

A-C® Performance Additives
WATER-BASED EMULSIONS

Honeywell...

Gives You Every Advantage

Honeywell's A-C® Performance Additives help you make a wide variety of water-based emulsions that let your products perform better, are easier to manufacture, and are cost-effective. They can give you a competitive edge in the marketplace that lets you increase profitability. With a versatile line of nearly 100 polyethylene, copolymer, and micronized polyolefin waxes, we can offer a diverse array of readily emulsifiable compositions, properties, and particle sizes that meet virtually any application requirements you have.

You Have a Wide Range of Choices

This versatile line of A-C Performance Additives includes a variety of different chemical functionalities that can satisfy the needs of just about any type of water-based product that utilizes emulsions. Among our offerings are low molecular weight polyethylene polymers, oxidized polyethylene polymers, and polyethylene copolymers. We also offer the ACumist® series of micronized polyolefins.

You Can Rely on Honeywell's Expertise

Honeywell has more than 45 years of experience in the field of polymer science. We were the first to produce polyethylene waxes. Years of innovation in product design and experience in solving problems for our customers have made our line of

A-C polyethylenes the world's widest, most versatile family of low molecular weight polyethylene waxes.

Today, we are still one of the world's leading manufacturers of low molecular weight polyethylene polymers and copolymers and have the know-how and expertise to consistently deliver products of the highest quality. But products of the highest quality are only part of the Honeywell equation. You also get the advantage of our global supply and customer service capabilities, assuring you of the right product delivered when and where you need it. And you get the benefits of our vast industry applications knowledge and formulations know-how that can help you formulate your products easily and cost-effectively.



A-C Additives for Better Water-Based Emulsions: Typical Properties

Mettler Drop Pt. (ASTM D-3954)			Hardness dmm (ASTM D-5)	Density g/cc (ASTM D-1505)	Viscosity-cps at 140°C (Brookf.)	Acid Number mg KOH/g
Oxidized Homopolymers						
A-C 629	101°C	214°F	5.5	0.93	200	15
A-C 656	98°C	208°F	9.0	0.92	185	15
A-C 673P	110°C	230°F	<1.0	0.95	400	17
A-C 680	108°C	226°F	1.5	0.93	250	16
A-C 6702	88°C	190°F	90.0*	0.85	35	15
High-Density Oxidized Homopolymers						
A-C 316	140°C	284°F	<0.5	0.98	8500 (@150°C)	16
A-C 325	136°C	277°F	<0.5	0.99	4400 (@150°C)	25
A-C 330	137°C	279°F	<0.5	0.99	3600 (@150°C)	30
A-C 392	138°C	280°F	<0.5	0.99	4500 (@150°C)	30
Copolymers/Ethylene-Acrylic Acid						
A-C 540	105°C	221°F	2.0	0.93	575	40
A-C 580	95°C	203°F	4.0	0.94	650	75
A-C 5120	92°C	198°F	8.0	0.94	650	120
Oxidized Copolymer and Maleated Polyolefins						
A-C 645P	100°C	212°F	5.0	0.94	375	13 (SAP#-56) ⁽¹⁾
A-C 597P	143°C	290°F	<0.5	0.94	500 (@190°C)	80
A-C 950P	153°C	307°F	<0.5	0.93	2000 (@190°C)	43

* ASTM D-1321

⁽¹⁾ Saponification No., mg KOH/g



You Can Use Honeywell A-C Performance Additives In a Wide Variety of Applications



Floor Polishes

Emulsions based on Honeywell's specialty waxes optimize the durability and appearance of water-based floor polishes. They provide greater resistance to traffic, gloss maintenance, and low color. These features let you produce floor polishes that last longer, require less maintenance, and cut your customers' labor costs.

We offer you one of the largest choices of emulsifiable polyethylenes, allowing you to select a product or combination of products that let you adjust your formulation to achieve the balance of properties you want.

Emulsifications of our widely-used A-C 316, A-C 325, A-C 392, and A-C 597 waxes require the use of pressure-rated equipment. Your Honeywell representative can give you information on pressure emulsification formulations and processes.

