

easy-spense™ P-20

polymeric dispersant for
agriculture formulations



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always solving™

Ashland has a range of specialty performance products to solve complex agrochemical formulations. Easy-Sperse™ P20 is an effective dispersant/binder/rainfastness agent that can be used with existing commercial dispersants.

superior suspension of agrochemical formulations

Easy-Sperse™ P-20 dispersant is a polymeric technology for improving the suspension stability of agrochemical formulations. Easy-Sperse™ P-20 dispersant features a synergistic composite of PVP (polyvinyl pyrrolidone) and MVE-MAHE (Methyl Vinyl Ether/Maleic Acid Half Ester Neutralized) copolymer that, together, lend super stabilizing effects to hydrophobic agrochemical actives. The EPA TSCA exempt polymer serves as an excellent binder to Diuron, Isoproturon, Imidacloprid and other actives, providing the benefit of stable suspensions in both concentrated and diluted forms.

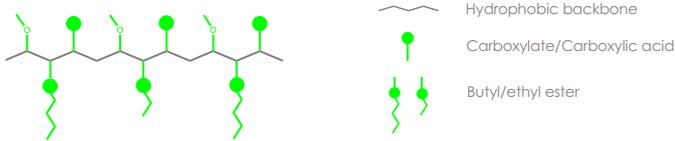
Easy-Sperse™ P-20

Synergistic, spray-dried composite of Polyvinyl Pyrrolidone (PVP) and partially neutralized methyl vinyl ether maleic acid butyl/ethyl half ester polymer

PVP



MVE/MA butyl/ethyl half ester polymer



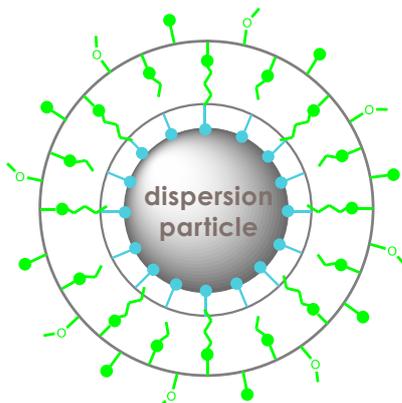
Easy-Sperse™ P-20 – mechanism

PVP

- Pyrrolidone groups associate with particle surface through polar interactions or electronic stacking

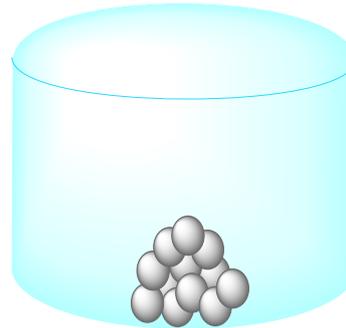
MVE/MA butyl/ethyl half ester polymer

- Hydrophobic Butyl/ethyl esters associate with hydrophobic PVP backbone
- Carboxylate groups render electronic charge density to exterior surface



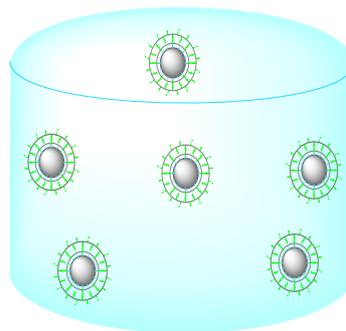
Easy-Sperse™ P-20 – mechanism

without Easy-Sperse™ P-20



aggregation and eventual precipitation
unstable suspension

with Easy-Sperse™ P-20



short range electronic repulsion
stable suspension

improved suspension of hydrophobic actives

Agrochemicals made with water-insoluble actives require a stronger dispersant system than is afforded by standard polymeric technologies. In absence of a strong dispersant, suspension concentrates of fungicides, insecticides, herbicides and other plant growth regulators will exhibit poor suspension stability immediately following dilution in water. Low suspension stability of actives will result in over or under dosing, leading to problems such as lower yields. Adding Easy-Sperse™ P-20 dispersant to suspension concentrates and diluting them to compositions containing 0.2% -1% active show greater than 80% suspension after 4 hours. The same formulations tested without Easy-Sperse™ P-20 dispersant show less than 50% suspension in most cases.

