

TD N° 4: The Morphological Organization of Soils

1) Rearrange the following Coarse Elements according to their size :

Blocks, Clay, Stones, Gravel, sand, large stones, silt, Pebbles.

Gravel – Pebbles – Stones – Large stones – Blocks →

2) Why the surface area of soil particles is so important?

3) Exercise 1:

Knowing that: $1 \text{ eqg} = \text{ions gram} / \text{valence} = \text{Mass} / \text{Valence}$

$1 \text{ meqg} = \text{Mass} / 1000 \times \text{valence}$

Calculate Calcium Ca^{++} retention capacity for 1 gram of: sand, silt and clay.

$1 \text{ meqg de } \text{Ca}^{++} = 40\text{g} / 1000 \times 2 = 40 \times 1000 / 1000 \times 2 = 20 \text{ mg}$

So :

One gram of clay → $150 \text{ meq g ions} = 150 \times 20\text{mg} = 3000\text{mg} = 3\text{g}$

One gram of silt → $15 \text{ meq g ions} = 15 \times 20\text{mg} = 300\text{mg} = 0,3\text{g}$

One gram dans → $5 \text{ meq g ions} = 5 \times 20\text{mg} = 100\text{mg} = 0,1\text{g}$

3) Silty soil texture is unfavorable for agriculture due to their:

- High porosity
- Low cohesion
- Low water and nutrient retention capacity.
- The particles tend to clog soil pores.

4) Complete the following statement with the proper term:

- The set of layers or horizons observed in this vertical trench : **soil profile or solum**
- Soil heterogeneous parallel divided layers or strata of varying thicknesses : **Horizons**
- The distribution of mineral particles according to their size category : **Granulometry, soil texture**
- The physical characteristics of the soil profile, which provide insights into its formation: **Soil morphology**

5) Complete the picture with the horizons indication and describe the composition of each horizon

Horizon O

The organic horizon (or humus) results from the transformation of plant debris accumulating on the soil surface into organic matter.

Horizon A

Horizon A contains both organic and mineral matter. It is the result of the activity of living organisms in the soil (worms, insects).

Horizon B

This horizon is enriched with various mineral or organic constituents: clay, iron, organic matter, calcium carbonate, etc. It forms through the transformation of primary minerals derived from the underlying rock.

Horizon C

This is the horizon of weathering of the underlying parent rock.

Horizon R or M

This is the parent rock, classified based on its hardness.

R for hard rocks (granite, sandstone, limestone).

M for soft rocks (sand, marl, etc.).

