

## Product Information

### Antifoams

#### Product Codes

**A6426 Antifoam 204**  
**A8311 Antifoam 204 (autoclaved)**  
**A5633 Antifoam A Concentrate**  
**A6582 Antifoam A Concentrate**  
Molecular biology grade  
**A5757 Antifoam B Emulsion**  
**A6707 Antifoam B Emulsion**  
Molecular biology grade

**A8011 Antifoam C Emulsion**  
**A5758 Antifoam Y-30 Emulsion**  
**A6457 Antifoam Y-30 Emulsion**  
Molecular biology grade  
**A8082 Antifoam O-30 Molecular biology grade**  
**A8582 Antifoam SE-15 Molecular biology grade**

Store at Room Temperature

#### Product Description

Antifoams are supplied as two basic types of composition or mixtures of the two. Organic antifoams are of synthetic origin. Silicone-based antifoams are generally considered to be siloxane polymers and are also synthetic. Our suppliers generally consider the exact composition to be proprietary.

Products A6582, A6457, A6707, A8082, and A8582 are listed as Molecular Biology Grade and have been tested for use in bacterial fermentation. No significant inhibition is found when *E. coli* or *B. subtilis* is grown in Terrific Broth supplemented with effective concentrations of antifoams. These products have individual data sheets available upon request.

#### Organic Antifoams

##### Antifoam 204 (A6426 and A8311)

Antifoam 204 contains 100% active components and is a mixture of organic non-silicone polypropylene based polyether dispersions. It does not contain mineral oil. Antifoam 204 can itself be considered a surfactant, but it contains no other surfactants. This product is synthetic, and not derived from animal or plant sources. Antifoam 204 can be sterilized repeatedly. The flow properties of Antifoam 204 are such that it can be pumped to a fermentor on an as-needed basis.

For use in microbiological media Sigma recommends a starting concentration of between 0.005% and 0.01%. The optimal amount of antifoam required for various applications will need to be determined. Antifoam 204 is soluble in methanol, ethanol, toluene, xylene, perchloroethylene, and cold water at temperatures below 15 °C. It is insoluble in warm water and ethylene glycol.

Appearance: Clear, colorless viscous liquid  
Density: 1.01 g/ml  
Viscosity: 400 cps  
Cloud Point: 18.0-21.0 °C in 1% aqueous solution

A8311 is supplied autoclaved for aseptic conditions.

Note: Antifoam 204 (100% organic defoaming agents) replaces Antifoam 289 (99% organic defoamer plus 1% silicon glycol as spreadability enhancer).

##### Antifoam O-30 (A8082)

Antifoam O-30 is completely organic, fatty acid ester-type antifoam that is dispersible in water. It can be repeatedly sterilized by autoclaving. The flow properties of Antifoam O-30 are such that it can be pumped to a fermentor on an as-needed basis.

Appearance: Amber-colored, clear liquid  
Density: 0.98 g/ml

#### Silicon Antifoams

The active ingredient of the antifoams is a silicone-based polymer that has a molecular weight range of 3,200 to 16,500 Da. These products consist of particles ranging in size from 10 to 40 microns, and can be removed by filtration.

The silicone-type antifoams are suspensions and must be agitated before a sample is taken from the container to insure representative sampling. In order to remove traces of these types of antifoam from glassware, wash the glassware in hot soapy water followed by an alcohol (isopropanol) wash or bleach.

Autoclaving may result in phase separation and may require remixing the emulsion. A different emulsifier is present in each of the Antifoam emulsions.

Antifoam emulsions B, C, and Y-30 contain preservatives to guard against microbial growth. Long-term storage of diluted material may diminish this antimicrobial effect and additional preservative may be required.

#### **Antifoam A Concentrate (A5633 and A6582)**

Antifoam A Concentrate is an extremely effective foam suppressor for aqueous and non-aqueous systems. It is 100% active silicone polymer. No emulsifiers are present. Antifoam A Concentrate is typically effective at 1-100 ppm. Antifoam A Concentrate should be diluted with 3-10 parts of propylene glycol (aqueous) or vegetable oil (nonaqueous) with slow mixing. The product will be stable in the pH range of 5 to 9. Antifoam A Concentrate can be added directly to a fermentation medium, but it is not recommended that it be pumped to a fermentor on an as-needed basis.

Appearance: Gray liquid  
Density: 0.97 g/ml at 25 °C

#### **Antifoam B Emulsion (A5757 and A6707)**

Antifoam B Emulsion is an aqueous emulsion containing 10% active silicone. It contains non-ionic emulsifiers different from those in Antifoam Emulsions C and Y-30.