A-C 540 is a directly synthesized (non-oxidized) copolymer wax. It provides emulsions of low color with an excellent balance of wear properties and slip resistance. Honeywell offers a non-oxidized polymer that preserves a "white whiteness" in emulsions. A-C 540 can be readily emulsified using standard processes and surfactants.

A-C 645P is an oxidized copolymer that also emulsifies well but requires careful formulation for maximum performance. It is most useful in applications where high-gloss is important.



Textiles

When applied to a fiber or fabric, emulsions made with Honeywell's A-C oxidized polyethylene waxes serve as sewing lubricants to reduce needle cutting and extend needle life. The high-density polyethylenes are particularly effective lubricants when applied to heavier weight fabrics.

Polyethylene-based emulsions also improve fabric strength, abrasion resistance, and fabric hand. Various grades of oxidized polyethylene polymers and copolymers are used as components in textile softeners, such as napping softeners used to manufacture raised pile fabrics.



Inks

A-C polyethylene waxes help ink formulators create emulsions and dispersions used in quality paste, solvent, or aqueous inks. Honeywell products provide a number of advantages, including improved scuff and scratch resistance, tougher films, excellent slip, reduced blocking and offsetting of stacked sheets. A-C polyethylene waxes also improve control of the coefficient of friction.



Paper

In paper manufacturing, emulsions made with Honeywell specialty waxes work especially well on heavy card stock and on high-speed coating and calendering equipment. Used in aqueous paper coating formulations, they provide excellent lubrication that extends the life of machine parts, such as cutting dies and rolls. They also help reduce dusting processing, while enhancing gloss, printability, release, blocking, and strength. They also impart oil and water barrier properties.



Coatings

Emulsions based on Honeywell's specialty waxes play a vital role in the paint and coatings industry's gradual shift from solvent-based to water-based technologies. These emulsions provide enhanced mar and abrasion resistance and increased surface lubricity that let you produce better, more cost-effective paints and coatings for your customers. Just as important, they give you environmentally sound alternatives to solvents and other increasingly regulated paint and coating compounds.



Other Applications

The potential uses for emulsions based on Honeywell's A-C performance additives is virtually limitless. In agriculture, for example, A-C 673P anionic emulsions improve the gloss, appearance and storage life of citrus fruits. Certain of our A-C polyethylene waxes are well suited for use as direct and indirect food additives under FDA 21 CFR regulations. They are also used in spreader-stickers for pesticides and in dust-control coatings for fertilizers.

Emulsions based on Honeywell products are also used to provide controlled release properties for urea; to make scratch prevention lubricants for glass bottle packaging; and to formulate finish enhancers for corrugated cardboard. Honeywell wax-based anionic emulsions are also used in leather finishing, and in the manufacture of mold release agents and anti-corrosion coatings.



Here's How A-C Additives Help You Make Better Water-Based Products

Emulsions are the backbone of many successful water-based products. An efficient emulsion holds together the immiscible phases of the product, keeping the ingredients from separating and settling during storage, distributing them throughout the mixture homogeneously, and allowing them to perform their functions effectively.

A-C products do this job extremely well. In addition, they impart a number of other important properties to waterborne formulations. These include gloss, lubrication, barrier properties, scratch resistance, slip control, abrasion resistance, and anti-blocking properties.

Our products help improve the properties of your existing lines, and they give you a boost in formulating your second-generation lines. They let you lead the way with new products and applications that keep you in front of the field. You get the competitive edge you need to succeed in the marketplace.

Surfactant-Type Emulsion Characteristics

There are a wide variety of emulsion formulations. However, regardless of their final composition, most surfactant-type emulsions contain a number of common elements.

