

RHEOLOGY SOLUTIONS

SETTLING OF PARTICLES IN FLOWABLE HERBICIDES

PROBLEM

A manufacturer of flowable herbicides found that a new product, composed of solid particles dispersed in a liquid medium, was separating during shipment. The solid particles were settling and presenting redispersion problems.

SOLUTION

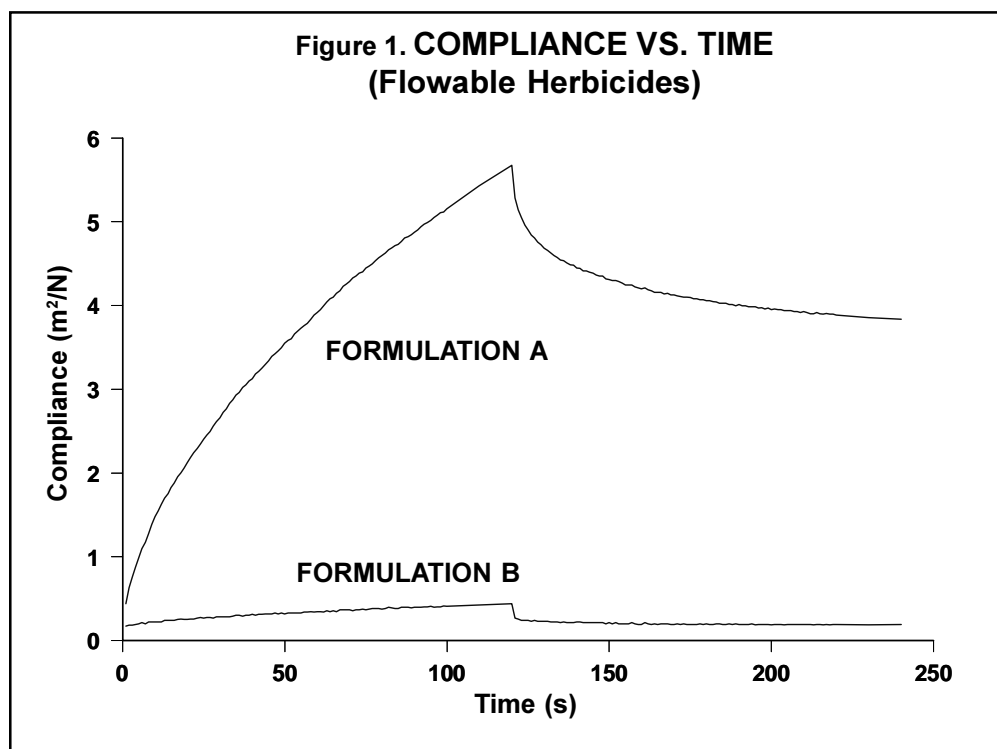
A Controlled Stress Rheometer was used to screen modified formulations of the new product to rapidly identify one which eliminated the redispersion and settling problems.

