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[54] **BONE DECALCIFICATION COMPOSITION**

[76] Inventor: **Mary F. Poston,** 14527 Littleford, Houston, Tex. 77045

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[51] **Int. Cl.**.....**G01n 1/00**

[58] **Field of Search**.....252/79.1, 80, 142, 252/182, 364; 424/395, 366

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Primary Examiner—Shep K. Rose
Attorney—B. R. Pravel

[57] **ABSTRACT**

A bone decalcification composition wherein an aqueous solution of about 2 grams of sodium oxalate or potassium oxalate is dissolved in about 100 cubic centimeters of formic acid, having a concentration of about 22 percent, which composition is capable of penetrating bone tissue and extracting calcium therefrom to render the bone soft enough to cut with a knife or the like into microscopic sections within a period of about 24 hours or less and without destroying cancer cells or elastic tissues with the bone.

6 Claims, No Drawings

BONE DECALCIFICATION COMPOSITION

BACKGROUND OF THE INVENTION

This invention relates to bone decalcification compositions.

Most bone decalcification compositions known in the past have required two to three weeks to effect a sufficient softening of the bone to process the bone for microscopic sections. In recent years, a fortified formic acid containing a chelating agent has been used which has reduced the softening or decalcifying time to about 24 hours, but such prior product has suffered from several disadvantages. Since the primary purpose of bone decalcification compositions is to prepare the bones for processing into microscopic sections for pathological tests, such as for determining the presence of cancer cells, it is important for adjacent tissue such as the blood cells, muscle striations, and elastic tissues within the walls of the blood vessels with the bones to be as unaffected as possible by the bone decalcification composition which is used. Thus, although the fortified formic acid has been satisfactory for softening bones rapidly, it has often been found to have a detrimental and even a destructive action on red blood cells, muscle tissue, and elastic tissues within the walls of blood vessels.

SUMMARY OF THE INVENTION

This invention relates to a new and improved bone decalcification composition with is capable of softening bones sufficiently in a period of 24 hours or less so that they can be cut with a knife or otherwise processed into microscopic sections. The composition includes an oxalate of sodium or potassium in a dilute formic acid, with the oxalate being about 2 percent of the total weight of the solution and with the strength of the formic acid preferably being about 22 ½ percent. The composition of this invention accomplishes such rapid softening without destruction or any materially damaging effect on the red blood cells, cancer cells, muscle tissue, or the elastic tissue within the wall of blood vessels, whereby these are observable under a microscope for pathological evaluation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The composition of the present invention is a bone decalcification composition which is essentially composed of a dilute formic acid solution and an oxalate selected from the group consisting of sodium oxalate and potassium oxalate. The amount of the oxalate is sufficient to effect a sufficient decalcification and consequent softening of a bone in a period of not more than about 24 hours so as to enable the bone to thereafter be processed by cutting with a knife or otherwise for producing microscopic sections. The composition of the present invention accomplishes such result without the destruction or any material alteration of the red blood cells, cancer cells, muscle tissue, and the elastic tissues within the wall of the blood vessels with the bone.

Considering now the specific details of the preferred embodiment of the bone decalcification composition of this invention, the preferred composition has about 2 percent by weight of the sodium oxalate dissolved in a formic acid solution which has a final concentration from 22 to 22 ½ percent by molecular weight of the total solution.

Although it will be appreciated that various procedures may be used for obtaining the composition of this invention in its final form for usage, a preferred manner of obtaining the composition of the present invention is to take one part of formic acid having an 88 percent (by molecular weight) concentration and three parts of pure water. Typically, 25 cc. of the 88 percent formic acid would be used with 75 cc. of pure water. Before mixing the 75 cc. of the pure water with the 25cc. of formic acid, part of the water is used for mixing the sodium oxalate therein and for dissolving same to facilitate subsequent dissolving and distribution of the sodium oxalate in the formic acid. After the sodium oxalate has thus been dissolved, such solution and the rest of the 75cc. of the water, are mixed with the 25cc. of the 88 percent formic acid. The final concentration of the formic acid then is about 22 ½ percent by molecular weight. Thus, for the purposes of this invention, the preferred strength of the formic acid is about 22 – 22 ½ percent by molecular weight of the final composition.

In the use of the composition of this invention, the bone specimen is immersed in a quantity of the solution and is allowed to remain there for about twenty-four hours. Such period of time is sufficient to soften the bone and render it decalcified so that it may be handled for processing into microscopic sections, and quite significantly, it has been found that additionally, the blood cells, particularly the red blood cells and the cancer cells, are not destroyed or substantially impaired by the action of the composition of this invention. This is particularly important because time is critical in the spread of cancer cells, especially after surgery. Therefore, it is important to obtain the pathological analysis as promptly as possible after the specimen is available and at the same time, the cancer cells must be substantially unimpaired to obtain a true analysis, which result is accomplisher with the composition of this invention.

Additionally, the muscle striations in tissue adjacent to the bone are visible under the microscope after using the composition of the present invention so that any effect upon such tissue may be observed clinically and may be analyzed pathologically. Similarly, the elastic tissues within the wall of the blood vessels which are with the bone may be observed with the microscope after using the composition of the present invention for decalcification purposes. Such elastic tissues are often destroyed with the prior known compositions. Since the condition of such tissues is significant in certain medical analyses, this information may provide very vital medical knowledge, and it is obtainable when using the present composition.

Although the preferred oxalate for use in the composition of this invention is sodium oxalate, it should be understood that potassium oxalate may also be employed. Although there may be other equivalents of the sodium oxalate and potassium oxalate for the composition of the present invention, so far as is known, these are the only two oxalates which accomplish the purposes and have the advantages of the present invention. Although the formic acid may have a concentration other than about 22 to 22 ½ percent, , it has been found that concentrations of formic acid in the present composition greater than such amount may cause distortion of the bone cells whereas lower concentrations of the formic acid delay the time for the decalcification pro-

cess beyond the normal 20 to 24 hours for each specimen.

I claim:

1. A bone decalcification composition, comprising:

a dilute formic acid solution; and

an oxalate selected from the group consisting of sodium oxalate and potassium oxalate;

the amount of the oxalate being sufficient to effect a sufficient decalcification and consequent softening of a bone in a period of not more than about twenty-four hours so as to enable the bone to be processed for microscopic sections without destruction or any material alteration of the red blood cells, cancer cells, muscle tissue, and the elastic tissues within the wall of blood vessels with the bone.

2. The composition set forth in claim 1, wherein the amount of oxalate present comprises about 2 percent by weight of the total solution.

3. The composition set forth in claim 1, wherein the concentration of the formic acid in the solution is about 24 percent by molecular weight.

4. The composition set forth in claim 1, wherein the amount of oxalate present comprises about 2 percent by weight of the total solution; and

wherein the concentration of the formic acid in the solution is about 22 percent by molecular weight.

5. The composition set forth in claim 4, wherein said oxalate is sodium oxalate.

6. The composition set forth in claim 4, wherein said oxalate is potassium oxalate.

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