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these terms are used will also be apparent from the further discussion of the invention herein.

The darkening noted above is clearly non-enzymic in nature, although in some instances it may involve enzymic conversion of starch to more highly reactive sugars. The pigment is clearly different from that produced in foods by active enzymes.

Referring back to the samples which were stored under controlled conditions designed to hasten the development of the undesirable pigmentation, certain additional generalizations can be made on the basis of studies conducted. In the specific compositions noted, monosodium glutamate and dextrose are among the most active amino acid materials and carbohydrate materials respectively which have been studied. In general, alkaline derivatives of the dicarboxylic mono amino acids and the sugars seem to be especially reactive. Further, it appears that the more alkaline the amino acid derivatives are, the more reactive they are; e. g. the disodium salts are more reactive than the monosodium salts and the latter more than the monoacid amides. Similarly the simpler carbohydrates, especially the mono- and di-saccharides, react more readily with amino acid materials to form pigmented bodies.

Referring again to the specific studies conducted on the soup mix specified above; pigment is formed more slowly and seemingly to a less extent in the absence of monosodium glutamate by reaction of the vegetable protein hydrolysate. Likewise, simple polysaccharides yield substantial pigmentation with amino acid materials but at a slower rate than the simple sugars, while the more complex starches react so slowly with most amino acids and the like as to render the pigmentation negligible over normal storage periods.

The invention contemplates inhibition of pigmentation in compositions of the type described above by inhibiting the reaction between amino acid materials and carbohydrate materials. In preferred embodiments of the invention, the reactants of one type are isolated from the reactants of the other type and/or the mass is rendered sufficiently acid to inhibit the undesired pigmentation reaction.

For example, in the soup mix described above, either the dextrose or the two amino acid materials may be isolated from the remainder of the mass. The material to be isolated may be enclosed in sheaths of a suitable substance such as methyl or ethyl cellulose, or fat or various combinations of these, or other materials which will readily dissolve or disperse when the mass is mixed with hot water or heated after dilution with water. A convenient expedient is to enclose or mix one type of reactant in or with the dry noodles packed with the mix containing the remainder of the ingredients described as making up the typical soup mix. In general the choice of isolating media and isolated reactants should be based on consideration of relative reactivities and anticipated maximum storage period.

By utilization of the invention herein disclosed, it is possible to prepare compositions such as concentrated soup mixes, and a wide variety of other dehydrated food preparations containing pigment-forming ingredients, which are very stable over normal or abnormal storage periods. As an alternative, or more advantageously in combination with such isolation, control of darkening over long storage periods is achieved by addition of an acid such that, in the presence of water sufficient to effect ionization it will have the effect

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of adjusting the pH to not substantially higher than 4.5. Where the medium, e. g. in the soup mix, is more acid than pH 4.5, substantial pigmentation of the type with which we are here concerned does not occur even though compositions including highly reactive amino acid materials and highly reactive carbohydrate materials are stored for long periods of time.

In many food compositions, pH below 4.5 is distastefully sour. Soups prepared from concentrated mixes of this acidity were found to be so sour as to mask the agreeable flavor intended in the mix described above. In instances where the sour taste is undesirable, means are provided by the present invention to neutralize the acid to a suitable pH (for example about 6.6 for soups). Sodium bicarbonate or other suitable base may advantageously be included in a potentially active form as by inclusion physically while isolated chemically in accordance with the above description for chemically isolating the potentially reactive sugars and amino acid material. In general, the acid used should be a solid and both acid and base must be non-toxic where the composition is intended for consumption as food. Inorganic acids may be used, for example, metaphosphoric acid and sodium bisulfate are suitable but in preparing foods the organic acids are found to be better suited to the purpose.

Thus, to the soup mix described above may be added sufficient dry citric acid to provide 1 to 2% of that agent in the finished mix. An amount of sodium bicarbonate to give the desired taste is added as granules coated with a suitable isolating medium such as ethyl cellulose. Incorporation or mixing of the base in or with the dry noodles is also satisfactory, and in such case the plastic mix of other ingredients may be isolated by coating with fat or other inert food material. With citric acid, I have found that 1.08 grams of anhydrous sodium bicarbonate is suitable for overcoming the objectionable acid taste of 1 gram of added citric acid, used as the crystalline monohydrate. Similarly, 0.9% citric acid with 12.5% monosodium glutamate and 2.5% disodium glutamate in isolated form makes a suitable stable soup mix. Good results are also obtained from use of glutamic acid and disodium glutamate, each in quantity equivalent to 7.5% monosodium glutamate, the disodium glutamate being isolated in accordance with this invention.

Good results have also been obtained by using glutamic acid instead of the monosodium salt in any desired proportions, with a suitable neutralizing agent, e. g. sodium carbonate or bicarbonate in isolated form.

Both ethyl cellulose and methyl cellulose have been used with satisfactory results in preparing isolated neutralizing agents to impart a palatable pH to stabilized soup mix having a pH below 4.5. Ordinary sodium bicarbonate of commerce was mixed with a solution of 50 grams of ethyl cellulose in 500 cc. of 95% ethyl alcohol, total of 100 grams of sodium bicarbonate being used. The alcohol was then removed by heating on a steam bath and the coated base ground to a powder (approximately 80 mesh). It was determined that 1.4 grams of the coated salt are equivalent to 1 gram of the salt before coating. Titration with hydrochloric acid indicates that the sodium bicarbonate is released slowly when the coated material is suspended in water at room temperature, or at refrigeration temperatures in the neighborhood of 5° C. for example, at 5° C., about one hour is required for complete extrac-