

## FREQUENTLY ASKED QUESTIONS

PuroMill™ Industrial is a novel polymeric milling media that helps to improve the characteristics of industrial materials through the creation of nanoparticles with greatly reduced contamination.

### Using the Media

#### **What is PuroMill™?**

PuroMill™ is an advanced technology used for reducing the particle size of chemical compounds to the nano scale. PuroMill™ media is composed of highly crosslinked copolymer beads that establish many benefits in the development of industrial materials.

#### **What type of industrial products can PuroMill™ be used for?**

PuroMill™ can be used in any industrial milling application that conventional ceramic media is used for, including inkjet pigments, coatings, electronics and nano-additives. Since PuroMill™ is an organic copolymer, it is particularly suitable for aqueous formulations, although organic formulations may be applicable depending upon solvent selection.

#### **What type of media mills, nanoparticle media mills or ball mills can PuroMill™ be used in?**

PuroMill™ is a low-density milling media and is recommended for use in high-energy mills with agitation speeds ranging from about 5 m/sec. to over 20 m/sec. PuroMill™ is compatible with all mill designs, including horizontal and vertical mills. In specialty applications such as inkjet pigments, very small (e.g., 50 µm) PuroMill™ media can be used in rotor-stator equipment with tip-speeds over 35 m/sec.

#### **Is PuroMill™ suitable for both dry milling and wet milling?**

Generally, PuroMill™ is recommended for wet milling applications using agitated media mills. In some cases, dry milling may be feasible.

# Performance & Characteristics

## **Will using PuroMill™ in my process allow scalability?**

Yes. PuroMill™ has demonstrated to scale very well from the smallest lab-scale media mills to the largest production-scale mills. Scaling is generally related to maintaining a consistent energy density within the agitated media bed during mill scale-up.

## **Will using PuroMill™ in my process allow consistent reproducibility?**

Yes. PuroMill™ technology is produced under tight specification parameters and strict ISO guidelines. The beads have a very specific particle size range and allow consistent batch-to-batch reproducibility.

## **Does PuroMill™ contain impurities?**

PuroMill™ is highly purified during manufacturing to ensure potential contaminants (both particulates and volatiles, such as monomers or solvents) are reduced to lowest attainable levels. We recommend that customers evaluate all final products prepared using PuroMill™ to ensure trace impurities are within acceptable limits.

## **Can PuroMill™ be used with viscous suspensions?**

Yes. Despite its lower density, PuroMill™ can be used effectively for processing viscous suspensions by maximizing media mill agitation speeds to promote effective media separation during milling.

## **Will PuroMill™ cause excessive wear to milling equipment?**

No. In fact, unlike ceramic media, PuroMill™ can be used in conventional stainless steel equipment or other acceptable alloys without measurable wear to milling equipment surfaces (e.g., agitator or chamber).

## **PuroMill™ is a low-density media. Doesn't that make it more susceptible to hydraulic packing?**

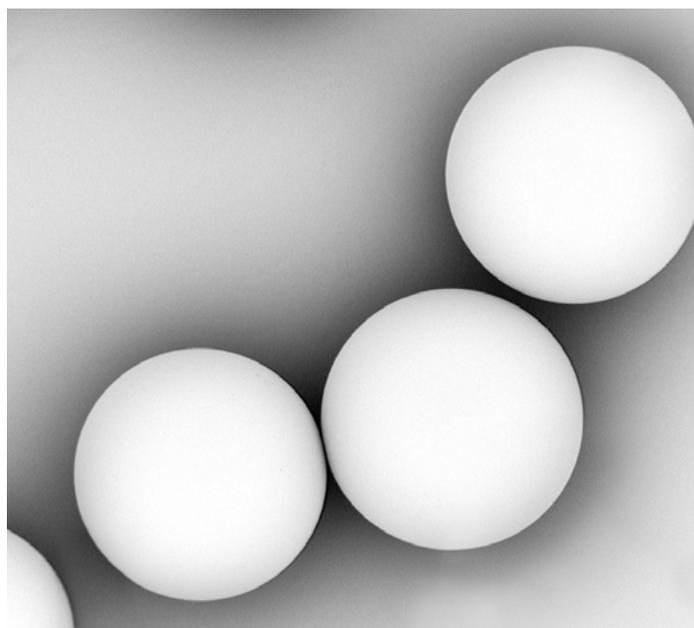
No. As with any milling media, the operational parameters of nanoparticle milling (e.g., flow rate, RPM, media load, product viscosity, etc.) need to be established and optimized experimentally. PuroMill™ can be used at maximum media loads and RPMs without hydraulic packing, provided product flow rate and viscosity are optimized.

