Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

A global (volume averaged) model of the chlorine discharge JON TOMAS GUDMUNDSSON, EYTHOR GISLI THORSTEINSSON, University of Iceland — A global (volume averaged) model is developed for the chlorine discharge using a revised reaction set [1]. The model is applied to explore both a steady state and pulse modulated discharge. Various calculated plasma parameters are compared to measurements found in the literature, showing a good overall agreement. The reaction rates for the various reactions are evaluated in the pressure range 1 – 100 mTorr. In particular we explore the dissociation process as well as the creation and destruction of the negative ions Cl^-. The mechanism for Cl creation is complex, although electron impact dissociation dominates with roughly 50 – 60 % contribution, dissociative electron attachment is also of importance and mutual neutralization is an important contributor to the production of Cl atoms at higher pressures. The electronegativity increases rapidly with decreasing dissociation fraction since the Cl^- ions are created entirely by dissociative electron attachment, predominantly from $Cl_2(v = 0)$ but $Cl_2(v > 0)$ has upto 14 % contribution at 100 mTorr. The negative ion Cl^- is lost almost entirely through mutual neutralization with Cl_2^+, but Cl^+ has a significant contribution at low pressure. Furthermore, dilution by argon was explored. Dilution by argon increases the electron temperature and the density of Cl^+ ions significantly. [1] E. G . Thorsteinsson and J. T. Gudmundsson, Plasma Sources Science and Technology, submitted 2009

Jon Gudmundsson
University of Iceland

Date submitted: 08 Jun 2009 Electronic form version 1.4