Trace Moisture Measurement in PET Bottle Manufacture

Application Note

SHAW MOISTURE METERS

Polyethylene Terephthalate (PET) is a widely used thermoplastic polymer, especially in the production of bottles for beverages, food, and other consumer goods. Ensuring optimal product quality in PET bottle manufacturing requires precise control of several parameters, with trace moisture measurement being one of the most critical.

What is PET and How is it Used?

PET is a strong, lightweight, and transparent plastic. Its key properties include:

- High strength-to-weight ratio
- Excellent chemical resistance
- Good barrier properties against gases and moisture

Applications of PET

- Beverage bottles (water, soft drinks, juices)
- Food packaging
- Personal care containers
- Synthetic fibres (polyester)

Moisture Problems in PET Bottle Manufacture

Why Moisture Matters

During PET processing, moisture content must be strictly controlled. PET is hygroscopic, meaning it absorbs moisture from the environment. If PET pellets contain excess moisture during melting and molding, several issues can arise:

Hydrolytic Degradation

Water reacts with PET at high temperatures, breaking polymer chains and reducing molecular weight.

Loss of Mechanical Strength

Degraded PET leads to brittle bottles with poor impact resistance.

Surface Defects

Increased haze, bubbles, and discoloration in finished bottles.

Reduced Barrier Properties

Compromised ability to protect contents from oxygen and CO_2 ingress.

Typical Moisture Related Defects

Defect Type	Cause	Impact
Brittleness	Chain scission by water	Cracking, breakage
Haze/discolouration	Degredation by Hydrolysis	Poor appearance, off-colour
Bubbles	Vaporization of moisture	Weak spots, leaks

Solutions and Key Steps

Pre-Drying PET Pellets

PET resin is typically dried to below 50 ppm (0.005%) moisture before processing, using desiccant dryers.

Moisture Measurement Techniques

Capacitance Sensors: Fast, inline monitoring.

Dew Point Meters: Monitor dryer performance.

Process Control

Continuous monitoring ensures consistent low moisture. Automated alarms and feedback loops prevent processing of wet resin.

References To Applicable Sandards

ISO 15512: Plastics — Determination of Water Content

ASTM D7191: Standard Practice for Quality Assurance of PET Resin

Conclusion

Trace moisture measurement is essential in PET bottle manufacturing to prevent product defects, maintain mechanical strength, and ensure compliance with industry standards.

By implementing robust moisture control and monitoring systems, manufacturers can achieve consistent product quality and reduce waste, supporting both operational efficiency and customer satisfaction.



Suitable Products



Dewpoint Sensor



Handheld Hygrometers



Portable Sample System

We design and manufacture dewpoint instruments for many different applications.

For advice, choosing the right product for your application, please contact us:

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