WACKER

CREATING TOMORROW'S SOLUTIONS

POLYMER DISPERSIONS I PLANT HYGIENE

IMPROVING PRODUCT SAFETY – MAKING PLANT HYGIENE TOP PRIORITY

Polymer dispersions are vulnerable to bio-contamination. Over the last decades, the growing number of regulations on biocides and restrictions on the availability of biocidal molecules have created a very challenging situation. The only way to minimize risks is to combine the use of suitable biocide packages with stringent plant hygiene. Further restrictions on the preservation of dispersions will further increase the importance of plant hygiene measures.

Why Plant Hygiene is More Important than Ever

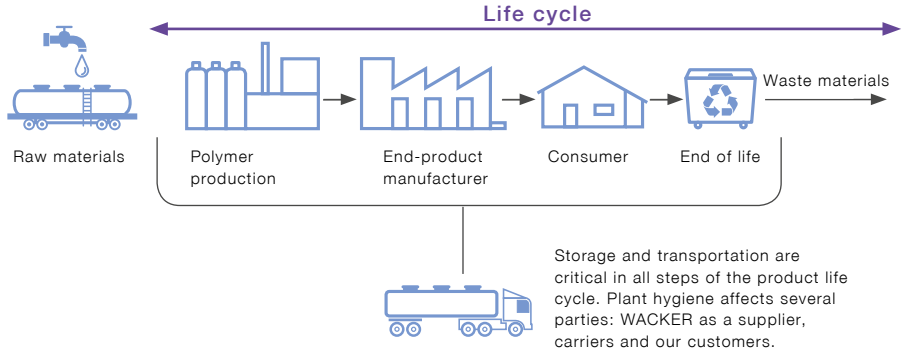
As waterborne systems, our polymer dispersions provide an environment that naturally promotes the growth of microorganisms. This growth tendency is further favored by our efforts to constantly reduce VOC content and residual monomer levels. We add biocides to counteract this tendency. Proper preservation of dispersions with biocides is important, but plant hygiene and hygienic transportation are also key factors for minimizing the risk of bio-contamination and growth of critical microorganisms.

Why this Topic Concerns all Market Partners

To maintain the high quality of our products, it is essential that proper hygiene measures be established along the whole value chain. Storage and transportation are two critical steps that are often underestimated. It is crucial that:

- Raw materials are clean
- Production plant units, silos, pipes, hoses are clean and sanitized
- Products are stored in clean and protected environments

Life Cycle of Polymer Dispersions



- Packaging for transportation and/or storage is dry and clean before use
- Tank trucks are cleaned according to defined procedures, such as the European Cleaning Document (ECD)
- End-product manufacturers take the same care within their production
- Proper procedures – periodic tank cleaning and sanitization – are in place to prevent microbial attack
- The use of additional biocides might be necessary, especially where the product is modified after delivery, e.g. by blending with additional raw materials or diluting with solvents, or where opened containers are placed in storage. Contact your biocide supplier for further plant hygiene recommendations.

Hotspots: Where Hygiene is Especially Important

Typical contamination hotspots arise in the production, transport and processing of polymer dispersions. Here are two examples, along with recommendations.

Sampling

- Use appropriate sample flasks and clean gloves
- Ensure cleanliness of equipment in use (clean and dry immediately after use)
- Avoid contamination when opening a tank, IBC and the like. Ensure caps / lids are kept on a clean surface and are cleaned before closing again.

Tank Trucks

- Clean tank trucks in accordance with defined procedures, e.g. ECD
- Do a full tank cleanout beforehand, typically with compressed air
- Use a doctor blade to remove high-viscosity or tacky products
- Ensure cleanliness of piping equipment when loading and unloading a tank truck or IBC

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Basic Rules of Plant Hygiene

It is advisable for every plant to establish basic rules for plant hygiene. These should include:

- Operation methods
- Bio-monitoring
- Appropriate technical equipment
- Sampling methods
- Tools to enhance awareness

With these in mind, we have drawn up eight golden rules to follow.

Eight Golden Rules for Plant Hygiene

- Avoid or cut off dead ends
- Regularly clean and sanitize equipment, storage tanks, silos, vessels and piping
- Adopt good monitoring procedures
- Use water treatment, e.g. chlorination
- Cleaning – ideally use chlorinated water
- Avoid stagnant water
- Raise personnel awareness
- Properly clean the whole system after contamination

Avoid or Cut off Dead Ends

Parts or areas of pipes in which no fluid is circulating are ideal habitats for microorganisms. They should either be avoided or specific cleaning measures should be implemented. General recommendations are:

- Keep distances short
- Avoid or cut off dead ends

Regularly Clean and Sanitize Equipment

Regular cleaning is essential and works best with established cleaning procedures:

- High-pressure cleaning of silos every 12 to 24 months
- Steam-assisted cleaning of pipes
- Purging of pipes, e.g. with NaOCl (200 ppm)

Adopt Good Monitoring Procedures

For quality control, analysis and tracing are indispensable. Procedures include:

- Microbiological tests (plating)
- Good sampling procedures (suitable, clean sample flasks, gloves etc.)

Use Water Treatment

As water makes an ideal environment for microbial growth, water treatment is crucial. At WACKER, we use only chlorinated water for cleaning processes. Stagnant water poses a risk and should be avoided. We recommend:

- Using clean or chlorinated process-water
- Ensuring clean operation processes

Cleaning – Ideally Use Chlorinated Water

Everything in contact with contamination has to be cleaned. This includes all gloves, filters, etc. used by personnel. Special attention must be paid to:

- Filter changes (dry filters, rinsed gloves)
- Cleaned and purged tubes
- Pumping and piping equipment

Avoid Stagnant Water

Stagnant water (water that is not flowing) is a bio-contamination risk and must be avoided. Recommendations:

- Drain hoses completely
- Dry tanks and hoses thoroughly
- Hang up hoses when not used

Raise Personnel Awareness

Rules will only be followed if they are understood. It is therefore important to hold regular trainings at all hierarchical levels. Only trained plant employees will be able to follow procedures and minimize the risk of contamination. They will be more proactive in identifying weaknesses and more efficient in tracing issues at an early stage. We recommend including the following routine measures:

- Trainings
- Information updates (e.g. e-mail, bulletin boards)
- Inspections (e.g. monthly bio-tour)
- Checklist of hotspots

Properly Clean the Whole System after Contamination

Despite all precautions, contamination can still occur. Microorganisms adapt readily and human error cannot be avoided 100% of the time. Where contamination occurs, the following measures are recommended:

- Emptying, cleaning and sanitization of tanks, vessels, silos, pipes and equipment
- Steam-assisted cleaning of pipes
- Technical improvements, if possible
- Separation of contaminated batches
- Tracing the origin of the contamination

We Support You in Your Efforts!

As a responsible raw materials producer, we keep researching ways to make our products even safer; not only during production, but throughout the whole life cycle. If you need assistance or have any queries, please contact your WACKER sales representative, who will advise you and can forward inquiries to our interdisciplinary bio-competence team.

Wacker Chemie AG, 81737 München, Germany, Infoline +49 89 6279-1741
info@wacker.com, www.wacker.com, www.wacker.com/socialmedia

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