MANAGED PRESERVATION CONCEPTS – Info for poster

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Abstract

Modern preservation of water based consumer goods requires careful balance between cost, efficiency, choice of actives, regulatory compliance and product safety. Over the years biocide formulators have realised that blending actives is the most effective method of preservation, but there are still some drawbacks as a preservative blend cannot cover all applications.

Preservation is also managed with integrated concepts. This means management or control of the environment within which preservatives are used. If raw material sterility, plant hygiene and process control can be optimised, the final preservative used can be applied more effectively, with minimal risk of failure. Pre-sterilising the formulation with DBNPA puts less pressure on the preserving biocide to perform this task, enabling more effective longer term in-can preservation during the shelf life of the product.

Another aspect of managed preservation is controlling the amount of active available in the dry film. By using dry film biocides in a matrix, the degree of release in the application is restricted, reducing leaching to the environment and prolonging efficacy in the application.

These technologies give the manufacturer more control over the preservation of their valuable products, beyond simply adding a biocide and hoping for the best.

Managed Preservation Concepts

Integrated or managed preservation principles enable the paint manufacturer to exert a greater influence on product quality. By understanding and employing these concepts the manufacturer can significantly reduce the possibility of product spoilage at very little actual cost.

Production Hygiene

Due to their ubiquitous and adaptive nature microorganisms will quickly populate a production facility, contaminating various areas: raw materials, raw material storage tanks, pipes, filters, valves, mixing tank surfaces, filling equipment. Without adequate control measures, these microbes end up in the final product, overwhelm the preservative system and cause degradation resulting in spoilage.

2,2-Dibromo-3-nitrilopropionamide (DBNPA) can be used to control extraneous contaminants in 2 ways: by eliminating microbes in the product (preservation enhancer) and sterilising production surfaces. By adding DBNPA as one of the first additives in the production process, microbes from production equipment and raw materials are eliminated. The preserving biocide, added later in the process, is not consumed and is available for its primary task of preventing microbe ingress and reproduction during storage. DBNPA breaks down completely to innocuous compounds by the time the paint is filled. An added advantage is a VOC variant of DBNPA, for low emission paints.

Due to its rapid kill rate, DBNPA is suitable for sterilisation of surfaces, without the need to rinse. Wide spectrum activity means that all typical industrial contaminants are eliminated before they reach the final product. By controlling contamination from raw materials and plant equipment, preservative performance is improved over longer periods.
Physico-chemical compatibility

Selection of the correct biocide active combination for a particular product is based on the chemical and physical characteristics of the product. The biocide has to be stable in the product, which depends on pH, reduction – oxidation potential (REDOX), manufacturing temperature and time and presence of degrading chemicals. The biocide formulator should advise which preservative will be the most stable in the final product. As some biocidal actives are highly reactive there is the possibility that they will cause destabilisation of the product.

Microbiological monitoring and R&D

This role should be performed by the biocide supplier. The advantage of microbiological monitoring is that contamination problems can be prevented if detected early enough. By detecting a source of microbes in the factory and installing an efficient sterilisation regime, contamination of end products can be reduced or eliminated. Biocide selection can be optimised by testing various combinations under laboratory conditions but using site specific microbial contaminants.

Enhanced dry film with Advanced Micro Matrix Embedding (AMME™)

Leaching and instability severely limit the life of dry film actives. By restricting the degree of release into the film and environment, actives will last longer in the film and efficacy will be improved. Various benefits of AMME™ have been realised over the last 10 years:

- Enhanced activity
- Improved stability in-can and dry film
- Broad spectrum efficacy
- Reduced leaching
- Long term performance
- Reduced human and environmental toxicity

As a result the paint manufacturer is offered more options as actives that would have been previously avoided due to excessive leaching or instability can now be used as the unique restricted release mechanism has overcome the disadvantages.

Conclusion

Blending of actives will provide good preservation, but controlling factors surrounding preservative application will enhance microbial control further. By reducing the microbe population from raw materials and production surfaces and ensuring the correct chemistries are used, the likelihood of spoilage is significantly reduced. Biocide specialists should assist in monitoring to ensure microbe control is effective. Changing the characteristics of actives gives them new life and advantages in the dry film not realised in the past.