lichkeit für H_2^+-Ionen betrug für die Emulsionsnummern S 3299 und S 3346 der Platten im Mittel 0,31 $\pm$ 0,03, für H^+-Ionen 0,42 $\pm$ 0,04. Brix und Dehmelt [2] fanden für die Emulsionsnummer S 2039 für H^+-Ionen 0,48 $\pm$ 0,08. Tab. 1 und Abb. 3 zeigen die Abhängigkeit der relativen Empfindlichkeiten von der Massenzahl für 13 verschiedene einfach geladene Ionen. Der wahrscheinliche Fehler der einzelnen Meßwerte belief sich auf 15%. Aus Abb. 3 ist zu entnehmen, daß die Meßpunkte ziemlich gut dem Verlauf der ausgezogenen Kurve $\sqrt{2/M}$ folgen.

Ion	Masse	rel. Empfindlichkeit
Wasserstoffatom	1	1,39 $\pm$ 0,19
Wasserstoffmolekül	2	1,00
Helium	4	0,85 $\pm$ 0,12
Lithium	7	0,63 $\pm$ 0,09
Kohlenstoff	12	0,52 $\pm$ 0,07
Stickstoff	14	0,44 $\pm$ 0,06
Neon	20	0,40 $\pm$ 0,06
Stickstoffmolekül	28	0,32 $\pm$ 0,05
Phosphor	31	0,29 $\pm$ 0,04
Argon	40	0,27 $\pm$ 0,04
Kalium	39	0,22 $\pm$ 0,03
Zink	64	0,16 $\pm$ 0,02
Krypton	84	0,10 $\pm$ 0,02
Xenon	129	0,10 $\pm$ 0,02

Tab. 1.

Ein Versuch zur Deutung dieser Meßergebnisse soll zurückgestellt werden, bis Ergebnisse von in Angriff genommenen Messungen der Abhängigkeit der Kornausbeuten von der Energie der Ionen vorliegen.

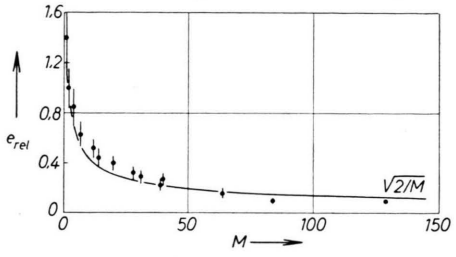

Abb. 3. Relative Empfindlichkeit e_{rel} in Abhängigkeit von der Massenzahl M.

[2] P. Brix u. H. G. Dehmelt, Z. Phys. **126**, 728 [1949].

Concerning Xe^{129} in the Meteorite Abee [1]

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In a recent note under the same title [3], Zähringer and Gentner have reported the results of an experiment in which the rare gases expelled at successively higher temperatures from the powdered meteorite were examined in a mass spectrometer. They reported several important findings: (1) There is a very distinct temperature separation between radiogenic A^{40} and primordial A^{36} (and A^{38}); A^{40} evolution (which reached a peak at 400 °C) was virtually over before appreciable A^{36} evolution (which reached a peak at about 1200 °C) began. (2) They have confirmed that the meteorite Abee is enriched [4] in Xe^{129}; after careful work in suppressing atmospheric contamination, they have found the highest value yet for the Xe^{129}/Xe^{132} ratio in nature, with their value of 5.5 for this stone. (3) They found that Xe evolution from the meteorite paralleled very closely the evolution of A^{36} and showed no variation in the Xe^{129}/Xe^{132} ratio over the range of their measurements of that quantity, 700° to 1350 °C. They have been led by this last finding seriously to question the simple assumption, usually made, that excess Xe^{129} in meteorites is principally due to decay of extinct I^{129} *in situ*. They suggest, on the contrary, that the excess Xe^{129} was already mixed with Xe^{132} at the time of formation of the meteorite and thus cannot be differentiated from the primordial xenon in a heating experiment. In this picture it is necessary, of course, to find a mechanism for prolonged storage of excess Xe^{129} from iodine decay in the solar system. They suggest that regional differences in xenon in the primtive "planetary cloud" have survived the subsequent processes of meteorite and planetary condensation.

