

The pH value is key

Quality assurance in biodiesel production



Rapeseed: A versatile crop

All of the benefits at a glance:

- Precise and reliable pH values even in extreme applications.
- Increased service life and extended operating time thanks to the ion trap, which protects the sensor from harmful substances.
- Reduced maintenance costs due to the salt storage, which stabilizes the reference side of the pH sensor and increases the measurement accuracy of the sensor.

Biodiesel is a renewable and environmentally friendly alternative to conventional diesel fuel. Final neutralization and washing are crucial steps in the manufacturing process to ensure the quality of the end product. An optimum pH value ensures purity and stability and prevents corrosion during subsequent use.

The challenge

During the washing phase, impurities such as methanol, alkalis and free fatty acids are removed from the raw biodiesel. Acids are used to neutralize the end product. Monitoring the pH value during the washing phase is a complex task. Low conductivity due to low water content in the biodiesel and high temperatures in the process impair the measurement accuracy of conventional pH sensors and may have a negative impact on product quality. Monitoring the pH value is a critical step to ensure the purity and

shelf life of the biodiesel and to avoid technical problems during use.

Process

In accordance with the European standard DIN EN 14214, biodiesel is produced from vegetable oil. Rapeseed oil is preferred in Europe due to its high oil yield and good availability. Before it enters the washing phase, the rapeseed oil is converted into biodiesel by a process known as transesterification. During transesterification, vegetable oil is mixed with methanol and a catalyst and heated. The methanol replaces the glycerine in the fat and biodiesel and glycerine are produced. A constant pH value helps to prevent emulsion formation, as this may hinder the efficient separation of biodiesel and washing solution. Neutralization with sulphuric acid ensures that basic residues are removed from the transesterification process. In this step, too, a precise pH

value ensures that these residues are completely removed. After cooling, the mixture is in two phases. The top layer contains the raw biodiesel, while glycerine and other by-products settle at the bottom. The excess methanol and residues of glycerine and catalyst are then removed in the washing process. After processing, the biodiesel is stored in special storage tanks in order to maintain the quality of the biodiesel.

Our solution

The Memosens CPS11E digital pH sensor with optional salt storage is specially designed for demanding conditions. For reliable pH measurement in media with low conductivity, a so-called ion cloud is required around the pH glass sensor. This is generated by a special salt storage inside the sensor. It ensures a stable reference value and therefore reliable measurement results. Normally, such salt storages are only used in pH sensors with a glass version for low temperatures. In this case, however, it is combined with a so-called B-glass, which is designed for the higher process temperatures that occur in this application. The additional ion trap protects the pH sensor by preventing the ingress of potentially harmful ions that may arise in the biodiesel production process. This increases the service life and leads to a significantly longer service life in the process. This reduces maintenance costs and improves stability and measurement accuracy. Precise and reliable pH values are important for the efficiency of the production process and the quality of the biodiesel. The pH value influences both the purity of the end product and the service life of motors and components.

Product

- CPS11E-***BTS



The digital all-rounder for stable processes: Memosens CPS11E

Good to know

In biodiesel production, great importance is attached to ensuring that by-products are not wasted but are put to good use:

- **Glycerine** is processed after transesterification and used in the cosmetics and pharmaceutical industries.
- Separated **methanol** is cleaned and reused.
- The remains of pressed **rapeseed** (rapeseed cake) are used as animal feed.
- Neutralization with **sulphuric acid** produces a valuable fertilizer for agriculture.

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