

# PLANT AND EQUIPMENT CONSTRUCTION

# THE APPLICATION AREAS OF NITROGEN

## NITROGEN – OXYGEN-SENSITIVE FOODS

It is a well-known fact that nitrogen is used in a wide range of areas in the food industry. Examples include beverage production, beverage storage, and packaging processes for oxygen-sensitive foods. Contact with oxygen changes the consistency of many foods. The reasons for this include oxidative and enzymatic reactions which, under the influence of oxygen, lead to chemical reactions and metabolic processes in natural foods such as fruit and vegetables. This is expressed by discolouration and rapid spoilage of the food to name just two examples. The use of the protective gas nitrogen helps to avert these undesirable effects in this regard.

**Inmatec nitrogen generators** offer the possibility of generating the requisite nitrogen directly from the ambient air on-site. The new Inmatec „IMT PNC“ generator can be fully integrated in existing in-house compressed air systems and produces nitrogen with a purity of at least 95.5 percent in compliance with food safety regulations. To this end, the ambient air is pressed into two adsorption vessels filled with a carbon molecular strainer. These switch alternately from filter mode to regeneration mode. In one vessel, oxygen and carbon dioxide molecules from the ambient air are adsorbed in the strainer, while

the strainer regenerates in the second vessel. The nitrogen obtained in this manner flows into a product tank and is then available for numerous applications. The „Pressure Swing Adsorption“ technology (PSA) ensures continuous nitrogen production.

**The PNC series** features innovative flow-through and vortex technology to supply more nitrogen with lower compressed air requirements, thereby saving further energy and costs. All operating values can be read at any time via a touch control panel. Inmatec offers high-quality, value-for-money systems for a variety of applications, even for small quantities in addition to stationary and mobile production of nitrogen. The production of climate-neutral gas on-site not only results in price advantages but also removes the need for truck deliveries of expensive cylinders and bundles – potential supply shortages can also be reduced and last but not least – they have an impressive impact on your CO<sub>2</sub> balance.



Chemical reactions and metabolic processes often cause spoiling of fruits and vegetables. (Image: iStock/AlexRaths)



#### POTENTIAL APPLICATIONS:

**Beverage production:** During the production of fruit juices, wine and beer, contact with oxygen needs to be avoided in various production steps. Prior to filling, the production and storage tanks are first emptied with nitrogen and sterilised. The filled tanks are then continuously overlaid with nitrogen in order to eliminate the contact risk and corre-

sponding quality losses of the beverages. Nitrogen is also used for bottling. In this context, each bottle is first filled with the gas via an elongated tube. Then the drink flows into the bottle, the nitrogen escapes while the oxygen remains outside.

#### PACKAGING AND STORAGE

Following the production of food, it is crucial that the product

reaches the end customer in optimum quality. In order to extend durability and maintain product quality, perishable foods such as meat, fish, yoghurt and cheese are packaged using the nitrogen inert gas (MAP process; "Modified Atmosphere Packaging"). In order to displace the harmful oxygen, nitrogen is added to the product packaging. This artificial, oxygen-free atmosphere keeps food fresh and long-lasting for longer without the addition of preservatives. It also provides protection against microbial infections with salmonella and listeria, which often occur in meat and are a major health risk. The overlaying of storage tanks and storage rooms with nitrogen also helps to avoid contact with oxygen during the storage and transport of foodstuffs. **Production:** Jet mills are used in the food industry to paint and grind products. To this end, a gas is pressed into the mill via a pipe with pressure and high speed. Inside the mill, a circulating gas stream is created, in which the food particles introduced collide with each other and disintegrate into ultra-fine particles. The dust-containing mixture of substance particles and escaping gases is highly explosive when in contact with oxygen. The use of nitrogen as grinding and inert gas efficiently prevents any ignition and explosion in the resulting dust atmosphere.



#### Image: IMT PNC Generator

The novel PNC technology developed by INMATEC increases the efficiency of the PSA technology used thanks to innovative flow technology combined with advanced vortex technology. Consequently, when nitrogen molecules are separated from oxygen molecules, significantly more nitrogen is produced with lower compressed air requirements. This saves energy and lowers costs.

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