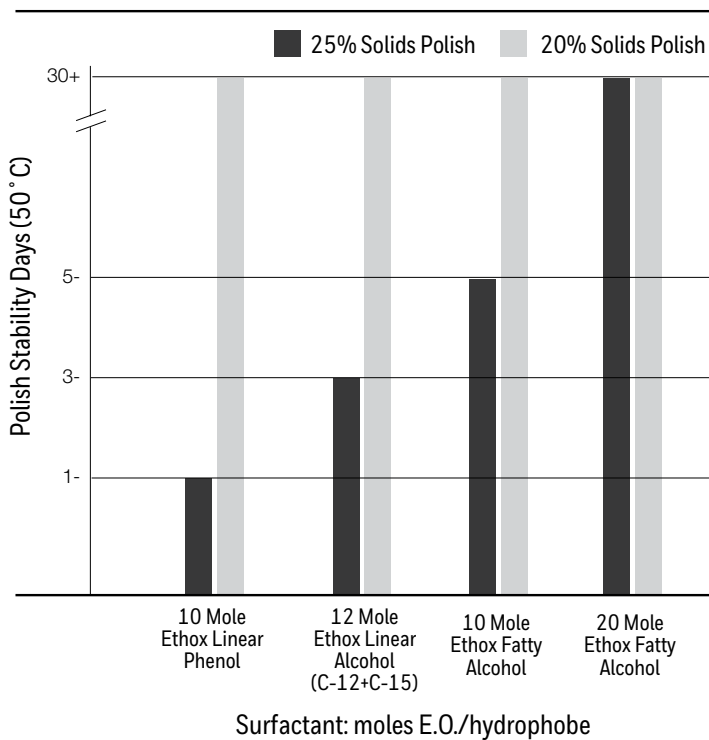
These include:

- Water
- A polymer, wax, or oil
- A surfactant
- A base, such as KOH, NaOH, or an amine
- And a salt, with ionic content, such as $\text{Na}_2\text{S}_2\text{O}_5$, NaCl, or acetic acid (in some instances the ionic portion can be omitted)

Emulsions used in water-based products should offer a balance of properties, including:

- pH – from 3 (cationic) to 10 (nonionic)
- Viscosity – from 7 to 300 cPs (Brookfield LVT, Spindle 1 or 2, ambient temperature, 20rpm)
- Clarity – transmittance > 50% (1% w/w @ 500nm)
- Non-Volatile Content – from 25 to 40%
- Wettability – contact angle on substrate
- Film Forming – dry, brittle or soft, tacky films

Polyethylene Emulsion Stability (Low Density Grades)



Solids, Viscosity, and pH

A major challenge in developing suitable polyethylene emulsions is stability (compatibility). This is especially true when formulating floor finishes with a 25% solids content. Experiments with general classes of ethoxylated surfactants, nonylphenols, linear-alcohols and fatty alcohols soon established a clear trend. Polyethylene emulsions made with fatty alcohol ethoxylates were considerably more stable than those made with other hydrophobic structures.

The degree of ethoxylation (e.g. 10 moles vs. 20 moles on fatty alcohols) is also important. For example, in floor polish applications, the total weight of polish solids is critical as well. In polish formulations containing 20% solids, stability criteria were easily met. But in formulations containing 25% solids, only a wax emulsion made with 20 mole ethoxylated fatty alcohol provided satisfactory performance.

When choosing an appropriate surfactant, you must consider the viscosity and viscosity stability of the finished emulsion. Emulsion viscosity varies considerably with surfactant type. Concentration, emulsion solids, the process (direct vs. dilution), and the polymer used are also factors. The chart shows emulsion viscosities for various surfactants and conditions.

An emulsion with a viscosity above 100 cps may cause thickening when formulated into a high solids polish. This condition may occur without any evidence of coagulation or flocculation. Predilute a viscous emulsion with water to an acceptable viscosity before adding it to the polish.

Emulsion pH is also an important factor in viscosity stability. The optimum pH range is 9.1 to 9.5. At pH levels above 9.5, some emulsions tend to thicken on aging. You can significantly alter emulsion clarity and particle size by varying the surfactant concentration and the pH.

Emulsion Clarity & Particle Size

Emulsion clarity and particle size can be significantly altered by varying surfactant concentration and pH. In the first example, A-C 540 was emulsified with a nonionic surfactant using a typical pressure/direct process. The following tables show results of experiments conducted with varying surfactant and alkali concentrations.



