

Water, soil and air sampling in environmental analysis

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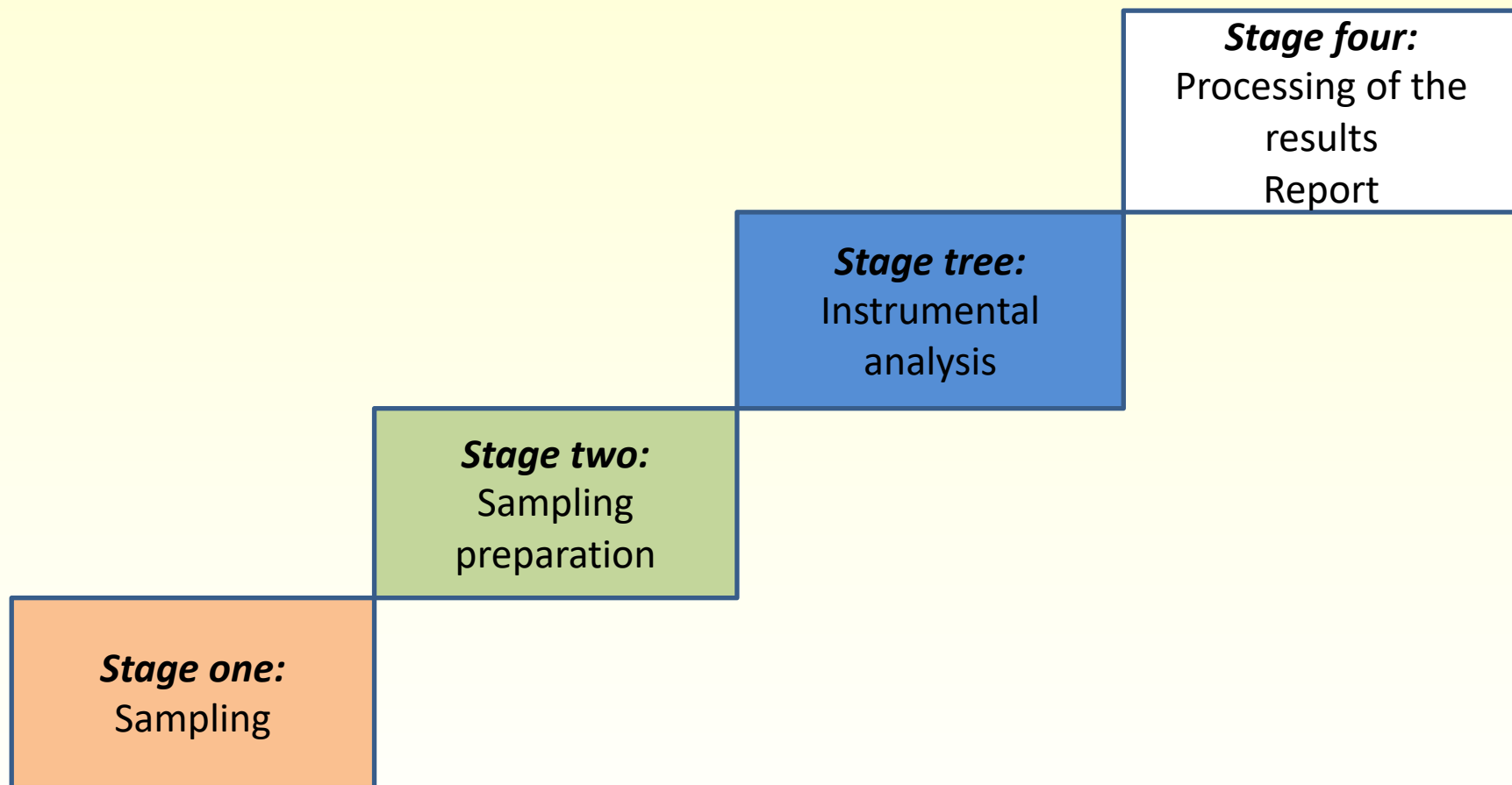
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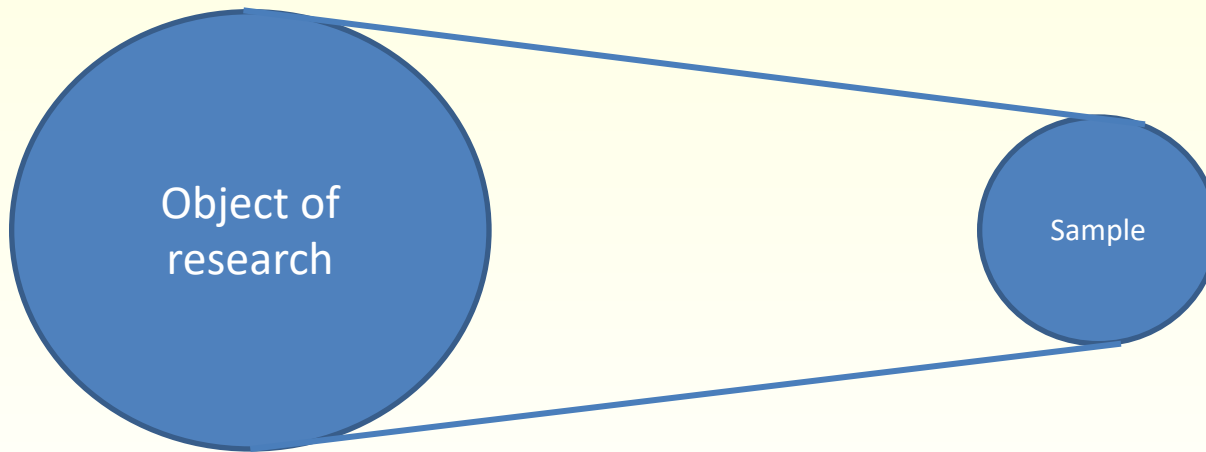
General sampling requirements

