Global Analysis of a Southern Planetary Nebulae Sample

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In this work we present a summary of the results of a long term observational program aimed to derive physical parameters and chemical abundances of southern PNe developed in the last years at the University of São Paulo, Brazil. Results shown here were derived from 74 nebulae, all of them observed (at least twice) with the 1.60m telescope at the Pico dos Dias Observatory, Brazil, using a Cassegrain spectrograph, a 300 lines/mm (4.4 Å/pixel) grating, and UV-coated CCD detectors. Observational runs took place between 1988 and 1995. Data reduction followed the standard procedure of bias and flat-field corrections, extraction of the spectrum, wavelength calibration, and flux calibration through spectrophotometric standard stars observed each night. The table below summarizes our results. Nebulae were classified among the Peimbert types and mean abundances are shown for each type, using the notation $\varepsilon(X)=\log(X/H)+12$.

	I	IIa	IIb	III
He/H	0.151	0.110	0.108	0.099
ε(O)	8.71	8.89	8.48	8.21
ε(N)	8.46	8.21	7.61	7.54
ε(S)	7.05	7.01	6.72	6.50
ε(Ar)	6.59	6.62	6.05	6.11
ε(Ne)	8.03	8.30	7.83	7.68

From the table one can see that abundances of He and N are higher for type I PNe with respect to the other types, reflecting the higher mass of their progenitors. On the other hand, oxygen, sulphur, argon and neon are not produced in significant quantities in intermediate mass stars. Their abundances then reflect those of the interstellar medium at the epoch of formation of the progenitors. For these elements, which can therefore be considered as tracers of the interstellar medium metalicity, the table shows lower mean abundances for late (IIb and III) PNe types, origined from older, lower mass progenitors.

A special atention should be drawn to the mean oxygen abundance, which is lower for type I than for type IIa PNe. Similar results can be found from stellar data, like those from Cunha and Lambert (1994, ApJ 426, 170) for the Orion region, and from the interstellar OI]λ1356Å line (Meyer et al. 1994, ApJ 437, L59). As type I nebulae are origined from more massive ($M > 2.5M_{\odot}$) progenitors, with ages lower than 1-2 Gyr, these results may indicate a depletion in the oxygen abundance of the interstellar medium after the Sun formation. A more detailed description of these results is done by de Freitas Pacheco and Costa (1997, in preparation).

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