Federal University of Santa Catarina (UFSC)
Joinville Technological Center (CTJ)
Graduate Program in Engineering and Mechanical Sciences (Pós-ECM)

Course: Plasmas and Electrical Discharges in Gases (ECM410054)
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Deionization (List 4)

1. What is the diffusion coefficient of He^+ in He at NTP?

2. Find the coefficient of diffusion of electrons under the conditions of problem 1.

3. Argon gas at NTP is injected in the center of an spherical chamber producing a density gradient along the radial axis given by $n(r) = n_0 \exp(-r/\lambda)$ where λ is the mean free path and $n_0 = 5 \times 10^{18}$ particles/m^3. What is the flux diffusion?

4. In an experiment using ionization loss to determine ρ it was found that the rate of ionization loss is -12×10^{12} particles/m^3·s and the concentration of positive and negative ions is 3×10^{16} and 2×10^{14} particles/m^3, respectively. What is the coefficient of recombination?

5. In an afterglow experiment in argon, it was found that the electron density was 1.0 and 0.218×10^9 electrons/cm^3 at 1 and 50 sec after the ionizing source has been shut off. Calcule (a) the electron-ion recombination coefficient, (b) the electron density just before the ionizing source was shut off.

6. In an experiment using ionization-growth method, the steady-state density of ionized particles is 3×10^{16} particles/m^3, where the density of newly ionized particles produced per second by an external ionizing source is 5×10^{14} particles/m^3·s. What is the coefficient of recombination?

7. An experiment initially using the ionization-growth method, where the density of newly ionized particles produced per second is 5×10^{14} particles/m^3·s and the coefficient of recombination is given by the solution of the problem 4, was run till the steady-state condition has been reached. Find the rate of ionization loss after 30 s of the ionizing source being switched off.