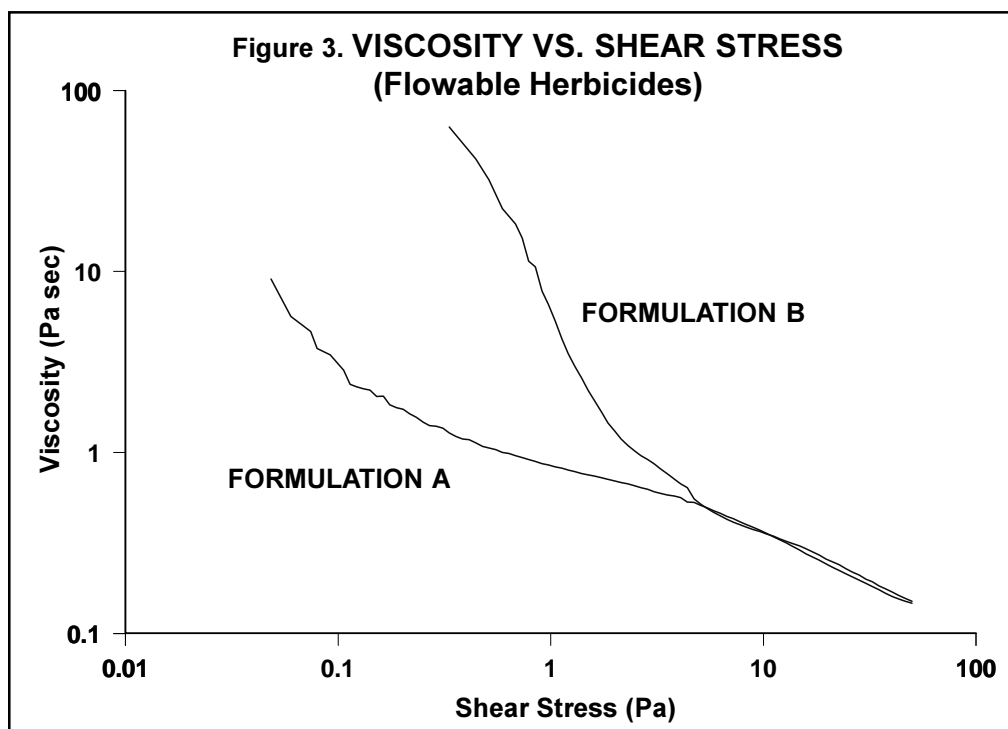
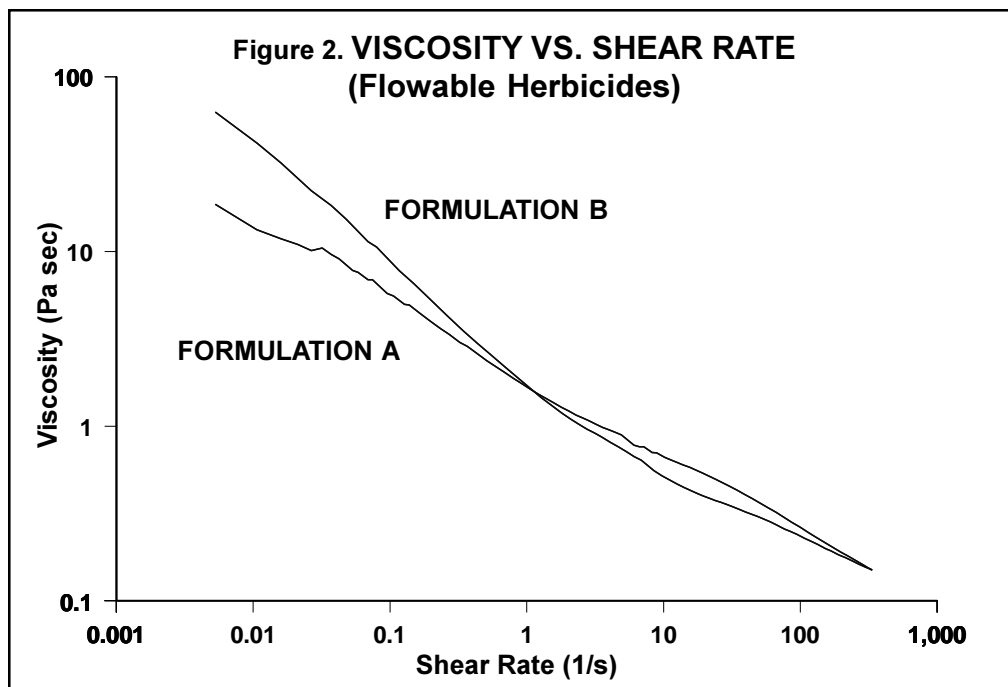
A Creep test (measurement of deformation under constant stress) was used to characterize the behavior of the formulations at low shear stress levels which approximate the gravitational forces acting on suspended particles. Figure 1 shows those creep results for the original product A and an improved formulation B. The lower compliance and higher elasticity (recovery to initial strain levels) observed for B

indicated the presence of a stronger "structural network" in the dispersion which retards particle settling. These tests also provided information on the viscosities of the dispersions at low shear stresses and low shear rates. From this information, Stokes Law was used to calculate terminal settling velocity for both formulations. The settling velocity of the particles in B was more than twenty (20) times less than for the particles in A.

The formulations were also evaluated at higher shear rates to determine their viscosity and flow behavior during pouring and mixing (Figure 2). In this region, formulations A and B behaved similarly indicating that the reformulation did not adversely affect these important end-use properties.

Finally, both formulations were evaluated as stress was decreased after shearing at high stress. Figure 3 shows the resultant viscosity versus stress curves. Formulation B showed a more rapid "rebuilding" of viscosity as shear stress decreased, providing further indication that formulation B should be less susceptible to particle settling.





For more information or to place an order, contact:

TA Instruments, Inc., 109 Lukens Drive, New Castle, DE 19720, Telephone: (302) 427-4000, Fax: (302) 427-4001

TA Instruments S.A.R.L., Paris, France, Telephone: 33-01-30489460, Fax: 33-01-30489451

TA Instruments N.V./S.A., Gent, Belgium, Telephone: 32-9-220-79-89, Fax: 32-9-220-83-21

TA Instruments GmbH, Alzenau, Germany, Telephone: 49-6023-30044, Fax: 49-6023-30823

TA Instruments, Ltd., Leatherhead, England, Telephone: 44-1-372-360363, Fax: 44-1-372-360135

TA Instruments Japan K.K., Tokyo, Japan, Telephone: 813-5434-2771, Fax: 813-5434-2770

Internet: <http://www.tainst.com>