mixture of particles of mercury, particles of a metallic component capable of amalgamation selected from the group consisting of silver and dental silver alloys and petroleum jelly, said petroleum jelly separating the mercury particles from the particles of the metallic component.

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