

# Electrical properties of colloids

A colloid is a dispersion system containing particles with a size of 1-1000 nm. They are therefore visible in an electron microscope, but not in a light microscope. Colloidal particles are all around us, we find them in the human body as well as in food or cleaning products. Colloids are characterized by their ability to capture a certain amount of liquid, with which they then form a **gel** (the most common example of a gel is gelatin).

## Electrical properties of colloids

A so-called **electrical double layer** is formed on the surface of each colloidal particle. From the name itself, we can deduce that it consists of two parts – compact and diffuse. The compact (Stern) part is closer to the surface of the particle, the diffuse part is further from the surface of the particle. Both of these parts are electrically charged. Adsorption forces do not act in the diffusion part (or they are so small that they can be neglected). In contrast, the compact adsorptive force acts in part. Because of this, there is a potential difference between the surface and the interior of a given colloid.

## Potential differences of colloids

We distinguish two types of potential differences – electrochemical and electrokinetic.

### Electrochemical

- It gives the total potential difference between the surface of the particle and the volume of liquid.
- It is responsible for membrane potentials.

### Electrokinetic (zeta)

- It indicates the potential difference between the volume of liquid and the thin layer of **counterions** at the interface between the compact and diffuse parts of the electric double layer.
- So-called electrokinetic phenomena are related to it.

## Electrokinetic phenomena

- They are caused by the effect of the electric field on the colloidal system.
- They can be used to determine the value of the electric potential.
- There are 4 basic types – electrophoresis, electroosmosis, sedimentation potential and flow potential.

## Links

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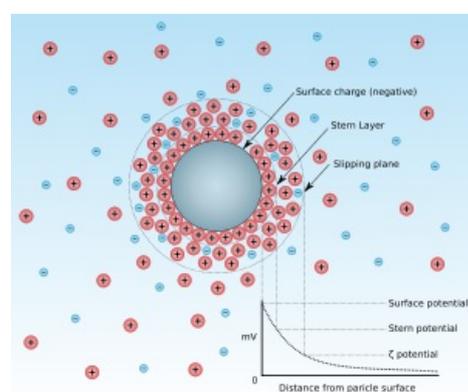
- Dispersion systems
- Potential
- Membrane potential and its changes
- Electrophoresis

### References

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- BARTOVSKÁ, Lidmila – ŠIŠKOVÁ, Marie. *Fyzikální chemie povrchů a koloidních soustav*. 5. edition. Praha : Vysoká škola chemicko-technologická, 2005. ISBN 80-7080-579-X.



An example of a gel-forming colloid



electrokinetic (zeta) potential diagram