Stages of chemical analysis



Sample - representative part of the test sample

- The chemical composition of the sample and the entire test sample must be identical.
Example, homogeneous gases and liquids.



Sample quality depends on:

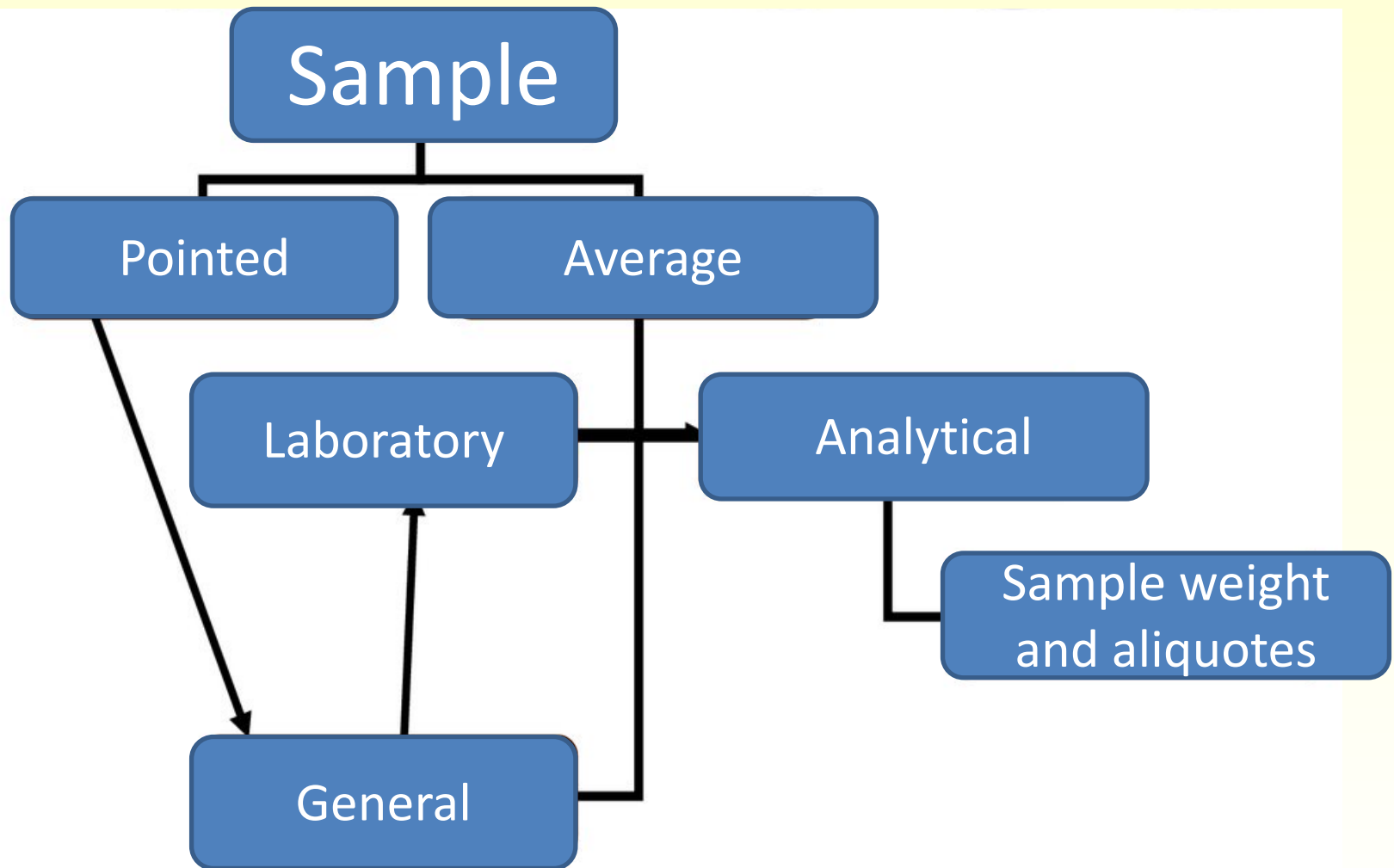
- Composition and homogeneity of the object
- Object and sample size
- Selected sampling method (GOST, TC and ND)
- Number of samples selected
- Decomposition or contamination of samples
- Primary sample preparation method (sample homogenization, sample size reduction)
- Storage conditions and labelling

