Foam Theory - What is foam?

Definition: Coarse dispersion of a gas in a small amount of liquid

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, neutralisation, redox, effervescence)

Biological
- Bacteria (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 CV

- 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
- Cost effective
- Low addition rates
- Easy to dose
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 - Diesel fuel
- Rudin Test - Fermented beers
- Hamilton Beech test - latex emulsions
- Wascator test - detergent antifoams
- Contifoam test - knockdown & durability
Foam Control
BRB Snapsil Technology

- Silicone fluids
- Silicone compounds
- Silicone emulsion
- Silicone powder
Foam Control - BRB Silicone Fluids

- **BRB Snapsil 12,500 – 80,000 cSt Fluids**
- **BRB 350 -1000cSt Food Grade**
- **Snapsil 3107 – In solvent**
- **Snapsil 8343 – Polyol modified**
Foam Control
BRB Snapsil Compounds

BRB Snapsil 100
BRB Snapsil 877
BRB 4571 - solid
Foam Control - BRB Snapsil emulsions

- Snapsil TG – Industrial
- Snapsil FD – Food compliant
- Snapsil RE – pH stable
- Snapsil PA 398 - modified
## Antifoam range overview

<table>
<thead>
<tr>
<th>Product</th>
<th>% active</th>
<th>Technology</th>
<th>Foaming medium</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snapsil 100</td>
<td>100</td>
<td>Compound</td>
<td>Non aq</td>
<td>Technical &amp; food grade</td>
</tr>
<tr>
<td>Snapsil TG 10, 20, 30</td>
<td>14, 22, 30</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>General purpose technical</td>
</tr>
<tr>
<td>Snapsil RE 10, 20</td>
<td>15, 30</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>Alkali resistant</td>
</tr>
<tr>
<td>Snapsil 8343</td>
<td>100</td>
<td>Concentrate</td>
<td>Non aq</td>
<td>For aliphatic hydrocarbons</td>
</tr>
<tr>
<td>Snapsil 3107</td>
<td>30</td>
<td>Solvent</td>
<td>Non aq</td>
<td>For hydrocarbons</td>
</tr>
<tr>
<td>Snapsil 12.5 - 60 K cSt</td>
<td>100</td>
<td>Concentrate</td>
<td>Non aq</td>
<td>For hydrocarbons</td>
</tr>
<tr>
<td>Snapsil 4571</td>
<td>100</td>
<td>Powder</td>
<td>Water</td>
<td>Powder detergent</td>
</tr>
<tr>
<td>Snapsil PA 398</td>
<td>57</td>
<td>Non-ionic emulsion</td>
<td>Water / non aq</td>
<td>Mar resistant</td>
</tr>
<tr>
<td>Oil 350 - 1000 cSt Food Grade</td>
<td>100</td>
<td>Concentrate</td>
<td>Non aq</td>
<td>Food grade</td>
</tr>
<tr>
<td>Snapsil FD 10, 20, 30</td>
<td>15, 30, 45</td>
<td>Non-ionic emulsion</td>
<td>Water</td>
<td>Food grade</td>
</tr>
</tbody>
</table>
Foam Control - Choices

Customer system

- Solid
  - Non-critical application: Snapsil 4571
  - Critical application: TG series, FD series, RE series
- Aqueous liquid
- Non-aqueous liquid
  - Snapsil PA 398, Snapsil 844
  - Snapsil 100, Snapsil 8343
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
Initial comments

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

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

- **Ch 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
BRB Snapsil 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
BRB Snapsil 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
BRB Snapsil 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
BRB Snapsil 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
<table>
<thead>
<tr>
<th>BRB Snapsil FD10 in vegetable &amp; salad</th>
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</table>

**Salads**
- Lettuce Washing & sanitising
- Salad packing industry

**Vegetables**
- Peas beansprout washing cutting
- Vegetable processing industry

**Beans and pulses**
- Washing, rinsing, cooking
- Canned food industry
Foam Control in other food

Cooking Oils
- BRB Snapsil 100
- Oils & fats producers

Tofu Production
- BRB FD10
- Soybean processing industry

Packaging adhesives
- BRB Snapsil FD10
- Adhesives industry
Foam Control Application
Water Treatment
Initial comments

- Hundreds of specialist service providers
- Distributors well placed to offer one-stop shop
- Regulatory limits: generally none
- PDMS attaches to solid waste
BRB Snapsil 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
BRB Snapsil TG10 for process water

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

Sanitizing packaging for food
- Boiling, concentrating
- I & I detergent producers

Mining and mineral processing
- Mineral benfication, ore flotation,
- Mining industry
BRB Snapsil TG10 for cooling water

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

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

### Boiler treatment
- Antifoaming and deaeration
- Water treatment service companies
Many and varied applicational areas
Many and varied products - often bespoke
Major pre-requisite is process inertness
BRB Snapsil 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
BRB Snapsil 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
BRB Snapsil RE10 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
- I & I detergent producers
BRB Snapsil 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
BRB Snapsil 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 (Si fluid) Diesel (Si glycol AF)
- Refineries
Bursts your bubbles