Production: NOODLES

Objective: Comparison of elasticity (or 'tensile strength') of noodles

Type of action: Tension test

Test mode settings:

Speed	Test mode	Trigger	Target	Hold
3 mm/s	Distance (t)	5 gf	100 mm	0 sec

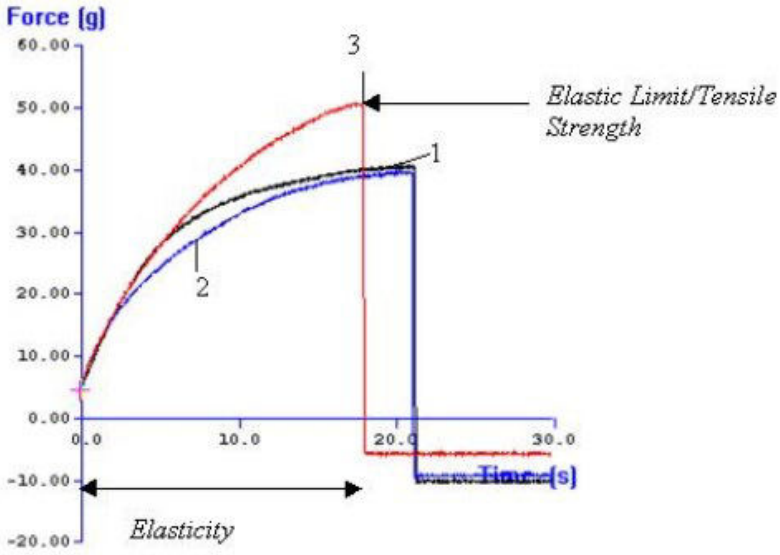
Accessory:
Noodle stretching rig, Platform

Test Set-Up:
Before carrying out the tensile test one must calibrate the rig arms to ensure that the starting distance between the arms is the same for each sample being tested (see below for instructions as to how this is done).

Test the noodles individually by placing one end into the lower rig arm slot and winding the loosened arm sufficiently, in order to anchor the noodle end (away from the slot) by at least two revolutions of the arm. The arm is tightened and the same procedure is performed to anchor the other noodle end to the upper arm. When doing this, one must ensure that while trying to avoid too much slack in the sample one does not wind the sample too tightly and hence create a false trigger.

Rig Calibration:
Lower the grip arms, so that they are close together. Click on **CALIBRATE HEIGHT** and specify the distance that you want the arms to start apart from each other for each test - e.g. **15mm** is suggested.

Typical plots:



The above curves were produced from 3 types of dry packaged noodles. Each batch was cooked for 10 minutes in boiling water, drained and rinsed and then left to stand for 15 minutes prior to testing.

Observations:
Once the trigger force of 5g is attained the graph proceeds to plot the effect on the noodle under tension. When the elastic limit/tensile strength is exceeded the noodle snaps (observed as the maximum tension force). It is quite clear that Type 3 is considerably less elastic whilst having more tensile strength than Types 1 and 2 (which themselves appear to be very similar in tensile strength).

Data Analysis:
☒Max Force

Results

Noodle Type	Mean Maximum Force 'Elastic Limit/Tensile Strength' (+/- S.D.) (g)
1	39.3 +/- 3.4
2	41.9 +/- 2.4
3	50.0 +/- 1.3

Notes:

- The measurement of distance at the break would give an indication of sample elasticity - the greater the extension distance, the more extensible/elastic is the sample.
- Before commencing each test ensure that there are no apparent weaknesses along the exposed sample length which would hence result in lower break forces and distance of break values.
- When analyzing the results it is likely that the variation in break distance values will be quite high. This is due to slight slippage of the first loop of the sample around the rig arm.
- When attempting to optimize test settings it is suggested that the first tests are performed on the hardest samples to anticipate the maximum testing range required and ensure that the force capacity allows testing of all future samples.

Recommendations:

If an elastic modulus in fundamental units is required then it can be obtained from the relationship:
E = (F * *l*o)/(t* Ao* v)
where ***l* o** is the original length of the noodles between the limit arms;
Ao is the original cross-sectional area of the product;
F is the initial slope and
v is the rate of movement of the **t** upper arm.
(If this is required in fundamental units then F/t should be in N.s-1, *l*o in meters, Ao in metres2 and v in m/s-1.)