Sampling – an operation in which selection of a sufficient number of representative parts of the test material (object), the composition and properties of which are identical to the composition and properties of the entire material is occurred

Sampling technique

- *Selection of sampling site location* depends on the purpose of the analysis
- *Types of sampling:*
 - One-time sampling;
 - Serial sampling: zonal and temporal;
- *Samples types:*
 - Simple;
 - Mixed.

Samples types



Samples types

Pointed sample

- Part of the object, which is selected at one time (in one operation) from different points and from different depth layers at a certain time
- Characterizes the quality of the tested material in one place or at a certain level. This is the most time consuming and complex part of the sampling process

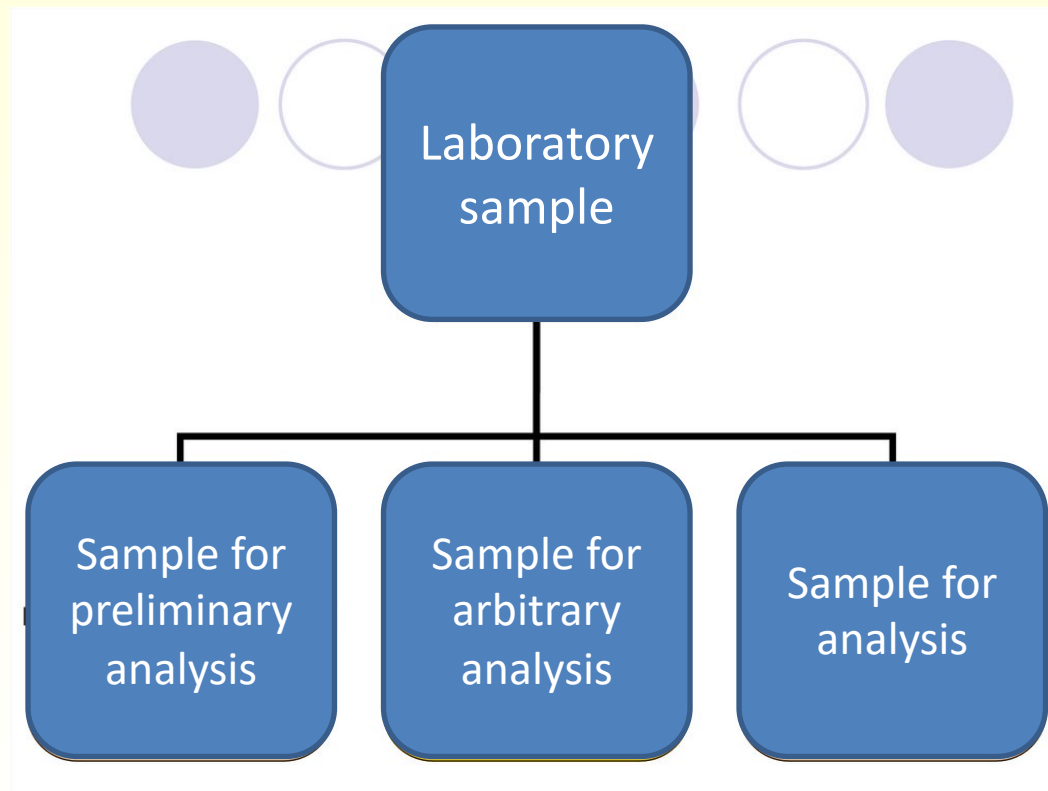
Samples types

Average sample

- Obtained by using one or more sampling cycles
- Divided as the general sample, with the result that their weight is gradually reduced until ready (medium, condensed, commercial sample)

