

## **pH and redoxpotential analysis**

### Date

20.05.2016

### Version

1.0 English

### Content

|   |   |   |
|---|---|---|
| 1 | Scope                                   | 2 |
| 2 | Basics                                  | 2 |
| 3 | Materials & Instruments                 | 2 |
|   | 3.1 Materials                           | 2 |
|   | 3.2 Instruments                         | 2 |
| 4 | Experimental procedure                  | 2 |
|   | 4.1 Suspension preparation              | 3 |
|   | 4.2 Measurement and Instrument settings | 3 |
|   | 4.2.1 After measuring                   | 3 |
| 5 | Data Evaluation / Reporting             | 3 |
| 6 | Quality control                         | 3 |
| 7 | Safety precautions                      | 3 |
| 8 | Waste disposal                          | 3 |

## 1 Scope

This Standard Operating Procedure (SOP) describes the pH and redoxpotential analysis by using a handheld instrument with pH and/or Pt electrodes.

## 2 Basics

The aim of this SOP is the description of the pH and redoxpotential analysis by using a handheld instrument with pH and/or Pt electrodes. Both parameters are standard characteristics of NM suspensions revealing information of the hydrogen ion concentration and the redoxpotential of the material. Whereas the pH value can provide important information e.g. of the agglomeration status combined with the zetapotential analysis the redox potential provides information on the grade of NM for electron transfers.

Before the analysis the NM were brought into suspension by using the nanOxiMet Dispersion protocol\_sonication\_cuphorn\_1.1.

## 3 Materials & Instruments

### 3.1 Materials

The following materials and chemicals are required:

- HPLC Grade water, cell media
- Nanomaterial suspension
- Beaker glass (50 mL)
- pH electrode
- pH meter
- standard pH buffers 4.01; 7.00; and 10.00
- Wipes
- waste container
- wash bottle

### 3.2 Instruments

The following instruments are required:

- pH meter with a pH electrode (KCl)
- redoxpotential meter with a Pt electrode

Note: For the analysis a WTW pH 3310 with a pH SenTix or SI Analytics (Pt 42-A) was used to record the pH and redoxpotential values. The usage and maintenance of the instruments will be not described in detail in this SOP. Please refer to the manual.

## 4 Experimental procedure

Before pH analysis perform at least a two point calibration using the standard buffers refer-

ring the manual. For redoxpotential no calibration is possible

#### **4.1 Suspension preparation**

The suspension preparation has been described in the SOP nanOxiMet Dispersion protocol\_sonication\_cuphorn\_1.1.

#### **4.2 Measurement and Instrument settings**

For analysis, a minimum of 10 mL of the prior prepared suspension has to be transferred into the beaker glass. Rinse the electrodes with dH<sub>2</sub>O and dip the pH or redoxpotential electrode into the suspension. Make sure that the sensors are fully dipped in the suspension and fix the electrode by a rack-clamp. Start the measurement (regarding the manual) and wait until the value is stable.

##### **4.2.1 After measuring**

Rinse the electrode in deionized water and store the electrode in the electrode soaker bottle filled with electrode storage solution. Recalibrate your meter after cleaning the electrode every 15 measurements.

### **5 Data Evaluation / Reporting**

For data evaluation write down the pH or redoxpotential value as well as the temperature.

### **6 Quality control**

The results are presented as absorption maxima (wavelength in  $\mu\text{m}$ ) and/or absorption spectra.

### **7 Safety precautions**

In general when handling the nanomaterials, protective clothing and suitable gloves have to be worn at any time and the working area. The used materials and instruments have to be labelled. Please follow the safety information of the instrument manufacturer and material provider.

### **8 Waste disposal**

Please follow the disposal advice of the material provider, if available.

**Title:** pH and redoxpotential analysis

**This SOP is valid from:** 20.05.2016

**This SOP replaces the SOP from:** Primary version

**Responsible for the implementation of this SOP:** Measurement personal

**Previous changes:** Primary version (1.0)

**Signature/Date**

**Author:**

\_\_\_\_\_  
Dr. rer. nat. B. Hellack

**Reviewed:**

\_\_\_\_\_  
Dr. rer. nat. C. Nickel