key benefits

- improved suspension of diluted formulations
- superior stability of hydrophobic actives
- excellent compatibility with formulation ingredients
- more uniform application of actives in the field
- lower cost-in-use with improved a.i. efficacy
- added benefit of rainfast properties

Easy-Sperse™ P-20 polymeric dispersant for suspension concentrates

improved suspension of concentrates

Ashland tested formulations of 30% Isoproturon, 40% Diuron, and 40% Imidacloprid, with and without 2.5% Easy-Sperse™ P-20 dispersant to demonstrate the suspension of concentrates following dilution. Figure 1 shows significantly higher suspension performance in formulations containing Easy-Sperse™ P-20 dispersant after heat age testing (HAT) at 50°C for 30 days.

better rainfast properties of suspension concentrates

With respect to rainfast performance, Ashland tested formulations of 40% Diuron, with and without Easy-Sperse™ P-20 dispersant. As shown, the recovery of Diuron in formulations containing Easy-Sperse™ P-20 dispersant is much greater than in those without Easy-Sperse™ P-20 dispersant, indicating enhanced water resistance during water rinsing.

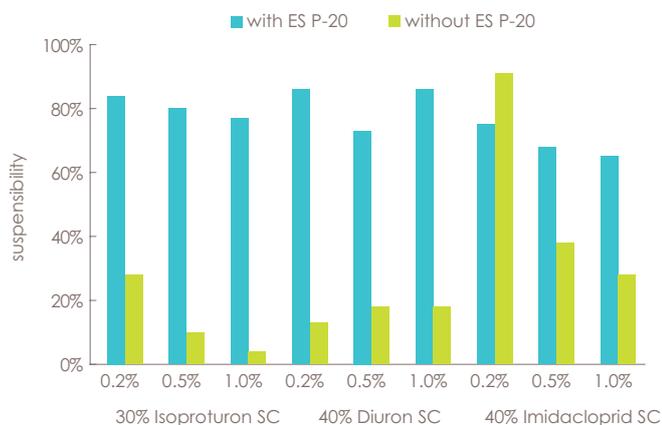
SC formulations with and without Easy-Sperse™ P-20

%	isoproturon 30%		diuron 40%		imidacloprid 40%	
	with	without	with	without	with	without
AI	30	30	40	40	40	40
ES P-20	2.5	...	2.5	...	2.5	...
sodium salt, sulfonated aromatic polymer ^a	2	2	2	2	2	2
sodium lignosulfonate ^b	2	4.5	2	4.5	2	4.5
Easy-Wet™ 20	1	1	1	1	1	1
defoamer	0.2	0.2	0.2	0.2	0.2	0.2
thicker	0.3	0.3	0.3	0.3	0.3	0.3
distilled water	62	62	52	52	52	52
total (%)	100	100	100	100	100	100

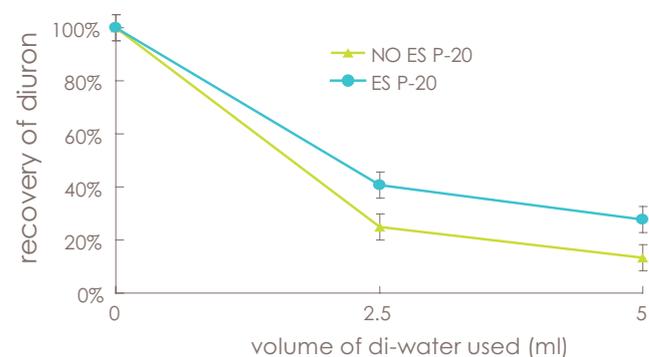
^a sodium salt, sulfonated aromatic polymer, CAS No. 9008-63-3.

