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Semiannual Report on NASA Grant NsG 313-63

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Isotopic Rb-Sr measurements of individual chondrules from the stone meteorite Bjurböle have been carried out and indicate that the time of last isotopic equilibration of strontium between the different chondrules was within 500 million years of the differentiation of the chondrites with respect to one another, i.e. 4500 ± 500 million years ago ($t_{\frac{1}{2}}$ Rb^{87} = 47 billion years), as well as within 500 million years of the differentiation of the chondrites, achondrites and mesosiderites from one another. It would be very valuable to improve the accuracy of this result by a factor of five or more in order to see if with this increased resolution, some fine structure in the evolutionary history of these objects could be discerned. Achievement of this depends on further decrease in the Rb and Sr contamination introduced in the chemical preparation. Ways are being sought to achieve this.

Work is going forward on the determination of the Rb^{87} half-life by direct isotope dilution measurement of the accumulated Sr^{87} daughter. Various coprecipitants (e.g. Fe(OH), $CaCO_3$) are being studied to determine their efficiency in removing strontium from large quantities of Rb while introducing negligible contamination. It is believed that one of these methods will be usable both for the original purification of the Rb solution and for the final separation of radiogenic strontium from the rubidium. Studies are also being made of the best method for separation of the radiogenic strontium from the coprecipitant prior to the final mass spectrometric determination. These include use of cation resions and solvent extraction into TTA and 8-quinolinol.

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