Emulsion Viscosity: Process-Pressure-Dilution & Direct

Polymer	Surfactant) Type	Surfactant) Conc. %*	Typical Emulsion Solids %	Viscosity (CPS)
A-C 540	Ethoxylated	20	40	143
	Alcohols ¹	20	35	30
		17	40	65
	Ethoxylated	20	35	19
	Alcohols ²	17	30	13
A-C 325	NP 9.2-10 ³	23	40	65
		20	35	17

* On emulsion solids

1 Polyoxyethylene (20) oleyl ether

2 Polyoxyethylated fatty alcohol (oleth-20)

3 Nonyl phenol 9.2- 10 moles EO

Emulsification Processes

Generally speaking, there are two primary methods for making emulsions – the atmospheric method and the pressure method. Atmospheric emulsification was the process of choice when emulsifiable polyethylenes were first developed. As the usefulness of these products became well-known, demand outstripped atmospheric capacity. The introduction of pressure emulsification allowed major increases in throughput and turnaround time.

There are two basic atmospheric methods. The water-to-wax process is seldom used for commercial polyethylene emulsions. This technique is used mostly for emulsifying low-viscosity natural waxes such as carnauba. In the wax-to-water emulsification process, a stirred melt tank is positioned above an emulsions kettle. Wax and surfactant are melted together, then transferred to the emulsion kettle while constantly stirring.

The refinement of the pressure process for emulsification has benefited a host of water-based specialties. Historically, the textile and polish industries were the early users of emulsions made by the pressure method. Today, as a myriad of environmental regulations control air and ground emissions, many of the classical solvent-based applications, including inks and coatings, are converting to water-based systems with emulsions produced by the pressure process.

The pressure method offers a number of advantages. Throughput is faster as super heated water is an effective heat transfer medium that produces rapid melting. Because you are working in a closed system, VOCs are reduced when you use amines. And, important to improving cost-effectiveness, batches can be reworked if the quality is not satisfactory. Typically, most formulations developed for an atmospheric process can be converted to pressure, usually with minor formulation adjustments. When emulsifying higher-melting waxes (>135°C), the pressure process is a practical and convenient method.

Honeywell will supply specific formulations and easy-to-follow, step-by-step procedures for these processes.

Emulsion: Surfactant Variable

	Parts by Wt.	Surfactant % Level	pH	Transmittance (600 nm)	Average Particle Size* (microm)
A-C 540	40	5	9.9	10	0.082
NP 9.2-10 ¹	5-10	8	9.8	56	0.046
KOH	0.85	10	9.7	58	0.03
NaCl	0.3				
Water 30%	109-126				

* Determined by Photon Correlation Spectroscopy Increased surfactant levels exhibit a marked effect in reducing particle size.

1 Nonyl phenol 9.2-10 moles EO

Atmospheric Techniques: Wax to Water

	Anionic	Nonionic (Parts by Weight)	Cationic
A-C Polyethylene	40	40	40
Fatty Acid	7	–	–
Amine	7	–	–
Ethoxylated Surfactant	–	10	–
Ethoxylated Amine	–	–	12
Potassium Hydroxide (90%)	–	0.6	–
Ethylene Glycol	–	1.2	–
Glacial Acetic Acid	–	–	3
Water	(to 25-30% Solids)		

NOTE: The copolymer waxes A-C 540, 580, and 5120 can also be emulsified atmospherically using a higher concentration of alkali.

Emulsion: pH Variable

	Parts by Wt.	KOH Level	pH	Transmittance (600 nm)	Average Particle Size* (microm)
A-C 540	40	0.6	9.3	<1	0.132
NP 9.2-10 ¹	8	0.7	9.4	<1	0.122
KOH	0.6-0.95	0.85	9.8	58	0.046
NaCl	0.3	0.95	9.9	69	0.04
Water 30%	114				

* Determined by Photon Correlation Spectroscopy In this example, the pH, as governed by the concentration of base, also plays an important role in the ultimate particle size and clarity of the emulsion.

