

Determination of chlorine according to International Standards: ensuring quality



Analytical Notice

The determination of free and total chlorine with DPD according to EN ISO 7393-2

The EN ISO 7393-2 standard outlines an established way of checking chlorine values by measuring changes in the depth of colour of DPD (N,N-Diethyl-1,4-Phenylendiamine). These changes are detected by visual colour comparison or photometric measurement. Generally, this is known as the DPD method for the analysis of free chlorine.

To ensure accurate results it is vital that the analysis is carried out correctly

and in strict compliance with the ISO standard. What does this imply and how does this relate to commercially available DPD 1 products?

In effect, the ISO standard describes the fundamental components of chlorine determination with DPD:

- 1) A phosphate buffer (pH 6.5) ensures that the pH value of the sample remains constantly between 6.2-6.5 in order to ensure full colour development
- 2) DPD sulphate should be used as the indicator.
- 3) Potassium iodide is used as the secondary reagent for the determination of total chlorine.

Standardized determination

The standard sets out how these components must be produced as liquids and also covers the use of custom, ready-to-use reagents in the form of a powder or tablet. The preface to this standard explicitly highlights that, if the custom reagent does not follow these regulations, end results may vary. End users should therefore ensure that their chosen reagent has been produced according to the requirements of the standard.

For many years, the combination of a buffer and DPD (as DPD 1 reagent) and DPD (with potassium iodide as DPD 3 reagent) has established itself as an international standard due to its wide commercial availability.

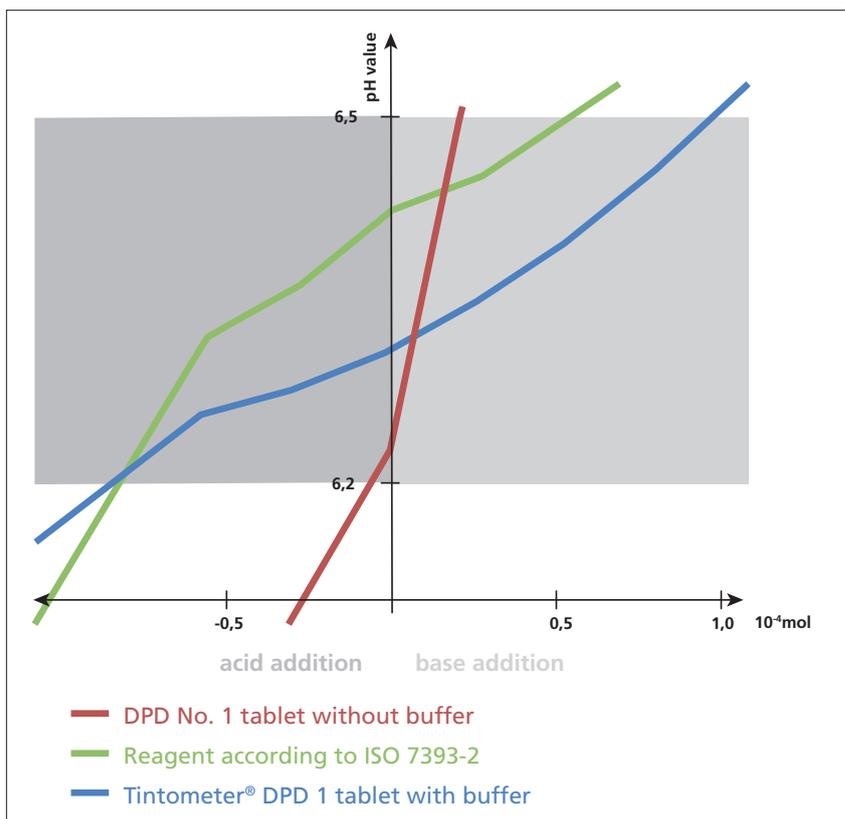
In the market, DPD 1 and DPD 3 are used as liquid, tablet or powder reagents. To comply with the standard, the DPD reagents must ensure long durability and exact dosage with the addition of non-interfering additives. Producers of these reagents must guarantee that their products also meet the requirements of EN ISO 7393-2.

Ask for the buffer

However, it is not always possible for end users to easily verify that the DPD 1 products they are using meet these standards. Therefore, for peace of mind, end users should ask their supplier for written confirmation that their products meet the three criteria listed above.

Titration shows differences

The titration curves of various commercially available reagents demonstrate whether or not the buffer system complies with the standard EN ISO 7393-2 (see illustration 1). The buffer is supposed to ensure a stable pH value for both acid and alkaline salt concentrations and, therefore, minimise incorrect measurements.



Operating range of DPD reagents

By adding acid or alkaline solution during a titration experiment the pH value is measured. The buffer ensures that any changes in pH value are minor. A steep curve, indicating a strong change of the pH value, indicates an insufficient buffer system.

Where insufficient buffer is indicated, incorrect measurement caused by slightly deviating pH values in the water is most likely to occur. Results are unreliable and do not comply with the requirements of the standard.

If a reagent can tolerate the addition of acid and alkaline solutions, the range for accurate chlorine determination is wider.

A missing buffer system is therefore a major quality defect and might lead to unreliable and incorrect results. End users are recommended to ensure their supply of DPD 1 reagent complies with International Standards.

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