## **How does the low density of PuroMill™ affect comminution time when compared to YTZ or other media?**

PuroMill™ can achieve comparable particle size reduction efficiency to YTZ media by operating the nanoparticle media mill with a higher media load and agitation speed.

## **In what other ways does PuroMill™ differ from YTZ or other media?**

PuroMill™ does not undergo hydrothermal degradation, often associated with YTZ media and YTZ ceramic mill components.



# About the technology

## How does PuroMill™ polymeric media produce effective particle nanonization?

Puromill™ is composed of optimized, monodisperse copolymer beads that have exceptional wear resistance and provide excellent milling efficiency. Similar to conventional media, the mechanism of particle size reduction with PuroMill™ is based upon shear and impact forces resulting from media collisions during high-energy agitation within a media mill. Unlike denser ceramic media, PuroMill™ can withstand higher media load and agitation speed without unacceptable media attrition, resulting in maximum stress intensity and stress frequency during milling.

## How is the uniform particle size of PuroMill™ media achieved?

PuroMill™ milling media is produced using Purolite's proprietary copolymer synthesis and purification technologies that enable production of consistent, monodisperse media bead distributions.

## What percent capacity of the empty mill volume should be filled with PuroMill™ for most effective operation?

PuroMill™ is generally used in mills at higher media loads than conventional ceramic media. Media loads of 90% to 99% are recommended to maximize milling efficiency.

## What agitator speeds are recommended with PuroMill™?

PuroMill™ can be used in media mills at much higher RPM or "tip-speeds" than conventional ceramic media, without excessive media attrition or heat generation. Tip-speeds of 15 – 20 m/sec. are generally recommended.

## Is PuroMill™ media reusable?

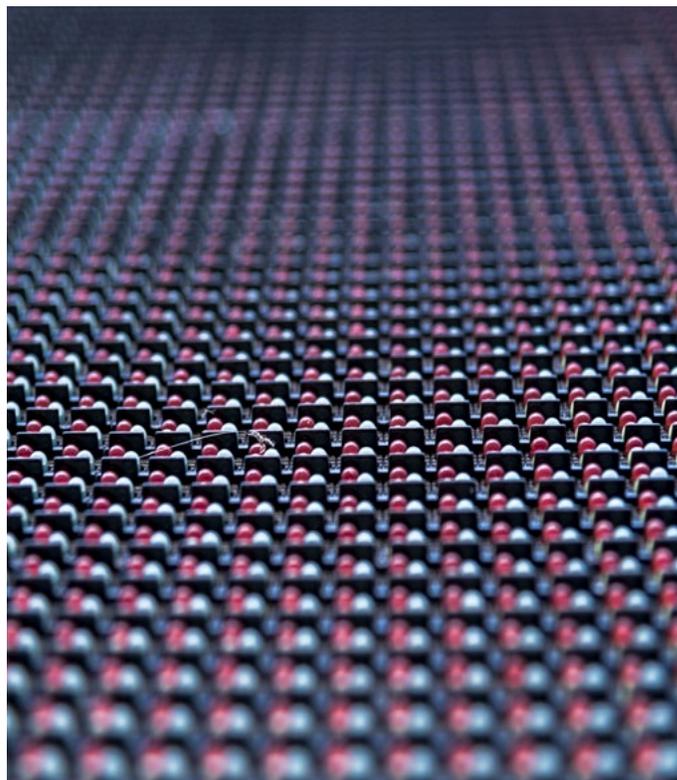
Yes. Due to its excellent wear resistance, PuroMill™ can be used multiple times, depending upon the application.

## Can PuroMill™ be cleaned and sterilized?

Yes. PuroMill™ media has been developed to withstand moist heat sterilization techniques, such as autoclaving or SIP (e.g., 121°C for 20 min.). Also, PuroMill™ can be cleaned by flushing with water or with the use of common CIP detergents to enable media reuse.

## Will anything cause PuroMill™ media to degrade prematurely?

Yes. Consideration should be given for the use of PuroMill™ with certain organic solvents and extreme operating temperatures.



**PuroMill™**  
Industrial milling media



## The Basics

### How is PuroMill™ sold?

PuroMill™ is sold by weight and a variety of packaging options are available, ranging from 1 kg to 50 kg quantities. Given the low bulk density (0.61 kg/L) of PuroMill™, customers should consider the required amount to charge the media mill on a volumetric basis.

### What is the shelf life of PuroMill™ media?

PuroMill™ Industrial grade does not have a stated expiry and should be evaluated by the customer for extended use.

### What grades of PuroMill™ are available?

PuroMill™ is offered as either an Industrial grade media or a Pharmaceutical-grade media. The manufacturing of PuroMill™ Industrial grade is governed by a quality system conforming to ISO 9001:2008 requirements.



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P-000141-200PP-1117-R2-PC0