Samples types

By reducing the finished sample, a laboratory sample(passport , certificate) is obtained, intended for all types of laboratory tests and a control sample (arbitration, archival, duplicate, backup), which is stored in case of repeated, arbitration or other control tests



- **Лабораторная проба** – конечная промежуточная проба, полученная при сокращении генеральной пробы и поступившая в лабораторию для анализа (25-1000 г). В лаборатории ее делят на три части: **проба для предварительных испытаний**; **проба для арбитражных анализов**; анализируемая проба.

- **Анализируемая проба** – часть лабораторной пробы (1-25 г), применяемая для выполнения аналитических определений всех контролируемых компонентов (согласно заказу). Из нее берутся отдельные **навески** (10-1000 мг) (для твердых веществ) или **аликвоты** (для жидкостей и газов).

Sample storage

- Sample is placed in two clean and dry hermetically sealed vessels (usually metal, glass or plastic jars), one is sent to the laboratory for analysis, and the second is stored for 1.5-6 months (control or arbitration sample)
- Samples are stored by type of material in special cabinets installed in temperature controlled rooms, in conditions that exclude exposure to light, moisture, oxygen and carbon dioxide, which can cause changes in the samples

Storage and preservation of samples

- Acidification of the solution or addition of complexants, if they do not interfere with the subsequent course of the analysis
- Storage in the refrigerator (biological materials and perishable products)
- Gas samples are not stored

Labeling/Marking of samples

During labeling, it should be notices:

- Name of product;
- Grade or brand;
- Manufacturer's names;
- Batch number indicating where the sample was taken;
- Sampling date;
- Name and signature of person who did sampling (sampler)
- Vessels with samples are sealed

Work plan

- Information about the mass of General sample
- Type (method) of sampling and the number of point (single) samples
- Description of sample preparation technique
- Maximum particle size in the final sample
- Number of samples
- Packing samples for analysis
- Data on moisture content, etc.

Sampling certificate

- For each sample the Protocol (certificate) of sampling which is carried out on the corresponding normative document (ND) is made
- The sampling Protocol includes the weighing Protocol
- The sampling report is a report, indicate all the data that are reflected in the accompanying document for the sample, as well as humidity in % and kg and dry net weight, and also make records of damage to the package during transportation, indicate whether it is necessary to dry the sample and at what temperature, note the change in mass during the firing of the sample, after sorting of foreign substances, degreasing, etc.

Sampling of Plants

- 1) On the same points as the soil samples
- 2) Separate main and by-products before harvesting
- 3) Weight 0.5-1.0 kg of initial moisture
- 4) Not less than 8-10 point samples
- 5) the size of the test sites 1x1 m (culture of continuous sowing) or 1x2 m (row crops), depending on the type of crops

Sampling of Plants

- 1) In the field, the ground part of the plants is cut with a sharp knife or scissors at a height of 3-5 cm above the soil surface
- 2) Placed in plastic wrap or Kraft paperВкладывают этикетку установленного образца.
- 3) The division of cut plants into main and by-products is carried out in the laboratory

Sampling of Plants

- 1) Samples of root crops, tubers and potatoes are placed for transportation separately from the tops
- 2) Crops, as well as grass and green mass of these crops are carried out according to the appropriate standard methods
- 3) Plant samples are often ground in a hammer mill or ball mill

Sampling of Plants

To truly determine the content of certain elements in plant tissue, the soil must be removed by washing with water, but there is a danger of leaching of plant elements

Sampling of Plants

- Analysis of food and biological materials is usually carried out without grinding. But if it is still necessary, they are cooled to the temperature of dry ice or liquid nitrogen; in this case, the samples become brittle and easily turn into powder
- Grinding is often carried out in mortars made of porcelain, corundum, boron carbide or agate; the possibility of contamination of the sample or loss of the determined substance due to sorption on the walls is almost completely excluded

A sampling procedure is a sequence of operations performed on an object to ensure that the sample is of a specified quality

Thank you for attention!