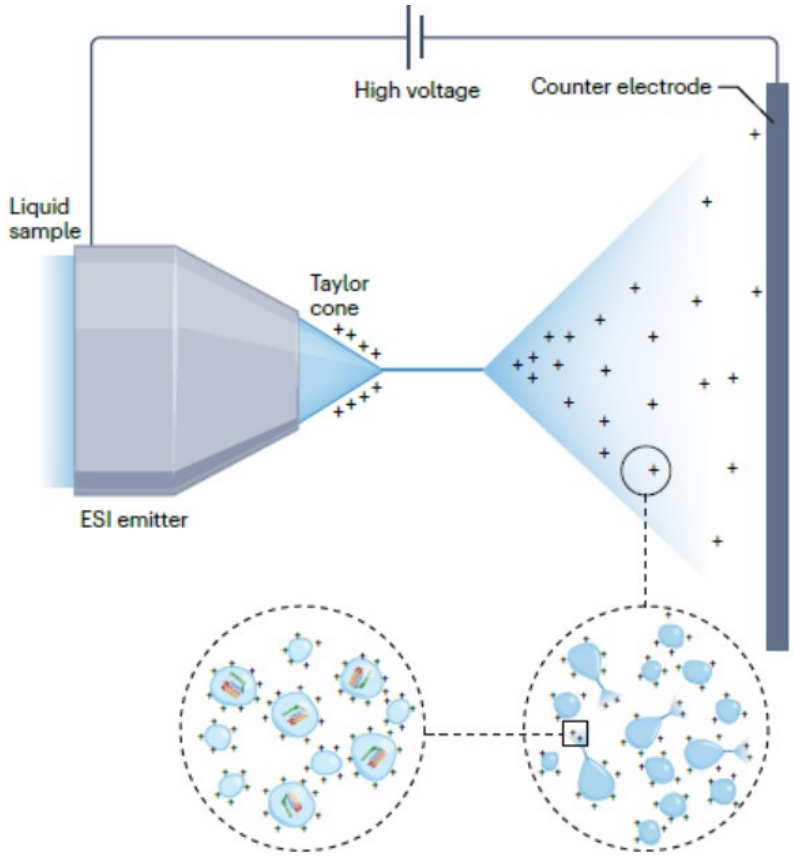
Name: _____ ID: _____

Analytical Chemistry II – Quiz (13th May, 2025)

Explain the operational principle of electrospray ionization source used in mass spectrometry. Illustrate this explanation with a scheme of the device.

- Liquid sample is infused through a metal capillary.
- Electric voltage is applied to the capillary and a counter electrode (near the MS orifice).
- The liquid meniscus forms Taylor cone, and microdroplets detach from its apex.
- The microdroplets undergo desolvation (evaporation of solvent).
- Electric charge density on the surface of droplets increases.
- Because surface tension forces cannot balance electrostatic repulsion forces, the microdroplets undergo fission.
- Finally, all the solvent molecules evaporate leaving behind gaseous ions of analyte species.
- Multiply charged species are formed from large molecules.
- Ionization typically follows any of the following pathways:
  - protonation
  - deprotonation
  - formation of adducts



Prabhu G. R. D., Williams E. R., Wilm M., Urban P. L. *Nat. Rev. Methods Primers* 2023, *3*, 23.