ties introduced by the correction for the presence of O^{3+}.

2. RESULTS

All the objects were analyzed in a similar way and using the same atomic data. An average electron density, n_e, was obtained using 2–3 diagnostic line ratios. Electron temperatures, T_e, for the low- and high-ionization regions inside each nebula were obtained from the usual [N II] and [O III] diagnostic line ratios (see, e.g., Osterbrock & Ferland 2006). The O^+/H^+ and O^{++}/H^+ abundance ratios were calculated using the values of n_e and T_e (T_e[N II] for O^+; T_e[O III] for O^{++}) and the line intensity ratios $I([O\,II]\ \lambda 3727)/I(H\beta)$ and $I([O\,III]\ \lambda\lambda 4959, 5007)/I(H\beta)$. The total oxygen abundance was derived by adding the O^+ and O^{++} abundances, and using ionization correction factors for the presence of O^{3+} that go from $O/(O^+ + O^{++}) = 1$ (for the H II regions and some PNe) to 1.18. For the results implied by RLs, the O^{++} abundance was derived using the O II RLs of multiplet 1. Then, we estimated the total oxygen abundance implied by RLs by assuming the same ionization fractions found with CELs. Further details on the procedure will be provided in Rodríguez & Delgado-Inglada (2011, in preparation).

Figure 1 shows the oxygen abundances implied by CELs and RLs as a function of O^+/O^{++} for all the objects in the sample. The abundances implied by CELs in H II regions are similar, with $12 + \log(O/H) = 8.45 - 8.54$, suggesting that the local ISM is very homogeneous. As for the PNe, if we exclude NGC 3242 (where the correction for O^{3+} is the largest, making its total oxygen abundance more uncertain), the abundances implied by CELs are in the range $12 + \log(O/H) = 8.65 - 8.80$. Since the oxygen abundances of PNe are expected to reflect the abundances in the ISM from which their progenitor stars formed several gigayears ago, this result is opposite to what we would predict using simple chemical evolution models. This overabundance of oxygen in PNe also holds when we consider the abundances derived with RLs. In fact, since the abundances implied by RLs in H II regions are similar to the abundances implied by CELs in PNe, even results intermediate between those implied by CELs and RLs (and shifted by different amounts in both kinds of objects) would indicate the presence of an overabundance in PNe.

This overabundance of oxygen in PNe could be due to different causes, like oxygen production in the stellar progenitors, large-scale gas flows in the Galaxy, recent infall of low-metallicity gas, or extensive stellar migration from the inner Galaxy. A discussion of these possibilities and a comparison of the results with those implied by stars of different ages and by those based on absorption lines in the diffuse ISM will be presented elsewhere (Rodríguez & Delgado-Inglada 2011, in prep.).

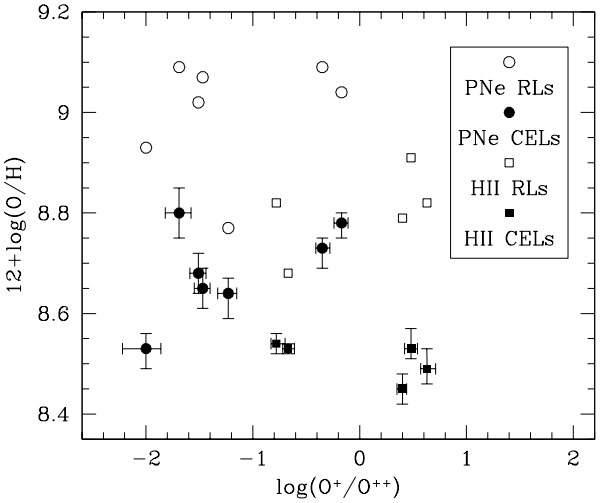

Fig. 1. Oxygen abundances implied by CELs (filled symbols) and RLs (open symbols) as a function of O^+/O^{++} for H II regions (squares) and PNe (circles) in the solar neighborhood. The error bars show the observational uncertainties.

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