AN #: 04_015_06_003
Market: Industrial
Subcategory: Textiles
Product: HI2002, HI11311

Measuring pH of Wool

Description

Spinning wool into yarn to be woven into cloth predates 10,000 BC. Exportation of wool products began as early as 55 BC in Great Britain. Today, the wool industry circumnavigates the globe; the durable and water resistant properties of wool make it a very popular textile fiber. The wool refinement process begins with sheep (or other wooly animal such as an alpaca). The sheep is sheered so the fleece is obtained in one piece. Then, the wool undergoes preliminary sorting to remove inferior sections. After sorting by length and width of the fibers, the wool is scoured.

Scouring removes grease, oils, and debris caught in the wool fibers. This step is important as improperly cleaned wool can lead to a greasy product or weakened wool fibers. While it is important to remove most of the grease from the wool, complete removal can lead to the inability of the wool to be stretched and spun. To keep the fibers hydrated, lubricants are often added to the scouring baths to prevent the wool from becoming stripped. The pH of the scouring bath is a critical parameter. If the pH of the bath is not properly balanced (depending on the type of bath), the fibers may fray and become brittle.

More traditional scouring treatments include a warm alkaline water wash at pH 10-11, organic solvent washes (i.e. perchloroethane) if the wool is particularly greasy, and a final treatment with water, isopropanol and hexane after the alkaline water wash. An alternative acidic scouring treatment is gaining popularity due to the speed of the wash. The acidic wash consists of a sulfate scouring solute at 150°C. During the wash, cottonseed oil acids may be added to lubricate the wool. The acid baths are usually maintained between pH 4 and 6. Maintaining the bath in this range keeps the wool in a neutral isoelectric point. This helps sustain the integrity of the wool fibers.

The main bath is usually followed by rinses in clean water to remove traces of the scouring solution. The pH is measured after scouring by performing an aqueous extract on the wool itself. The pH of the wool is important as it can affect how dyes adhere to the fibers. If the pH of the wool is known, then the dye baths can be adjusted accordingly. This saves dyers time and money.

Application

A textile company contacted Hanna Instruments interested in testing the pH of their scouring baths and their post-scoured wool. They wanted to make sure that their acidic scouring bath was maintaining a pH of 5 as to not deteriorate the wool fibers. Having the ability the test the pH of the treated wool before it went to their dying facility was also a priority. Due to limited space, they wanted a unit with a small laboratory footprint that could also be easily transported to their production floor.

Hanna Instruments recommended the **HI2002** edge® Dedicated pH/ORP Meter. The HI2002 features a large, easy to read LCD screen with an intuitive capacitive touch keypad. The customer appreciated that the HI2002 has diagnostic features including CAL Check™. The CAL Check feature alerts the user of potential issues, such as the electrode requiring cleaning or that the buffer is contaminated. Once the probe is calibrated, the probe condition is displayed on the screen. Another appealing feature of the HI2002 is the included wall mount cradle that enables the instrument to take up zero bench space in the small lab they were preparing the wool extractions. The 8-hour battery allowed the customer to easily carry the instrument onto their production floor to quickly check grab samples from their scouring baths.

The Hanna sales consultant proposed coupling the HI2002 with the **HI11311** Digital Glass Body pH Electrode with Matching Pin. The HI11311 features a high temperature glass sensing bulb that can be used in samples up to 100°C. The customer was very pleased with the unique Sensor Check™ feature of the HI11311. This feature is available due to the matching pin integrated into the probe. This allows the HI2002 edge to identify issues such as cracks in the glass bulb or a clogged junction. The double junction on this electrode was well suited to the customer as their scour baths could contain solvents. The double junction design separates the silver electrolyte ensuring none comes in contact with the sample. This prevents silver precipitates from clogging the probe junction. The HI2002 and HI11311 provided a complete solution for the customer's wool testing needs.