

# Application Note

## Identification of an unknown plastic material. No3

The identiPol QA2 has three modes of operation: Comparison, Confirmation and Identification. The Identification mode of the system can be used to identify an unknown plastic material by comparing its behaviour to a library of known thermoplastics (PE, PP, PA6 etc) that is built into the system software.

The identification of an unknown material requires a match of several thermophysical properties that are measured as the unknown plastic is heated, these are:

**Amorphicity** - a measure of the degree of orientation of the polymer chains.

**Glass transition temperature** - the temperature at which non crystalline material starts to become mobile and soften.

**Melting point temperature** - the temperature at which crystalline material starts to melt.

**End point temperature** - the temperature at which the plastic loses mechanical integrity.

Although there are many methods available to confirm the identity of a plastic material, few are as quick—or as cheap—as that of the identiPol. Best of all, an unskilled and untrained operator can be shown how to use the system in just a few minutes.

The test sample was prepared in the standard way. A couple of plastic granules were first moulded within the identiPol QA2 to give a consistent material for measurement. This was then followed by a second heating regime to measure the properties of the unknown sample.

The following parameters were measured:

Amorphicity = Semi-crystalline

Glass Transition = 51.5°C

Melting Point = 206.8°C

End Point = 204.2°C

Following the test the software displays a table of the closest matches to the unknown.



The identiPol QA2

The table below illustrates how the unknown plastic has been correctly and unambiguously identified as PA6 (Nylon 6 - a material widely used for its high tensile strength), based upon matching the measured parameters with the library stored within the system's memory.

Material Type	Match	Amorphicity	Tg	Tm	End point
PA6	Match	✓ Semi-crystalline	51.3 to 73.5 51.5	195.7 to 228.9 206.8	190.2 to 225.2 204.2
PBT	Partial match	✓ Semi-crystalline	54.2 to 66.2	202.4 to 231.0 206.8	200.6 to 229.8 204.2
PET	Partial match	✓ Semi-crystalline	80.8 to 109.2	223.3 to 267.8	198.6 to 254.1 204.2
LLDPE	Partial match	✓ Semi-crystalline	None	119.7 to 136.5	117.0 to 134.0
PA46	Partial match	✓ Semi-crystalline	76.0 to 89.3	256.5 to 288.8	250.8 to 300.3

Table of results displayed in Identification Mode

The entire test, from selecting a couple of plastic granules, to printing out a certificate of analysis, takes only 15-20 minutes.