

Standard operation procedure

Faculty of Biosciences, NMBU

Method name: Particle size analysis

BIOVIT-no.: Arb1016

1. Introduction:

MALVERN MASTERSIZER 2000 Version 5.22

Is used for the analysis of particle sizes and their distribution in a given sample.

2. Reagents:

Distillated water- used to spread the material.

3. Risk assessment: No risk.

4. Equipment:

MALVERN MASTERSIZER 2000

5. Sample material:

Test sample requirement: the particle size should not be greater than 2 mm in diameter.

There is a difference between dry and wet samples. The dry samples can differ between pellets and grinded samples. Pellets must be dissolved in the distillated water in advance. The hardness of the pellets determines the time, can take up to two hours.

4. Work procedure

Particle size analyzer

Open the water tap (which also closes when the work is completed), then start both the Sizer and Hydro.

The instruments need about 15 minutes on heating.

Connect to PC.

Select Mastersizer- icon and choose **Configure - Accessories – Empty** to ensure that no residual water is present. Remember **Drain Valve** afterwards, this closes the valve. **Close Accessories!**

Fill distilled water in the tank at Hydro– it is important that the water covers the lower part of the white stick in the tank – approximately up to the drain hole, then there is about 800 mL water in the tank.

In order to create the run program for the samples;

Choose **File – New** (give a name)

Configure – New SOP

New SOP Creation Wizard

Next

Sampler Selection – Hydro 2000G (A)

Next

Material – Standard – Water -choose **Materials** and specify if you know the refractive index of the sample material.

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Default can be used to test where the particle size is over 50 µm normal)

Next

Labels – do nothing

Next

Report/Saving – do nothing

Next

Measurement – **Measurement time: 10 – 12 seconds** – **Background time: app. 5 seconds**
(you can also set an alarm for warning of too big/small particle sizes, as well as an alarm that notifies of impurities in the material)

Next

Sampler Settings – **Pump speed: ca. 1500 RPM** (max. 2000) – **Stirrer speed: approx. 600 RPM** (bigger/denser materials require higher RPM on both).

(Ultrasonics) (it is an advantage to run ultrasound where the particles in materials can stick together) **Premeasurement period** (must be ticked off), **approx. 10 seconds - Tip displacement: ca. 50 % - (Tank Fill) Manual** (must be checked off)

Next

Measurement Cycles – **Aliquots: 1** – **Measurements: 3** – **Delay: 30 seconds** (depending on whether one is interested in investigating particle swelling / solubility and the similar) **Create Average Result** (must be checked off) – **(Cleaning) After each aliquot** (must be checked off) – **Flush cycles: 1** (means three washes) – **Automatic** (must be ticked off) – **Full wash** (must be checked off)

Next

Quantities – do nothing

Next

Finished SOP Creation

Finish (give the SOP the same name as File - New)

(A tip all the way is to lean on "advice")

Analysis of the sample

Measure – **start SOP** - Open the file or retrieve it under Measure. Run the program without having any of the sample material in it.

The laser intensity should be approx. 70%.

The light energy should be below 40 - this is seen as a blue bar up in the red-green-red area.

I **Documentation** you can enter further identification and such if you want.

Choose OK.

Load the sample material: have so much of the sample in it that the blue column remains in the green area – then choose "START".

Read the messages in the yellow field.

Regarding the sample material, a distinction is made between dry and wet samples and pellets and grinded form- in the case of dry samples. Pellets must be dissolved in the Distillated water in advance. Hardness of the pellets determines the time; it can take up to two hours.

For each new sample, the water tank is emptied automatically and washed, also flush the tank manually with RO water. You have to enter the final phase yourself and empty the tank -

Configure - Accessories - Empty.

New RO water is filled (remember to close the valve first - Drain Valve).

Choose **-Result Analysis.**

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Once the analysis is complete, the user has a variety of approaches for reporting the result as a curve- Choose - (one or all sample readings, or just averages.)

The particle size is given along the x-axis (given in μm) and the volume is given along the y-axis (given as a percentage of particles of a certain size.)

For information:

See **Result analysis** and **Difference** (right-click)

Report Designer (mark and drag across the page)

Configure-data-export-template (add all the different data)

If an error occurs, right-click on the **Sample name**

Look at the **Program-extract SOP**

Obscuration determines how much of the material is needed for an analysis-a range between 5 and 20 is in use here (the coarser the material the higher the value is).

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CLEANING OF GLASS

Unscrew the frames and push the glass out. Clean in Zalo water and dry with Kleenex - without conditioner. When placing the glasses back to their position- note that they are slanted. Lay the glasses down in the frame with *the largest diameter down!* Press the o-ring into place.

When TRANSFERRING DATA / GRAPHS / TABLES to Excel

Select "New Template"

Choose the same name as the file

Edit

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Move "Graph" and "Table" over to Excel;

- Select what to copy
- Enter "Result Analysis"
- Edit
- Copy graph / table
- Paste into Excel

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