TA Instruments

Thermal Analysis & Rheology

RHEOLOGY SOLUTIONS

EVALUATION OF UV-CURING GELS

PROBLEM

Medicinal gels derived from animal sources are becoming popular in microsurgical procedures. These gels are initially very low viscosity solutions which are injected into a wound. Subsequent exposure to UV light causes the solution to gel and form a protective barrier to protect the wound as it heals. Ultimately, the gel is absorbed by the body. Suppliers of these gels need to know the gel time and rate of structure development in order to effectively compare alternative formulations.

SOLUTION

Controlled stress rheology using a transparent measurement geometry (acrylic was used in the results shown here) provides a convenient technique for evaluating these gels. Figure 1 shows the shear rate with time under a constant applied stress. The point at which the dramatic decrease in shear rate occurs is the gel time. This decrease occurs because gel formation causes the material to become stiffer, more resistant to flow. Immediately after the onset of gelation, switching the mode of measurement to oscillation allows the build-up of structure to be followed without interfering with (or destroying) the structure building process. Figure 2 shows the comparative G' (stiffness) curves for the same material with and without 1% water. Although the added water dilutant does not significantly affect gel time, the altered material does exhibit slower on-going structure formation and a weaker final gel.

Figure 1. **SHEAR RATE VS. TIME (Medicinal Gels)**

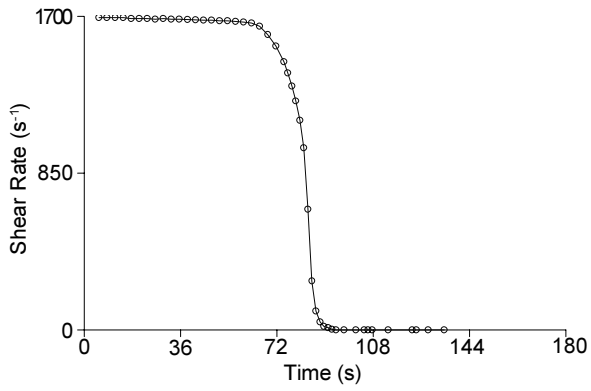
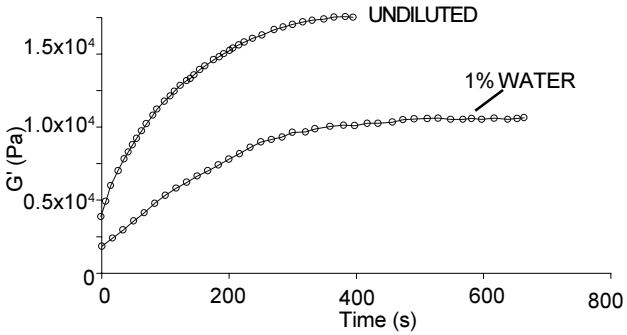


Figure 2. **STORAGE MODULUS VS. TIME (Medicinal Gels)**



Acknowledgment: This brief is based on work by Gene Gaudio, Regional Manager, TA Instruments (US).

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

TA Instruments
Thermal Analysis & Rheology
A Subsidiary of Waters Corporation