1 Nonyl phenol 9.2-10 moles EO

Atmospheric Process – General Procedure

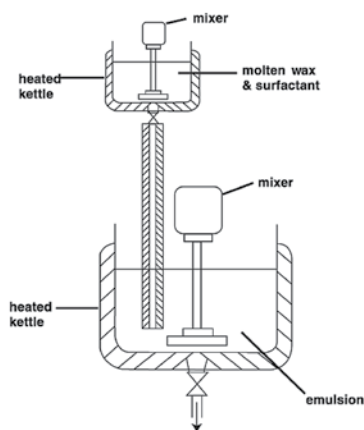
Load the wax and the first part of the surfactant system, the fatty acids (for anionic emulsions), or the ethoxylated fatty amine (for cationic emulsions), or the ethoxylated fatty alcohol (for nonionic emulsions).

Melt by heating to the following temperatures:

- Anionic: 125 – 130°C
- Cationic: 115 – 125°C
- Nonionic: 120 – 135°C

Exact temperatures depend on the grade of wax used.

Stir in the other ingredients, except for water, until the saponification reaction is complete. For the anionic emulsions, cool the wax/fatty acid blend to the lowest temperature at which it will remain liquid before adding the amine. This prevents excessive amine evaporation. Then reheat the saponified mixture to 125 – 130°C. Slowly pour the blend into water preheated to 95 – 98°C with agitation sufficient to form a small vortex. To get swift, efficient dispersion, pour the blend at the side of the vortex. Cool the emulsion to room temperature (at least to 40°C) as quickly as possible while stirring. This assures a high quality, stable emulsion with fine particle size. Potential problems in the finished emulsion are haze, particle filling, or gelling. A major contributor to poor emulsion quality is incorrect temperature control of the water or the wax. The list shows common problems in the atmospheric process, their causes, and recommended solutions.



Emulsification: Wax to Water

Anionic		Parts by Weight	
A-C 629 or A-C 680	40	—	—
A-C 540	—	40	—
A-C 580 or A-C 5120	—	—	40
Fatty Acid	7	7	—
Amine ¹	7	7	10
Water	150	150	150
Cationic		Parts by Weight	
A-C 629 or A-C 680	40		
Ethoxylated fatty amine ²	12		
Glacial acetic acid	3		
Water	150		
Nonionic		Parts by Weight	
A-C 629 or A-C 680	40	—	—
A-C 540	—	40	—
A-C 5120	—	—	40
Ethoxylated fatty alcohol ³	10	10	10
KOH (86%)	0.6	—	—
Ethylene glycol	1.2	2	—
Water	150	150	150

¹Anionic emulsions: preferred amines are DEAE (Diethylaminoethanol) and AMP (2-amino 2-methyl 1- propanol)

²Cationic emulsions: preferred surfactants are stearyl and tallow amines with 2 moles ethylene oxide

³Nonionic emulsions: number of moles of ethylene oxide (EO) are 9 to 12 for A-C 629 and A-C 680, 15 for A-C 540, and 25 for A-C 5120 emulsions

Typical Problems	Probable Causes	Recommended Solutions
Emulsion boils in vessel	Water too hot	Remove heat from vessel before adding wax melt
	Wax melt too hot	Add wax melt at lower temperature
	Wax melt added too rapidly	Add melt slower
	Insufficient agitation	Increase stirrer speed
Film forms on surface	Insufficient agitation	Increase stirrer speed
Emulsion thickens or occurs during gelling cooling	Too much caustic	Decrease caustic
	Too much surfactant	Decrease surfactant
	Solids too high	Decrease solids
Emulsion too dark	Too much caustic	Decrease caustic
	Wax melt heated too long	Decrease heating time
Opaque emulsion	Insufficient caustic	Increase caustic
	Insufficient surfactant	Increase surfactant
Opaque emulsion or particles in emulsion	Water too cold	Increase water temperature
	Wax melt too cold	Increase melt temperature
	Surfactant volatilized	Add volatile surfactant to melt just before melt is added to water
	Incorrect acid or alkali content	Add melt under water via heated tube

There are two methods for the pressure process –direct and indirect.

Direct Method

For the direct method, first charge water into the pressure vessel and begin stirring. Add the remaining ingredients. Close the vessel and start heating. Maintain the process conditions as follows:

- A-C 5120 anionic emulsion:
10 min. at 110°C
- A-C 629 and A-C 680 cationic emulsion:
15 min. at 115-120°C
- A-C 316 and A-C 330 cationic emulsion:
30 min. at 150°C
- A-C 629 and A-C 680 nonionic emulsion:
30 min. at 135-150°C
- A-C 540 nonionic emulsion:
30 min. at 135°C

Next, cool the emulsion as quickly as possible, preferably through an external heat exchanger. The direct method is the simplest procedure to use. All raw materials are charged into the reactor. The mixture is heated to a given temperature, reacted for a short time, and cooled.

