Antifoams & Defoamers
What is foam?
Before we look at the solution, we need to have an understanding of the problem - the foam itself! In simple terms, foam is a mass of bubbles that is created when a gas is dispersed into a liquid and this dispersion becomes stabilized. Foam is often difficult to break down because it is stabilised by the surface elasticity and surface viscosity of its film. In a pure liquid, foam usually will not form but this is rarely the case in any system and the presence of surface active agents or surfactants are often responsible for the stabilization.

When gas bubbles form, they take on a spherical shape and will begin to rise to the surface. As they emerge, a liquid lamella is formed - the liquid film that separates the bubbles. It is in this film that the surfactant and/or foam stabilizing molecules will orientate themselves. The resulting intermolecular forces between these stabilizing molecules result in the stabilization of the film and thereby the bubble itself. As liquid drains through the lamella the foam film thins and the bubbles become more tightly packed and take on polyhedral shapes. Without the stabilization, the lamella will continue to thin and eventually will rupture (which would occur in a pure liquid).

What is anti-foam?
An antifoam is an additive designed to prevent the formation of foam. Similarly, a de-foamer is used to remove the foam that has already formed in the system. In many instances, the same additive will perform both functions - removing the foam that is present upon its addition and then preventing any further foam from forming.

There are many different types of antifoams but they are all essentially composed of a synergistic mixture of hydrophobic solids and liquids. The liquid needs to have some degree of incompatibility with the foaming medium and have a lower surface tension than the system it is added to. For use in aqueous systems, an antifoam is usually applied in the form of an emulsion or a dispersion containing a surfactant system, which allows emulsification of the hydrophobic components into the medium. This is generally not required for applications in non-water based systems and can simply be the hydrophobic liquid component with or without the hydrophobic solid.

How does an antifoam work?
The basic principle behind the activity of an anti-foam is the destabilization of the film that forms the bubble surface, causing the foam to collapse.

This is achieved by the hydrophobic fluid component of the antifoam having a lower surface and interfacial tension than the foaming medium, which enables them to flow easily over the bubble film. They then occupy the spaces between the foam stabilizing molecules at the liquid-air interface within the system. The hydrophobic solid component in the antifoam assists in the droplets entry into the foam film more easily. They also help increase the penetration depth of the droplet which in turn facilitates the bridge formation, which is explained below.

The major theories of anti-foam action are bridge de-wetting, where the oil droplet enters the foam film and as this thins, the drop forms into a lens shape and bridges the opposite surfaces. De-wetting then occurs through capillary action that draws the film away from the oil droplet and results in the film rupturing. The alternative theory is bridging-spreadling, where that the oil droplet forms the bridge as before but then thins over time and eventually ruptures at its thinnest point, causing the film to rupture. Both are depicted in the diagram beside:
Silicone based antifoam:
One of the most widely used base fluids for antifoam manufacturing are silicone fluids, which consist of a liquid polymerised siloxane (Si–O–Si linkage) backbone as the core structure and may contain different functional groups. Although initially more expensive than other base materials, silicones have proven to be more efficient and thereby more cost effective, often being more active at much lower dosage rates than organic based antifoams.

Silicone fluids are chemically inert, which results in less odour and residue in the systems in which they are applied. This is particularly amenable for use in the food and beverage industry where taste will not be effected. The low surface tension of the silicone fluid base aids in more rapid destruction of the foam and their insolubility in a wide range of systems makes them suitable for use in a much wider range of applications. The non-volatile nature of silicone also prevents evaporation at high temperatures and they are known to be stability over extremes of pH.

Despite all the benefits of silicone based antifoams, there are certain circumstances where silicone cannot be used due to restriction or limitations of the production process. In these cases an alternative, organic/mineral oil based antifoam, would be needed.

Why use anti-foam?
The existence of foam will causes several problems in any process where it is present. If not controlled, foam can reduce production capacity, by occupying production volume; increase processing time; decrease cleaning efficiency or increase cleaning time; can overflow vessels causing loss of product or possible contamination and could even result in damage to production equipment by clogging filters or distribution lines. These all will ultimately result in increased operational costs through maintenance or the need for higher-capacity equipment to compensate for the loss through the foam.

Foam can be often be controlled by making changes to the process itself, however, chemical foam control agents are the most versatile, effective and economical solution to the foaming problem. Furthermore, the introduction of foam can be caused by many of the essential stages during the production process, making it difficult to alter the production method and eliminate the foam formation.

As such, the use of anti-foam will eliminate or reduce the foam in the system to acceptable levels. In doing so, this can effectively increase the capacity of mixing tanks by reducing the volume that would otherwise be occupied by foam (meaning more space for product). Reduction in waste and increase in production efficiency can also be achieved with the use of anti-foams, along with reduced production times (by eliminating holding times for foam removal from products). In the end, this all comes down to saving you money and helping produce a better end product.
About us
Silicone & Technical Products (Pty) Ltd was established in 1984 and is a market leader in the supplying, manufacturing and distribution of silicone and acrylic based products in South Africa. We pride ourselves as top class distributors and re-packers of silicone and acrylic sealants in cartridges, tubes and buckets as well as manufacturers of silicone and chemical products such as antifoams and defoamers, emulsions, compounds and non-silicone antifoam dispersions. We also offer private label products to customers on a range of our product lines, such silicones, acrylics, and cornice adhesives as well as on chemicals products.

Our fully functional quality control laboratory allows us to test all our products and ensure consistently high quality products are supplied to our customers. We also have a full time R & D programme that allows us to continually improve our existing products as well as develop new products to better serve our customers. We are always striving to offer a wider range of products and are also able to work with customers to develop products to suite their specific requirements.

Fulfilling customer needs and demands is our biggest driver, and in March 2011 we received ISO 9001:2008 accreditation from SABS to support our customer promise of delivering continuous quality products and exceptional service. In January 2014 we received ISO 22000:2005 accreditation from SABS to further satisfy this promise and serve as a testament to our dedication to provide high quality products to the food industry. Our food grade antifoams have carried Kosher certification since 2006 and all of our antifoam and emulsion products have carried Halal certification since 2008.

Our mission and vision is to provide work environments where employees can meet their potential and thrive in an atmosphere of “excellence”. We strive to be the industry standard in service delivery to customers. We maintain a superior level of integrity in interactions with business partners and associates. We appreciate our achieved success and we conduct our business as model corporate citizens. Our head office is based in Cape Town and we have regional offices in both Johannesburg and Durban. For further information please refer to our website www.silicone.co.za or e-mail us at info@silicone.co.za