

THE BENEFITS OF PENTANE IN THE PRODUCTION OF INSULATION FOAMS

Every day, we benefit from the diverse range of available solvents and their unique properties. From paints, coatings and personal care products to cleaners and inks, solvents play an essential role, helping to provide solutions in many aspects of modern business and home life.

Pentane as a blowing agent

Pentane is a hydrocarbon solvent that belongs to the family of paraffins. It plays a fundamental role in the production of polystyrene (PS) and polyurethane (PU) insulation foams, serving as a blowing agent that turns the raw plastic material into foam. A small quantity of pentane indirectly provides important performance characteristics to these foams: primarily, great thermal insulation properties.



Pentane: adds great thermal insulation properties

Energy-saving potential

The benefits of pentane are therefore of particular interest from the perspective of energy saving. Pentane yields great thermal insulation properties to PS and PU foams, which ultimately leads to lower energy consumption and the improvement of energy efficiency, in line with the targets and priorities set by the EU in the energy field.



Pentane: keeping food fresh



Used to insulate almost anything, from walls and roofs to freezers and refrigerators, PS and PU foams are vital for saving energy in the construction sector and in domestic appliances. The building sector alone accounts for 40% of the EU's energy requirements and offers the largest single potential for improving energy efficiency. Meanwhile, the electricity used for domestic appliances in households accounts for 25% of the final energy needs in the EU.

Furthermore, the small proportion of pentane that is used in the production of PS and PU foams easily decomposes in the atmosphere, avoiding any adverse impact on the ozone layer.

By respecting the environment, insulating homes and keeping food fresh, the use of pentane in the manufacture of insulation foams is just another example of the many applications of solvents and the benefits they bring to our daily lives.

EXPANDED POLYSTYRENE FOAM BLOWING PROCESS

Polystyrene's most common use is as Expanded Polystyrene (EPS), which consists of about 90-95 per cent polystyrene and five to ten per cent gaseous blowing agent, such as pentane. The blowing process of EPS is carried out in three stages:

- 1 The spherical polystyrene beads, similar to sugar in appearance, are expanded to about 40 times their size using a small quantity of pentane as a blowing agent. This is done by heating the polystyrene beads using steam, which makes the pentane boil. The pentane gas that is produced expands under the action of the heat, producing a honeycomb-like plastic foam as a result. Only around two per cent of the pentane used stays inside the foam after the blowing process. This is one of the major differences between PS and PU foams. In PU foams, the whole quantity of pentane used stays inside the foam once the blowing process is completed.
- 2 Once the polystyrene has cooled down, the pentane liquefies and a partial vacuum is formed inside the beads. The beads are then placed inside a holding tank, where they are kept for 12 to 48 hours, depending on the desired expanded density.
- 3 Finally, the pre-expanded stabilised beads are reheated with steam in a mould. This is where the final expansion takes place. The density of the foam is predetermined by the amount of pressure applied on the beads while in the mould. In its final form, EPS is made up of 98 per cent air. This gives EPS a low thermal conductivity, making it ideal for insulation.