PRODUCT INFORMATION BULLETIN
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POTASSIUM BENZOATE

FORMULA: C_6H_5COOK $(C_7H_5KO_2)$ **MOLECULAR WEIGHT:** 160.22

CAS REGISTRATION NUMBER: 582-25-2

GRADE AVAILABLE: Food Chemicals Codex (F.C.C.)

FORM AVAILABLE: BEVERAGE

Potassium benzoate is a high quality fine chemical, specifically manufactured for food and beverage use. It is designed to replace sodium benzoate in applications where the preserving power of benzoic acid is required, but where a low sodium content is desired.

Part 184 of 21 CFR describes those "DIRECT FOOD SUBSTANCES AFFIRMED AS GENERALLY RECOGNIZED AS SAFE." Both benzoic acid (21 CFR 184.1021) and sodium benzoate (21 CFR 184.1733) are included in this listing. Both are approved for use as antimicrobial agents, flavoring agents, and adjuvants. Good manufacturing practice (GMP) results in a maximum level of 0.1% of either product in food. In addition, both sodium benzoate and benzoic acid must meet the specifications contained in the Food Chemicals Codex. The Division of Regulatory Guidance, Bureau of Foods, US Food and Drug Administration has stated-, "We would consider potassium benzoate to be generally recognized as safe (GRAS) to the same extent that sodium benzoate is GRAS, as a preservative with a limitation of 0.I%."

PRODUCT SPECIFICATIONS and PACKAGING INFO ARE AVAILABLE UPON REQUEST:

TYPICAL PROPERTIES:

Potassium Benzoate is the potassium salt of benzoic acid. 1 gram of the salt is soluble in 2 ml of water, in 75 ml of alcohol, and in 50 ml of 90% alcohol. The salt is insoluble in ether. Additional solubility data (from the literature) for the salt in water is as follows:

GRAMS POTASSIUM BENZOATE

TEMP(° C)	PER 100 GRAMS SATURATED SOLUTION
13.0	40.6
17.5	41.1
25.0	42.4
33.3	44.0
41.0	44.9
50.0	46.6

Potassium benzoate is a slightly hygroscopic, white, odorless or nearly odorless product. A typical aqueous solution of potassium benzoate will be slightly alkaline with a sweetish astringent taste. It is offered for sale in a densified granular form. The bulk density of potassium benzoate is ~ 45 # / ft^3. Potassium benzoate contains 76.2 % of available benzoic acid.

POTASSIUM BENZOATE APPLICATIONS

***FOOD AND BEVERAGE PRESERVATIVE*:** Food and beverage spoilage has been a problem throughout history. Most food spoilage is due to enzyme action upon the food. Enzymes are complex organic compounds that may act as catalysts and cause a chemical change to occur. Most enzymes that cause food to spoil are produced by living microorganisms, e.g., bacteria, molds, and yeast. Fresh foodstuffs may have some of these microorganisms present and others may be encountered by exposure to air or in processing.

The enzymes that cause spoilage may be generally described as two types which are (1) "endoenzymes" which exist within the microorganism and (2) "exoenzymes" which are released by the microorganism. The quantity of microorganism enzymes causing food to spoil is directly related to the amount of the microorganism present, its species, and its general activity.

By its general nature, food cannot resist the action of enzymes which may lead to food spoilage. Thus, the elimination of food spoiling enzymes is accomplished most easily by either (1) destroying or (2) inhibiting the source of the enzymes which are the microorganisms themselves.

There are basically four generally accepted methods for preserving foodstuffs and these methods rely on one or the other of these above mentioned methods of microorganism control. Sterilization by heat or radiation destroys the microorganisms; refrigeration reduces or stops the activity of the microorganisms; drying reduces or stops the activity of the microorganisms by removing essential water; and chemical preservatives reduce or inhibit the activity of the microorganisms.

The addition of chemical preservatives to food is not new and has been practiced for centuries. Some of the most familiar preservation methods; those of brining, pickling with vinegar, smoking, and preserving with sugar solutions, depend upon chemical preservatives. These methods inhibit microorganism activity and retard microorganism growth and multiplication. These methods act in one of two generalized ways-. (1) by physically increasing the density of the microorganism's environment (raising osmotic pressure) or (2) chemically, by a direct inhibiting action on the microorganisms themselves.

