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Discharges In Electronegative Gases

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This talk will come in three parts. First, the early work in electronegative plasmas, principally by Emeleus and co-workers in Iodine, and by Massey and co-workers in Oxygen. They were at opposite ends of the “spectrum” of electronegativity - the ratio of negative ion density to electron density. Secondly, we cover in more detail work in Oxygen, where in retrospect we know that too many parameters were included to reveal the underlying structure of electronegative plasmas. That is associated with Edgley and von Engel, and later with Ferriera and co-workers. From there until the present day we describe work coming from different directions, showing that by questioning prior assumptions, we have arrived at our present understanding. The basic elements are, that in general there is a negative ion core, surrounded by a conventional plasma, and that at low pressures the situation is significantly different from higher pressures. The talk will seek to avoid mathematical complexity and concentrate on the physics, explaining the reason for previous differences, and show the way forward for a more Complete understanding of the very complex problem of strongly electronegative plasmas and their structure when diluted by rare gases. All of this involves a multiplicity of ion species of both signs, and a variety of reaction rates.