



11/09/2019

Pós-graduanda: Fernanda Lopes da Silva

Orientador: Antônio Fernandes de Carvalho

Use of phosphate in food industry

Phosphates are derivatives of phosphoric acid (H_3PO_4) with positively charged ions of elements, such as sodium, to form salts (inorganic phosphates), or with organic groups, such as phenyl, to form esters (organic phosphates). Phosphates irrespective of whether they are inorganic phosphates or constituents of phosphoproteins and membrane phospholipids, are found in most living organisms. Phosphates are used as additives to a range of food products where they serve as to aid processing, enhance organoleptic properties or improve safety and shelf-life. They are present in a range of foods typically including protein rich products such as meat, poultry, seafood and dairy products, its main functions can be: pH control, metal ion complexing agent, dispersing and/or suspending agent and stabilizer. These food grade phosphates aid in maintaining the structure and hydration of the meat products by enhancing the water holding capacity of muscle and assisting in the oxidative stability of the meat by chelating pro-oxidative metal ions. In dairy products, phosphates are used as a protein dispersant in spray dried milk products, besides acting as melting salts for the processing of processed cheese. In bread and pasta industry, phosphates are used as a leavening agent, being the ingredient for the chemical baking powder that neutralizes sodium or potassium bicarbonate, and which controls the rate of carbon dioxide release from chemical fermentation. Processed food products tend to have a higher phosphate content than that naturally present on food. For instance, processed meat and poultry products were reported to have twice the amount of phosphate as compared to natural products. Levels of phosphates permitted for use in foods must be “generally be regarded as safe” by the Food and Drug Administration (FDA). Phosphates are an essential dietary requirement for humans. Organic phosphates from meat, grains, dairy products, and nuts, and inorganic phosphates (Pi) from food additives are readily absorbed in the small intestine, processed in the liver, stored in cells and bone, and reabsorbed in the kidneys. Phosphate has many physiological, biochemical and cell signalling roles in the body. Na appropriate balance between the use of phosphates as additives and possible ill effects associated with excessive consumption needs to be struck. As a biomolecule, the tetrahedral molecular geometry of phosphate allows it to form bonds with four other molecules and create complex molecular compounds such as nucleic acids, proteins, ATP and phospholipids. The importance of phosphate in the human body is evident by

the fact that 80 %-90 % of filtered plasma phosphate is actively reabsorbed in the renal tubules in a healthy individual. However, the amount of phosphate additives in the average North American's diet has more than doubled since 1990, with an estimated half the population of the USA consuming in excess of the recommended ADI of phosphates. Another point is the intake of sodium in modern western diet is excessive, the amount of sodium present in processed cheese is usually higher (325-798 mg/50 g) than present in natural cheese (95-697 mg/50 g) due to addition of NaCl and emulsifying salts. Therefore, industry as a whole should look for ways to reduce phosphate use and replace formulations to contain low sodium content without altering the quality of the end product and sensory profile.

References

Dykes, G.A., Coorey, R.; Ravensdale, J.T.; Sarjit, A. (2019). Phosphates. Encyclopedia of Food Chemistry, 218-224.

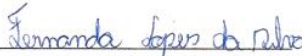
Mozuraityte, R.; Berget, I.; Mahdalova, M.; Gronsberg, A.; Oye, E.R.; Greiff, K. (2019). Sodium reduction in processed cheese spreads and the effect on physicochemical properties. International Dairy Journal, 90, 45-55.

Chen, M.; Wang, L.; Qian, H.; Zhang, H.; Li, Y.; Wu, G.; Qi, X. (2019). The effects of phosphate salts on the pasting, mixing and noodle-making performance of wheat flour. Food Chemistry, 283, 353-358.

Sádlíková, I.; Buňka, F.; Budinský, P.; Barbora, V.; Pavlínek, V.; Hoza, I. The effect of selected phosphate emulsifying salts on viscoelastic properties of processed cheese. (2010). LWT – Food Science and Technology, 43, 1220-1225.

Maures, A; Sheurer, G. (2012). Manufacture of processed cheese and stabilization of milk protein systems. JOHA Guide.


Orientador


Orientanda