

PROCESS FOR MANUFACTURING SOYBEAN PROTEINS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a process for manufacturing soybean proteins and, more particularly, to a process for manufacturing soybean proteins particularly suitable as edible proteins.

2. Description of the Prior Art

Heretofore, processes have been known for manufacturing soybean proteins, for producing soybean protein concentrates by removing saccharides by washing defatted soybean with an acid or by extracting defatted soybean with water, and for manufacturing isolated soybean proteins by a combination of the acid washing and the water extraction. The soybean proteins produced by these processes, however, all smell like raw soybean and have an unfavorable color tone so that they are not suitable as edible proteins.

When defatted soybean is washed with an organic solvent such as alcohol, soybean protein concentrates which have excellent flavor and color tone are obtained. Accordingly, if proteins alone can be extracted and separated from such soybean protein concentrates, soybean proteins which have desirable flavor and color tone and a high solubility would be produced. In order to sufficiently remove saccharides, pigment ingredients and odor causing ingredients, however, washing with hydrated alcohol containing some water is required. Washing with such an organic solvent may denature the soybean proteins and render them so insoluble that further extraction and separation become impossible. Proteins which are only slightly soluble in water may provide only limited utilization as food. Furthermore, water-insoluble fibrous portions derived from soybean may remain intact in proteinous products, giving them a rough texture, so that they are not desired as edible proteins.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a process for manufacturing soybean proteins which have excellent flavor and color tone and have a high solubility.

Another object of the present invention is to provide a process for extracting and separating soybean proteins from alcohol-denatured soybean protein concentrates containing proteins which have excellent flavor and color tone, but which are insoluble in water.

The present invention is directed to a process for manufacturing soybean proteins from soybean protein concentrates. The afore-mentioned soybean protein concentrates may be prepared by washing defatted soybean with an alcoholic aqueous solution. The soybean protein concentrates are dispersed in water and then adjusted with ammonia to a neutral to slightly alkaline pH range or dispersed in an aqueous solution which was previously adjusted with ammonia to be in an alkaline pH range, providing a neutral to slightly alkaline aqueous dispersion. The afore-mentioned soybean proteins in this aqueous dispersion are solubilized by the action of a neutral protease. The insolubles in the aqueous dispersion thus prepared are then removed to produce an aqueous solution containing solubilized proteins from which solid proteins are recovered. The

recovered soybean proteins have excellent flavor and color tone and retain a high solubility in water.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Raw materials to be employed for the present invention are alcohol-denatured soybean protein concentrates. Defatted soybean which provides suitable raw material concentrates may be obtained by oil extraction through compression of the soybean. Defatted soybean which has not undergone too much thermal denaturation is particularly suitable. The defatted soybean is washed with an alcoholic aqueous solution to provide alcohol-denatured soybean protein concentrates. The concentration of alcohol in the alcoholic aqueous solution, the ratio of the concentrates to the alcoholic aqueous solution, and the washing temperatures may be conveniently chosen depending upon the desired qualities of the product, such as protein purity, flavor and color tone. As the alcohol methanol, ethanol and propanol can be used, but ethanol is most preferred.

The alcoholic aqueous solution usually contains an alcohol in an amount between 40 percent by weight and 95 percent by weight, and a middle concentration solution containing an alcohol in an amount between 50 and 80 percent by weight provides a high degree of refinement of the defatted soybean and improved flavor and color tone. The middle concentration solution, however, tends to increase the insolubility of the proteins.

The solvent ratio of the alcoholic aqueous solution to the defatted soybean to be used for washing the defatted soybean is not critical, and the larger the solvent ratio of alcoholic aqueous solution the better the purification. The optimum solvent ratio may be chosen from manufacturing and economic considerations. Preferably, the alcoholic aqueous solution is employed in an amount of 5 to 20 times the weight of the defatted soybean.

The temperature of washing may be chosen depending upon the desired qualities of the alcohol-denatured protein concentrates and the like; however, the higher the temperature (but below the boiling point of the alcoholic aqueous solution), the higher the degree of purification, but the application of too high a washing temperature may decrease the solubility of the proteins.

Generally, the washing may be carried out by placing the defatted soybean in a vessel together with the alcoholic aqueous solution and stirring the mixture. This washing step transfers saccharides, pigment ingredients and odor causing ingredients contained in the defatted soybean to the alcoholic aqueous solution. The mixture is then filtered to produce a filtrate and a caked residue. If necessary, the cake may be washed repeatedly with the alcoholic aqueous solution to produce a higher degree of purification.

The resulting cake is then subjected to drying under reduced pressure or drying under heating to remove the remaining alcohol and moisture and to provide alcohol-denatured, water-insoluble soybean protein concentrates.

A neutral to slightly alkaline aqueous dispersion in which the soybean protein concentrates are dispersed is then prepared from the soybean protein concentrates. This aqueous dispersion may be preferably obtained by dispersing the above-mentioned concentrates in water and adjusting it with ammonia to achieve a neutral to slightly alkaline dispersion. The aqueous dispersion may also be prepared by dispersing the above-mentioned concentrates in an aqueous solution which was pread-