Antifoam B Emulsion can be prediluted with 3-10 parts of cool water to aid in dispersion. Prediluted suspensions should be used immediately. Antifoam B Emulsion is typically effective at 1-100 ppm. The flow properties of Antifoam B Emulsion are such that it can be pumped on an as-needed basis to a fermentor system with sufficient agitation to disperse the antifoam.

Appearance: White emulsion  
pH: ~6.5  
Density: 1.0 at 25 °C

#### **A8011 Antifoam C Emulsion**

Antifoam C Emulsion is an aqueous emulsion containing 30% active silicone. It contains non-ionic emulsifiers different from those in Antifoam Emulsions B and Y-30. Antifoam C Emulsion can be prediluted with 3-10 parts of cool water to aid in dispersion. Prediluted suspensions should be used immediately.

Antifoam C Emulsion is typically effective at 1-10 ppm. The flow properties of Antifoam C Emulsion are such that it can be pumped on an as-needed basis to a fermentor system with sufficient agitation to disperse the antifoam.

Appearance: White emulsion  
pH: ~3  
Density: 1.0 at 25 °C

#### **Antifoam Y-30 Emulsion (A5758 and A6457)**

Antifoam Y-30 Emulsion is an aqueous emulsion containing 30% active silicon. It contains non-ionic emulsifiers different from those in Antifoam Emulsions B and C.

Antifoam Y-30 Emulsion can be prediluted with 3-10 parts of cool water to aid in dispersion. Prediluted suspensions should be used immediately. Antifoam Y-30 Emulsion is typically effective at 1-100 ppm. The flow properties of Antifoam Y-30 Emulsion are such that it can be pumped on an as-needed basis to a fermentor system with sufficient agitation to disperse the antifoam.

Appearance: White emulsion  
pH: ~3  
Density: 1.0 at 25 °C

#### **Antifoam SE-15 (A8582)**

Antifoam SE-15 is a 10% emulsion of active silicone polymer and non-ionic emulsifiers. This antifoam is water-dilutable and effective in both hot and cold systems. It can be repeatedly sterilized by autoclaving. The flow properties of Antifoam SE-15 are such that it can be pumped to a fermentor on an as-needed basis.

Appearance: Milky-white liquid  
Density: 1.0 g/ml  
Viscosity: 2000 cps

#### **Precautions and Disclaimer**

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

#### **Storage/Stability**

The recommended storage temperature for antifoams is room temperature.

## Procedure

Antifoams should be added prior to the point where foaming occurs. Alternatively, antifoam can be used as supplied, by wiping on filling nozzles, rims of processing vats, or on a screen suspended above the foaming system. One of the most common applications for antifoams is in microbiological fermentation.

Since one cannot predict the effectiveness of an antifoam for a particular application, antifoams should also be tested to ensure adequate defoaming effectiveness under representative culture conditions for each microorganism. The variables of medium composition, temperature, pH, mixing, and aeration anticipated for the final experimental or fermentation conditions should be used. If the antifoam is not effective under these test conditions either a higher amount of antifoam can be added or a different type of antifoam can be tested.

## Applications

The application of antifoam silicones in the microbiological fermentation technique.<sup>1</sup>

Foam formation and the subsequent cell damage/losses in the foam layer were found to be the major problems affecting cell growth and monoclonal antibody (MAb) production in stirred and sparged bioreactors for both serum-supplemented and serum-free media.

Surfactants in the culture media had a profound effect on cell growth by changing both the properties of bubbles and the qualities of foam formed.<sup>2</sup> Addition of high concentrations of silicone antifoam to a suspension of hybridoma cells in a bubble column reduces the death rate when using medium without a protective component.<sup>3</sup>

The mechanism of antifoaming in a nonionic Triton™ X-100 surfactant solution with silicone polyethers, the so-called "cloud point antifoams," was investigated. The cloud point (CP) studies showed that the CP of a Triton X-100/silicone polyether mixed system is between the CP of the foaming and the antifoam surfactants, due to mixed micelle formation.<sup>4</sup>

Supercritical carbon dioxide was used for the direct extraction of drugs from plasma prior to analysis. The supercritical fluid was directly passed through plasma samples spiked with either a neutral (flavone) or an acidic (ketorolac) drug. The addition of an antifoam agent to the plasma prior to extraction was required to avoid restrictor plugging caused by denaturation of the plasma proteins by the supercritical fluid.<sup>5</sup>

## References

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3. van der Pol, L.A., *et al.*, Biotechnol. Prog., **9**, 504-9 (1993).
4. Nemeth, Z., *et al.*, J. Colloid Interface Sci., **207**, 386-394 (1998).
5. Liu, H., and Wehmeyer, K.R., Chromatogr. B Biomed. Appl., **657**, 206-13 (1994).

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