^b sodium lignosulfonate, CAS No. 8061-51-6.

suspension stability with 0.2%, 0.5% and 1.0% Easy-Sperse™ P-20 (ES P-20)



rainfastness of 40% diuron formulations



improved suspension of water dispersible granules

In water-dispersible granule products, Ashland tested formulations of 90% Atrazine, 75% Nicosulfuron and 80% Diuron, with and without 3% Easy-Sperse™ P-20 dispersant, to demonstrate suspension performance. Most samples without Easy-Sperse™ P-20 dispersant were below 50%, while the samples with Easy-Sperse™ P-20 dispersant showed suspension values ranging

from 78% to 99% before heat age testing (HAT) at 1/200 dilution and 4 hours standing. Suspension of 90% Atrazine increased six times in water after adding 3% Easy-Sperse™ P-20 dispersant. After heat age testing at 50°C for 30 days, the suspension values decreased by 5% to 10%.

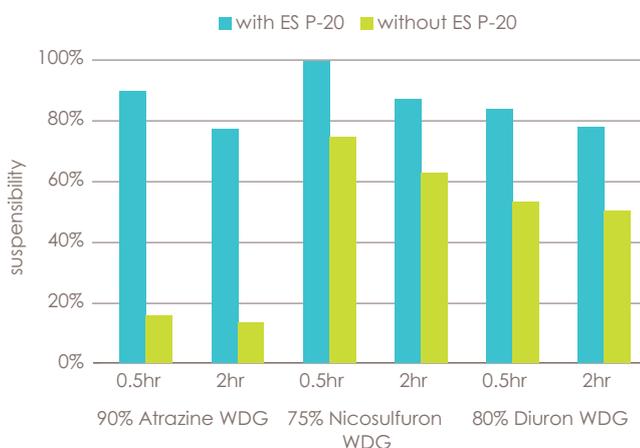
WDG formulations with and without Easy-Sperse™ P-20

%	atrazine 90%		nicosulfuron 75%		diuron 80%	
	with	without	with	without	with	without
AI	90	90	75	75	80	80
ES P-20	3	...	3	...	3	...
sodium salt, sulfonated aromatic polymer ^a	2	3	4	4	2	3
sodium lignosulfonate ^b	1	3	3	6	1	3
Easy-Wet™ 20	...	...	1	1	1	1
other wetting agent	1.5	1.5	2	2	2	2
deformer	0.5	0.5	0.5	0.5	0.5	0.5
ammonium sulfate	...	...	1	1	1	1
Agrimer™ AT	2	2	3	3	3	3
filler	...	...	7.5	7.5	7.5	7.5
total (%)	100	100	100	100	100	100

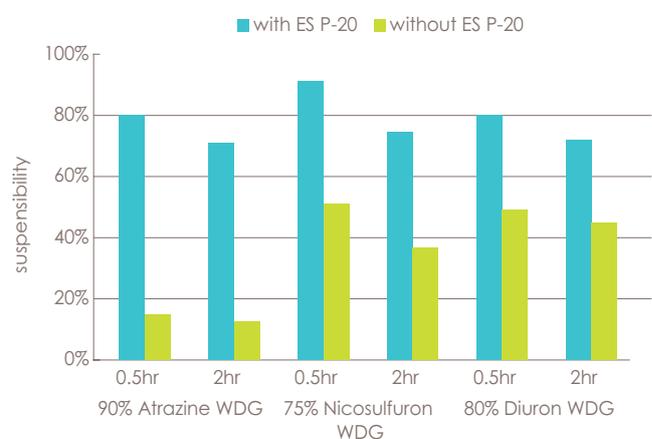
^a sodium salt, sulfonated aromatic polymer, CAS No. 9008-63-3.