Indirect Method

The indirect, or pressure dilution method is similar to the direct method except for the water addition step. First charge some of the water into the pressure vessel and begin stirring. Add the remaining ingredients. Close the vessel and start heating. Maintain the process conditions as follows:

- A-C 629 and A-C 680 anionic emulsion:
15 min. at 120-130°C
- A-C 316, A-C 330 and A-C 392 anionic emulsion: 30 min. at 150°C
- A-C 540 anionic emulsion: 30 min. at 135°C
- A-C 629 and A-C 680 cationic emulsion:
15 min. at 120-135°C
- A-C 316 and A-C 330 cationic emulsion:
30 min. at 150°C
- A-C 316, A-C 330 and A-C 392 nonionic emulsion: 30 min. at 150°C

Preheat the rest of the water to 95°C and inject it into the vessel at the temperature of the initial blend. Next, cool the emulsion as quickly as possible, preferably through an external heat exchanger. The indirect method is more complex. However, some formulations can only be made by a dilution procedure. After sufficient reaction time (15 to 30 minutes at temperature), the preheated dilution water is pumped into the emulsion vessel under pressure. Some formulations may be enhanced by incorporating small quantities of various salts in the dilution water

Notes:

1. The amines and ethoxylated fatty amines recommended for the wax-to-water emulsification process are also preferred for the pressure process.
2. The emulsions range from strongly cationic (pH=4.5) to weakly cationic (pH=6.5) as the proportion of fatty acid increases.

Pressure Emulsification: Direct and Indirect

Anionic Parts by Weight.				
	Direct	Indirect		
A-C 629 or A-C 680	–	40	–	–
A-C 392, A-C 330 or A-C 316	–	–	40	–
A-C 540	–	–	–	40
A-C 5120	40	–	–	–
Fatty Acid	–	7	7	7
Amine	10	7	7	7
Water	200	50	50	50
Injected Water	–	100	100	100

Cationic 1. Oxidized homopolymers Parts by Weight				
	Direct			Indirect
A-C 629 or A-C 680	40	40	40	40
Ethoxylated fatty amine (2EO) (5EO) (10EO)	–	–	12	–
	12	–	–	–
	–	12	–	–
Imidazoline S	–	–	–	12
Glacial acetic acid	0.8	0.2	3	3
Na ₂ S ₂ O ₅	0.4	0.4	0.4	0.4
Anti-foam agent	–	–	–	0.5
Water	150	150	150	50
Injected Water	–	–	–	100

Cationic 2. Oxidized high density polyethylenes		Parts by Weight	
	Direct	Indirect	
A-C 330 or A-C 316	40	40	
Ethoxylated fatty amine (2EO)	12	–	
Imidazoline S	–	12	
Glacial acetic acid 3 3	–	–	
Na ₂ S ₂ O ₅	0.4	0.4	
Anti-foam agent	–	0.05	
Water	150	50	
Injected Water	–	100	
Nonionic		Parts by Weight	
	Direct	Indirect	
A-C 629 or A-C 680	40	–	–
A-C 392, A-C 330 or A-C 316	–	–	40
A-C 540	–	40	–
Ethoxylated fatty alcohol	10	10	–10
KOH (86%)	0.6	1.2	1
Na ₂ S ₂ O ₅	0.4	0.4	0.4
Water	75	150	50
Injected Water	–	–	46
KOH (86%)	–	–	0.2