Consequently, chemical preservatives which perform by a direct inhibiting action on the microorganisms themselves are not new. Potassium Benzoate is a chemical preservative, which in very low concentrations inhibits the activity of the microorganisms themselves,

The effectiveness of potassium benzoate as a preservative increases with decreasing pH (increasing acidity). This is because the ratio of undissociated benzoic acid (free benzoic acid) to ionized benzoic acid increases as the pH decreases. It is generally accepted that the undissociated benzoic aid is the active antimicrobial agent. Although no definite theory has been yet proposed to explain this antimicrobial effect, it is believed to be related to the high lipid solubility of the undissociated benzoic aid which allows it to accumulate on the cell membranes or on various structures and surfaces of the bacterial cell, effectively inhibiting its cellular activity.

Potassium benzoate has activity against yeast, mold, and bacteria. Although several studies have been performed on the antimicrobial activity of benzoic acid on these species, it is difficult to obtain substantial evidence on relative activities against specific members of those general species. Actual field application trials are recommended for assurance of satisfactory antimicrobial activity against the species in question.

At low pH values, potassium benzoate may impart a slight tang in taste attributable to the undissociated benzoic acid. If this effect is undesirable, it may be overcome by using other applicable approved preservatives in conjunction with potassium benzoate to lower the concentration of potassium benzoate below the taste threshold.

An important consideration in preserving with potassium benzoate is the addition of the preservative as early as possible in the food processing. The early addition of potassium benzoate will prevent the

microorganisms from forming enzymes which may continue to cause deterioration, even though the microorganism growth will be inhibited at the later stage in processing.

One of the most important considerations in preserving with potassium benzoate is the maintenance of absolute cleanliness. It should be clearly understood that although preservatives such as potassium benzoate serve a very useful purpose in foods, they cannot take the place of cleanliness in food processing. Products that have already spoiled will not benefit from the use of potassium benzoate as a preservative.

Potassium benzoate may be added conveniently and efficiently in the form of a concentrated stock solution in water. A simple stock solution may be prepared by dissolving one pound of potassium benzoate in one gallon of water. One fluid ounce of this solution when added to one gallon of beverage gives a concentration of about 0.1 % potassium benzoate. If the specific gravity of the beverage is significantly higher than water after potassium benzoate is added in processing, and an acidic pH adjustment is needed with the addition of a strong acid such as citric acid, sufficient agitation should be available to prevent localized precipitation of benzoic acid, which has a solubility of about 0.3 % in water at 20'C. This processing step is important because the relatively water insoluble benzoic acid may precipitate inside the processing vessels and lines causing plugging problems and loss of essential preservative in the total batch contents.

Potassium benzoate may be used in carbonated and still beverages, syrups, cider, salted margarine, olives, sauces, relishes, jellies, jams, preserves, pastry and pie fillings, low fat salad dressing, fruit salads, prepared salads, and in storage of vegetables. Keep in mind that both federal and state regulations may apply to specific applications. These regulations should be reviewed and verified as applicable or non-applicable for each specific use application.

BEVERAGES: Potassium benzoate may be used in carbonated beverages with 0.03 to 0.08 % typically used for the finished products, potassium benzoate may also be used to preserve the flavor syrup prior to the addition of the beverage acidulant. Non-carbonated beverages normally require somewhat higher concentrations of 0.05 to 0.1 % potassium benzoate in the finished products.

***CIDER*:** The shelf life of un-pasteurized cider can be greatly extended by adding potassium benzoate as soon as the juice is pressed. A slight tang, which many tasters apparently prefer, may be imparted to the cider by concentrations of potassium benzoate as low as 0.04 %.

METHODS OF ANALYSIS: General methods of analysis for potassium benzoate (as benzoic acid) in food and drug products are described in *Official Methods of Analysis* of the Association of Official Analytical Chemists.

STORAGE CONDITIONS: Potassium benzoate is slightly hygroscopic and should be stored in sealed containers. Exposure to conditions of high humidity and elevated temperatures should be avoided.

NOTE: *The information presented herein is believed to be true and accurate. However, all suggestions and recommendations are made without guarantee. Our technical personnel are always ready to respond to inquiries regarding the safe handling of any of our products.*

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