Antifoams
Antifoams
**Foam Theory - What is foam?**

- **Definition:** A concentrated dispersion of air or gas bubbles in a liquid medium, stabilized by impurities

- **Properties:**
  - Low density and large surface area
  - Liquid in bubble-wall thinned to a lamella

- **Structures:**
  - Spherical
    - Wet
    - Less stable
    - Beer
    - Detergent
  - Polyhedral
    - Dry
    - Highly stable
    - Fire fighting
    - Shaving
Foam Theory - How it’s formed

- **Chemical**
  - Reaction (curing, neutralization, redox, effervescence)

- **Biological**
  - Bacteria & yeast (degradation, metabolism, fermentation)

- **Physical**
  - Handling (blending, extraction, centrifuging, pouring)
Foam Theory - Stability

High Concentration
Low Temperature
High viscosity
High pH

Surface Elasticity - Marangoni ‘self-heal’
Surface Viscosity - Slows bubble drainage
Bulk Viscosity - Maintains trapped air
Electrical Repulsion - Prevents wall thinning
Gas Diffusion - Otswald Ripening
Foam Control Theory - Mechanism

- Bubble wall
- Defoamer
- Entry
- Insoluble
- Dewetting
- Bursting
Foam Control Practise - Antifoam Characteristic

• Be neither soluble or insoluble in foaming media
• Disperse to the surface quickly and evenly
• Cause no unwanted secondary effects
  • Oil spotting
  • Reticulation
  • Separation
  • Poisoning
• Meet regulatory protocol
Foam Control Practise - The ideal antifoam

- Rapid knockdown
- Long lasting effect
- Low addition rates
- Easy to dose
- Cost effective
Foam Control Practise
- Antifoam testing

ASTM 89274 Airstream aerator

ASTM 351976 High shear silverson

ASTM 117352 Liquid cascade

ASTM 360177 Low shear paddle
Foam Control Application
- Application testing

- Basic measuring cylinder shake-test
- Ross Miles test - Diesel fuel
- Rudin test - Fermented beers
- Hamilton Beech test - Latex emulsions
- Wascator test - Detergent antifoams
- Contifoam test - Knockdown & durability
Foam Control
BRB Akasil® Technology

- Silicone fluids
- Silicone compounds
- Silicone emulsion
Foam Control - Akasil® Antifoam Silicone Fluids

- Akasil® Antifoam 12,500 – 80,000 cSt Fluids
- BRB Silicone Oil 100 – 1000 cSt Food Grade
- Akasil® Antifoam 3107 – In solvent
- Akasil® Antifoam 4107 – In solvent
Foam Control - Akasil® Antifoam Compounds

Akasil® ADP 100
Foam Control - Akasil® Antifoam Silicone Emulsion

- Akasil® Antifoam TG/SP – Industrial
- Akasil® Antifoam FD/PS – Food compliant
- Akasil® Antifoam RE – pH stable
- Akasil® Antifoam 642 – Non-silicone
## BRB Antifoam range overview

<table>
<thead>
<tr>
<th>Product</th>
<th>% Silicone content</th>
<th>Technology</th>
<th>Foaming medium</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akasil® ADP 100</td>
<td>100</td>
<td>Compound</td>
<td>Non aq</td>
<td>Technical &amp; food grade</td>
</tr>
<tr>
<td>Akasil® Antifoam TG 10, 20, 30</td>
<td>10, 20, 30</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>General purpose technical</td>
</tr>
<tr>
<td>Akasil® Antifoam RE 20</td>
<td>20</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>Alkali resistant</td>
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<tr>
<td>Akasil® Antifoam SP 20</td>
<td>20</td>
<td>Emulsion</td>
<td>Water</td>
<td>High shear stable</td>
</tr>
<tr>
<td>Akasil® Antifoam 3107, 4107</td>
<td>30, 10</td>
<td>Solvent</td>
<td>Non aq</td>
<td>For hydrocarbons</td>
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<tr>
<td>Akasil® Antifoam 12.5 - 60 K cSt</td>
<td>100</td>
<td>Concentrate</td>
<td>Non aq</td>
<td>For hydrocarbons</td>
</tr>
<tr>
<td>BRB Silicone Oil 100 - 1000 cSt Food Grade</td>
<td>100</td>
<td>Concentrate</td>
<td>Non aq</td>
<td>Food grade</td>
</tr>
<tr>
<td>Akasil® Antifoam FD 10, 20, 30</td>
<td>10, 20, 30</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>Food grade</td>
</tr>
<tr>
<td>Akasil® Antifoam 10, 20, 30 PS (Halal certified)</td>
<td>10, 20, 30</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>Food grade</td>
</tr>
<tr>
<td>Akasil® Antifoam 642</td>
<td>100</td>
<td>Concentrate</td>
<td>Water</td>
<td>General purpose technical, non-Silicone based</td>
</tr>
</tbody>
</table>
Foam Control - Choices

- Customer system
  - Aqueous liquid
    - TG series
    - FD/PS series
    - RE series
    - SP series
    - Akasil® Antifoam 642
  - Non-aqueous liquid
    - Akasil® ADP 100
    - Akasil® Silicone Oil
    - Silicone Oil Food Grade
    - Akasil® 3107/4107
Foam Control In Application
Markets

- Adhesives & Sealants
- Agro-chemicals
- Coatings / inks / Varnishes
- Construction Chemicals
- Detergents & cleaning
- Fermentation

- Food and beverages
- Leather & Textile
- Metal working fluids
- Decorative paints
- Pulp & Paper
- Oil & Petrochemicals
- Starch - Sugar / Potato
- Water Treatment
Foam Control Application - Food