Pressure Dilution

	Anionic ^a	Nonionic ^b	Cationic ^c
	(Parts by Weight)		
A-C 629	40	–	–
A-C 325	–	40	–
A-C 392	–	–	40
Fatty Acid	7	–	–
Diethylaminoethanol	7	–	–
Ethoxylated Surfactant	–	10	–
Oleyl Imidazoline	–	–	16
Potassium Hydroxide (90%)	0.85	0.66	–
Sodium Metabisulfite	0.4	0.4	0.4
Glacial Acetic Acid	–	–	1
Water (for Solids/%)	70%	50%	50%
Water (Dilution) (for Solids/%)	25%	35%	30%
Potassium Hydroxide (90%) (Dilution)	–	0.6	–
Glacial Acetic Acid (Dilution)	–	1.5	–

Reaction Temperatures °C

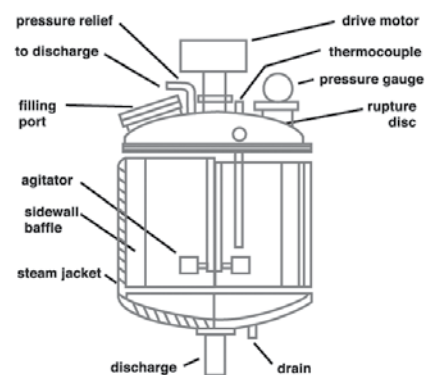
a A-C 629; 135°C for 30 minutes

b A-C 325; 150°C for 30 minutes

c A-C 392; 150°C for 30 minutes

Because of their high softening points, A-C 300 series polyethylenes require pressure for emulsification. The most widely used surfactants are nonionic. The two charts shown here list potential problems, their causes, and their remedies. It is best to conduct your initial experiments in a laboratory-size reactor as this lets you examine many variables in a short time. Among the variables are: surfactant type and concentration, solids, pH, and choice of process (direct vs. dilution). If pilot plant facilities are available, test the process there as well before moving to full plant production. There are several factors to consider before scaling up the process. The variables you encounter in a large vessel may differ somewhat from those found in the pilot plant. These include:

- Heating and cooling rates
- Agitation – configuration and positioning of the impeller(s)
- Baffling – number and type
- Filtration – type and location
- Agitator drives – variable speed with sufficient power to handle melt viscosities
- Vessel geometry
- Heating capacity
- Dilution intervals and techniques.



Pressure Direct

	Anionic ^a	Nonionic ^b	Cationic ^c
	(Parts by Weight)		
A-C 680	40	—	—
A-C 540	—	40	—
A-C 330	—	—	40
Fatty Acid	7	—	—
Diethylaminoethanol	5-7	—	—
Ethoxylated Surfactant	—	10	—
Ethoxylated Amine	—	—	16
Potassium Hydroxide (90%)	0.85	0.85	—
Sodium Metabisulfite	0.4	—	0.4
Sodium Chloride	—	0.3	—
Glacial Acetic Acid	—	—	2.5
Water (for Solids/%)	25%	30%	25%

Reaction Temperatures °C

a A-C 680; 135°C for 30 minutes

b A-C 540; 135°C for 30 minutes

c A-C 330; 140-145°C for 15 minutes

Direct Emulsification

Problem	Probable Cause	Remedy
Solid KOH at bottom of kettle	Incorrect addition sequence	Add one half water first, stir slowly, add A-C polyethylene, remainder of water, KOH, and surfactant
Unmelted polymer	Insufficient stirring or heat. Dead spot in kettle	Increase stirring Increase heat Install baffles
Boiling	Kettle leak	Repair

Dilution Emulsification

Problem	Probable Cause	Remedy
Solid material present	Dilution water too cold, or added too quickly or with poor stirring Too much KOH withheld from original kettle charge.	Maintain dilution water at 90°C, increase stirring. Change KOH ratio of initial to dilution. Recovery of problem batch: reheat to 150°C, cool immediately.

The competitive edge

A-C Performance Additives offer many important advantages and properties when used to make emulsions for a wide variety of applications. The characteristics they provide let you make more efficient, more cost-effective products that keep your customers satisfied.

Learn how to put the power of A-C Performance Additives to work for you.

Visit our web site: **www.honeywell-additives.com**.

NOTE:

The formulations and procedures are only suggestions for customer consideration. Customers are responsible for formulating and using products in their own processes.

For additional information or to contact us, please visit:
honeywell-additives.com

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OUR COMMITMENT TO SUSTAINABILITY

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