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## **Adsorption of Divalent Cations on DNA**

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**Summary:** The distribution of divalent ions in semi-dilute solutions of high molecular mass DNA containing both sodium chloride and strontium chloride in near-physiological conditions is studied by SAXS and by SANS. Both SANS and SAXS reveal a continuous increase in the scattering intensity at low  $q$  with increasing divalent ion concentration, while at high  $q$  the scattering curves converge. The best fit to the data is found for a configuration in which DNA strands of cross-sectional radius 10 Å are surrounded by a counter-ion sheath of outer radius approximately 13.8 Å, independent of the strontium chloride concentration. When the strontium chloride is replaced by calcium chloride, similar results are obtained, but the thickness of the sheath increases when the divalent salt concentration decreases. These results correspond in both cases to partial localisation of the counter-ions within a layer that is thinner than the effective Debye screening length.