DIVERSITY IN THE ELEMENTAL COMPOSITION OF PLANETARY NEBULAE

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Planetary nebulae are comprised of the expelled outer layers of evolved low and intermediate mass stars. Their composition reflects both the make-up of their birth clouds and the alchemical effects of nuclear processing within the stars as they age. Historically, the study of nuclides affected by *in situ* reactions within the star has focused primarily on He and the CNO group of elements. A few years ago, we demonstrated the prevalence of enhanced abundances of Se and Kr, part of the first (lightest) peak of the slow neutron-capture process. Here we give an update on our results for these and other s-process products. We also developed a method for determining total abundances of the Fe-group despite large and uncertain depletions of most of these species into dust grains, by using the less refractory element Zn as a tracer. This enables us to locate specific objects in the abundance ratio phase space [alpha/Fe] vs. [Fe/H], which can be used to identify the parent stellar populations of individual stars and to constrain the star formation history. A substantial number of planetary nebulae with apparently normal (near-solar) alpha-species abundances have elevated [alpha/Fe] that compensates for, and therefore masks, their lower [Fe/H] values. This is the case especially for older stellar populations such as the Milky Way's bulge and thick disk. We acknowledge support from NSF grant 0708425.