ISO 9001 CERTIFIED
BROOKFIELD AMETEK

TEXTURE ANALYSIS APPLICATION NOTE:

Toothpaste

Consistency Test

TEST PRINCIPLE

Evaluation of the consistencies of the contents of two toothpastes using a tube/sachet extrusion fixture.

BACKGROUND

Manufacturers in the fast moving consumer products arena package many of their products in sachets and tubes for quick and easy access. In the cosmetics and personal care industries, tubes and sachets are extensively, used ranging from make-up and hair care products to hand cream, facial cleansers and many more. The sachets and tubes are a consumer friendly way to promote and retail the liquids, creams and gels.

In the health and nutrition sector, sachets may serve as single use packaging for drinks and sport gels, practical solution for people on the go. Sachets can also be used as spoon free single unit dose packs.

In the food industry, many condiments such as ready-made sauces, pastes and dressings, amongst other products, can be packaged in sachets or tubes for quick and easy use. Sachets and tubes are also widely used in industrial products, such as lubricants for bearings and clutches, and home care products, such as adhesives and polishes amongst others.

The general use of sachets and tubes is to provide a quick and easy extrusion of the contents and application. Product consistency, defined by the viscosity or thickness of the contents, will dictate the force required to extrude the contents from the packaging. The Tube/Sachet Extrusion Fixture is designed to measure the force required to extrude the contents out of a tube or sachet. The higher the force value, the more viscous the sample and the more difficult a consumer will find squeezing out the contents.

METHOD

EQUIPMENT:
- CT3 with 4.5 kg load cell
- Tensile Fixture
- Tube Extrusion Fixture (TA-TEF)
- Fixture Base Table (TA-BT-KIT)
- Product Catchment Tray

SETTINGS:

Test Type:	Tension
Pre-Test Speed:	1.0 mm/s
Test Speed:	2.0 mm/s
Post-Test Speed:	2.0 mm/s
Target Type:	Distance
Target Value:	30 mm
Trigger Force:	20 g

PROCEDURE

1. Attach the tensile fixture to the load cell.
2. Fit the base table to the base of the instrument and loosely tighten the screws to enable some degree of mobility.
3. Place the sample support loosely on the base table.
4. Insert the sample with it orifice facing down between the support rollers and secure at the chosen tension.
5. Lower the upper tensile fixture and align with the upper tensile fixture and tighten the screws.
6. After alignment, tighten the screws of the base table.
7. Place a catchment tray underneath the sample.
8. Remove the cap or open the sachet.
10. Start the test.

RESULTS

Typical Plot: A comparison of the consistencies of two toothpastes.

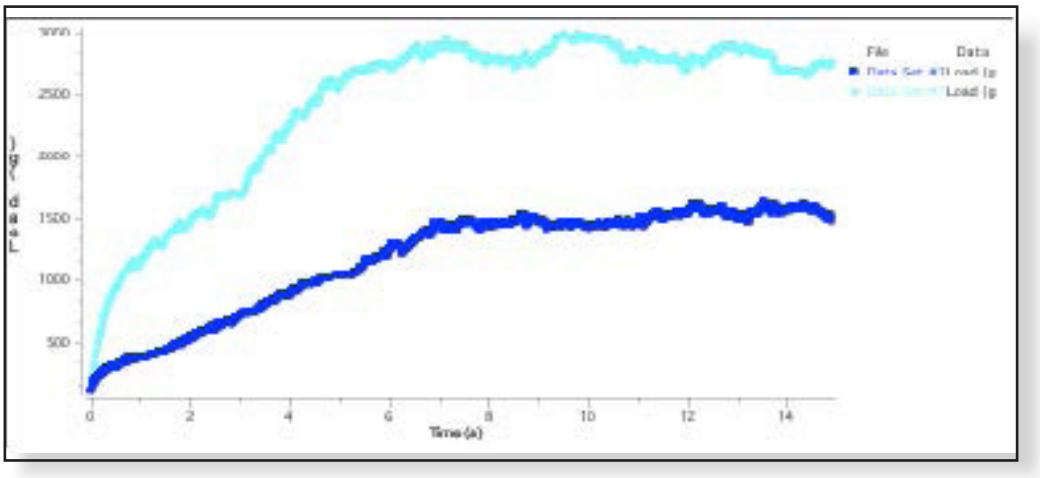

Figure I

Figure I shows the force required to extrude the contents from the tubes of toothpastes of different formulations in 100 mL tubes.

Data Set #1: Premium Toothpaste
Data Set #2: Budget Toothpaste

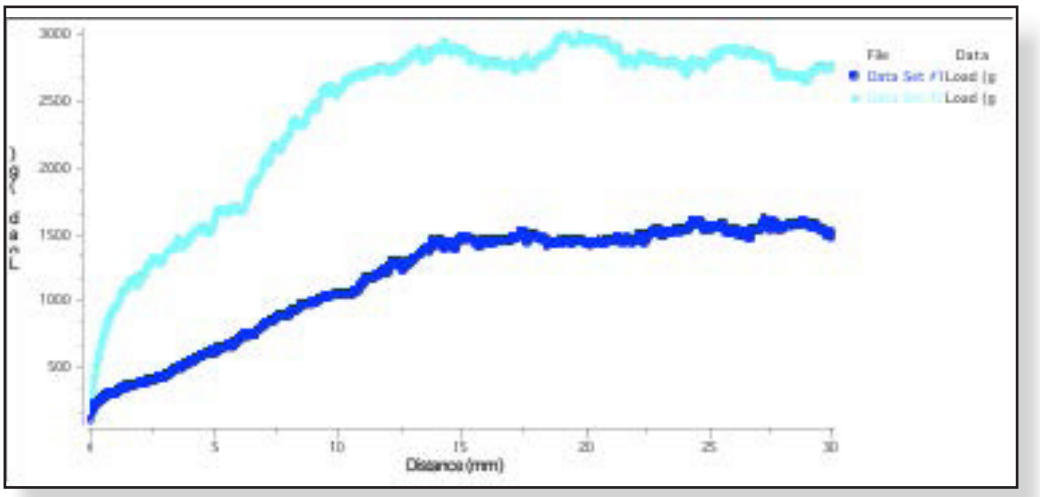

Figure II

Figure II shows load versus distance for the extrusion of formulations (premium and budget toothpaste) in 100 mL tubes.

Data Set #1: Premium Toothpaste
Data Set #2: Budget Toothpaste

OBSERVATIONS

When a trigger force of 20 g has been attained, the extrusion fixture proceeds to exert a tension force on the tube by pulling the tube through the support rollers to a specified distance of 30 mm. The maximum force (peak Load) required to extrude the contents over the specified distance is a measure of the force required to extrude the sample. The higher the force value the more viscous the sample. The test can also give us an insight into the samples pseudo plastic/ dilatant properties. A sample with a high pseudoplastic property will exhibit decreasing viscosity with increasing shear rate and a dilatant will display increasing viscosity with an increase in shear rate. The hardness work done gives us information on the energy required to extrude the samples; the higher the values, the more energy the consumer will require to squeeze out the contents of the tube or sachet. From Figure 1, the budget toothpaste requires more force to extrude its contents, making it the more viscous of the two.

Mean peak load and deformation at peak load values for the two toothpastes are shown below:

Sample	Peak Load (g)	Work Done (mJ)
Premium Toothpaste	1625	344.9
Budget Toothpaste	2995	712.8