^b sodium lignosulfonate, CAS No. 8061-51-6.

suspension stability before HAT



suspension stability after HAT



suspension stability following dilution

Suspension concentrates and water-dispersible granule forms of herbicides, fungicides, insecticides and other plant growth regulators are highly diluted in water prior to application. High-performing dispersant technology offers the assurance of good suspension stability following dilution. Use of 1% Easy-Sperse™ P-20 dispersant in pre-formulated suspension concentrates diluted to use level, typically 1/50 – 1/1000, show better suspension performance properties when compared with formulations containing no dispersant.

Commercial formulations pictured here include 40% IPBC (Iodopropynyl butylcarbamate) diluted 1/100 in tap water. Photographs taken at the zero hour, 2-hour and 18-hour mark show significantly higher suspension stability properties immediately following and long after dilution. In Figures 1, 2 and 3:

- A Indicates formulations with Easy-Sperse™ P-20 dispersant
- B Indicates formulations without Easy-Sperse™ P-20 dispersant

figure 1: zero hour

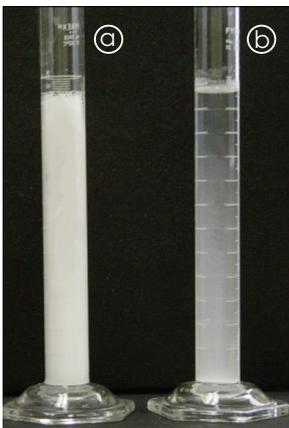


figure 2: after two hours

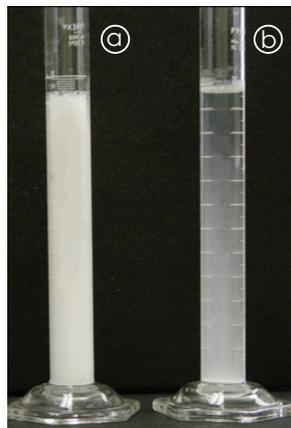
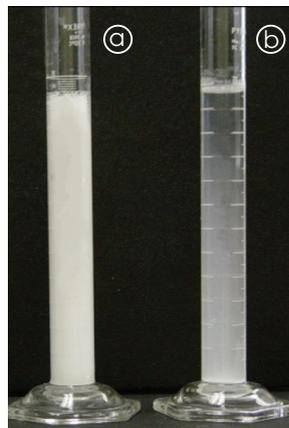


figure 3: after 18 hours



summary of results

Based on these photos it is easy to see that commercial formulations without Easy-Sperse™ P-20 dispersant are susceptible to settling within a short period of time. On the other hand, commercial formulations with Easy-Sperse™ P-20 dispersant provide the assurance of stability for an extended period.

Easy-Sperse™ P-20 polymeric dispersant for suspension concentrates

typical properties

Easy-Sperse™ P-20 dispersant is a spray-dried, optimized composite of MVA-MAHE copolymer and polyvinyl pyrrolidone.

Appearance @ 25°C	White powder
Percent of bound water	<10%
Flash point	>100°C
pH in 10% solution	3.5- 6.0
CAS number	9003-39-8; 205193-99-3
TSCA inventory	Polymer exempt

dial-in performance

Easy-Sperse™ P-20 is synergistic with other commercial dispersants. This allows formulators to include additional polymeric dispersants as a strategy to dial-in higher production levels of performance when needed.

Ashland offers a range of solutions for agrochemical formulas containing a series of hydrophobic actives. For more information about Ashland's portfolio of products, visit ashland.com.

usage notes

Easy-Sperse™ P-20 dispersant can be used in the preparation of zero-VOC suspension concentrates or water-dispersible granules. Approved for use in both food and non-food crops, the recommended use level is 1-3% on a dry weight basis and may be used with co-dispersants, such as Lignosulfonates, Naphthalene sulfonate condensates, or other polymeric dispersants, such as polyacrylates, maleic acid styrene copolymers and EO/PO block polymers.

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