Key factors

- Antifoam are process-aids, seldom ingredient
- Each country has unique food sector
- Universal contract food production
- Observe FDA Limits: 10 ppm antifoam actives
Foam Control in Foods - Regulation

- Chapter 21 FDA 173.340 Direct Food Contact
  - Most relevant paragraph for defoamers

- Chapter 21 FDA 175-178 Indirect Food Contact (Silicone)
  - Adhesives for board & packaging, process lubricants

- Jecfa
  - Joint Expert Committee on Food Additives (PDMS E900)

- HACCP
  - Hazard Analysis & Critical Control Point
Akasil® Antifoam FD10 for meat & fish

**Pork processing**
- Dehairing, scalding
- Meat processing industry

**Digest production**
- Boiling, concentrating
- Rendering industry

**Brine solutions (shellfish)**
- Washing and canning
- Fish processing industry
Akasil® Antifoam FD10 in dairy sector

Condensed milk
- Evaporation under vacuum
- Dairy industry

Whey, protein products
- Lactose processing evaporation, spray drying
- Food ingredients industry

Cleaning/Sanitizing In Process
- Rinsing and draining aid
- I & I detergent producers
Akasil® Antifoam FD10 in sugar preparations

Jams, marmalades & sweets
- Soft fruit boiling, jellies
- Jams & preserves industry

Fruit compotes
- Boiling, sieving dearating
- Dairy industry

Juices, cordials & syrups
- Diluting, boiling, evaporating, bottling
- Soft drinks industry
Akasil® Antifoam FD10 in vegetable & salad

Salads
- Lettuce Washing & sanitising
- Salad packing industry

Vegetables
- Peas beansprout washing cutting
- Vegetable processing industry

Beans and pulses
- Washing, rinsing, cooking
- Canned food industry
Akasil® Antifoam FD20 in food fermentation

**Beers and lagers**
- Fermenting, boiling, centrifuging, yeast transfer
- Breweries

**Alcohol and spirits**
- Bio-culture forming, fermentation
- Alcoholic beverages industry

**Vinegars**
- Fermentation, bottling
- Condiments industry
Foam Control in other food categories

Cooking Oils
- Akasil® ADP 100/Akasil® ADP 2000P (Halal-certified)
- Oils & fats producers

Tofu and Soy Milk Production
- Akasil® Antifoam FD10/Akasil® Antifoam 30PS (Halal-certified)
- Soybean processing industry

Packaging adhesives
- Akasil® Antifoam FD10/Akasil® Antifoam 30PS (Halal-certified)
- Adhesives industry
Foam Control Application - Water Treatment

Key factors

- Hundreds of specialist service providers
- Distributors well placed to offer one-stop shop
- Regulatory limits: generally none
- PDMS attaches to solid waste (non-biodegradable)
Akasil® Antifoam TG10 for effluents

Municipal wastewater
- Aerobic, anaerobic digestion, evaporators
- Domestic water-supply companies

Industrial liquid waste
- Digestion, flotation units, lamella-flow, final effluent
- Chemical plants, food plants, textile/leather producers

Landfill and solid waste
- Leachate treatment, solvent recovery, biogas
- Waste and domestic landfill
Akasil® Antifoam TG10 for process water

Recycling
- Plastic, cement, metal washing, effluent treatment
- Recycling industry

Sanitizing packaging for food
- Boiling, concentrating
- Industrial & Institutional detergent producers

Mining and mineral processing
- Mineral beneficiation, ore flotation
- Mining industry
Akasil® Antifoam TG10 for cooling water

Metal working fluids
- Cutting, grinding, flushing
- Lubricant producers

Wire drawing
- Cooling, antifoaming, deaerating
- Metal processing industry

Boiler treatment
- Antifoaming and dearration
- Water treatment service companies
Foam Control Application - Industry

Key factors

• Many and varied applicational areas
• Many and varied products - often bespoke
• Major pre-requisite is process inertness
Akasil® Antifoam TG10 for processing industry

Textile applications
- Preparation, coloration, finishing
- Textile auxiliary suppliers

Leather processing
- 47 processes in beamhouse, dyehouse
- Leather chemical suppliers

Pulp and paper
- Kraft pulping, brown-stock washing, coating
- Paper chemicals suppliers
Akasil® Antifoam TG20 for formulations

- **Paints, inks, coatings, adhesives**
  - Solvent and water-based systems (Fluorosilicone)
  - Coatings industry

- **Wood preservatives**
  - CCA, Copper triazole, cationics
  - Timber chemical industry

- **Agrochemicals**
  - Pesticides, herbicides, fertilizers, rinsing
  - Agrochemical industry
Akasil® Antifoam TG30 for chemical industry

- **Polymers and latex emulsions**
  - Monomer stripping, styrene-butadiene, acrylonitriles
  - Latex producers

- **Organic resins**
  - PU, PF, UF, blending, distillation, in process
  - Polymers & resins producers

- **Construction cements and mortars**
  - Air-entrainment, plasticizers, chemical grouts
  - Construction auxiliary suppliers
Akasil® Antifoam RE 20 and SP 20 for detergents

**Powder laundry**
- Dry-blend, spray-tower, fluidized bed
- Detergent producers

**Liquid laundry**
- In-line blending, batchwise process
- Detergent producers

**Industrial detergents**
- Professional cleaners & detergents
- Industrial & Institutional detergent producers
Akasil® Antifoam for petrochemical

Exploration and extraction
- Drilling muds, cuttings treatment
- Drilling mud producers

Separation – gas, oil, water
- Demulsifiers (High Visc fluid), S/N scavanging
- Oilfield service companies

Downstream processing
- Refining (Silicone fluid) Diesel (Silicone glycol antifoam)
- Refineries
Bursts your bubbles
Powerful like a major, flexible like a formulator