Because of the importance of this experiment and the far-reaching conclusions based upon it, we undertook to repeat the experiment. For this purpose we attached a gas extraction and purification apparatus directly to the sample system of a mass spectrometer. Two steps were taken to reduce atmospheric contamination in the experiment. First, a larger than usual sample was used, consisting of 3.3 grams of angular fragments ranging in dimensions from 1 to 5 mm. Second, a new getter of Ti foil in a stainless steel container was substituted for our previous glass enclosed Ca furnace. Direct comparison of these gettering systems – attached to the mass spectrometer – has revealed that there is a much larger release of contaminating atmospheric argon when the Ca furnace is operated than when the Ti getter is used. As has been our recent practice, provision was made for outgassing the Mo crucible and lid at the maximum available temperature before the sample, wrapped in a small piece of Al foil, was dropped (by a mechanism in the vacuum) into the crucible.

[1] Work supported in part by the U.S. Atomic Energy Commission.

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[3] J. Zähringer, W. Gentner, Z. Naturforschg. **16 a**, 239 [1961].

[4] J. H. Reynolds, Z. Naturforschg. **15 a**, 1112 [1960].

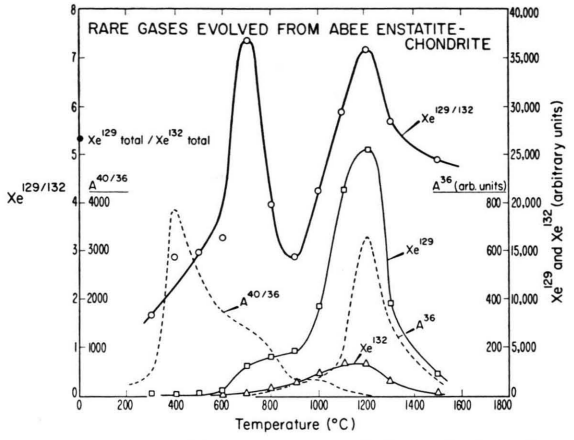

Fig. 1. Progress, with temperature, of the evolution of rare gases from a 3.3 gram sample of 1 to 5 mm fragments of the enstatite chondrite Abee. Heating was for 1 hour at each temperature plotted.

Pt versus Pt-Rh and W versus W-Re thermocouples were imbedded in the Mo crucible just below the sample.

Results of our experiment are shown in the figure. The heating was for one hour at each temperature. Errors in temperature measurement may be as high as 50 °C, judging from inconsistencies between different thermocouples. The plots of individual isotope yields are in arbitrary units. We have no data on which to base an estimate of variations in mass spectrometer sensitivity during the run, although care was taken to keep conditions unchanged. Judging from the smoothness of the curves and the general agreement with curves obtained by ZÄHRINGER and GENTNER the reproducibility in sensitivity probably stayed within 10 percent. There was drift due to memory in most of the isotopic ratio measurements. Measurement was by the static method in all cases, so that memory effects could be monitored and corrections successfully applied.

Curves for A and for Xe^{132} evolution are in general agreement with those published by the Heidelberg group, despite the hundredfold difference in sample particle size. This independence of gas loss from particle size is a characteristic result in heating experiments with silicates. It indicates that under the laboratory conditions, the zonal dimensions for rare-gas diffusion is usually smaller than the sieve size of the sample particles. Presumably loss of gas after it reaches the margins of these microscopic zones is quite rapid.

Our curve, for the Xe^{129}/Xe^{132} ratio of the evolved gas is strikingly different from the Heidelberg result, however. Although the ratio of total Xe^{129} to total Xe^{132} is 5.3, in good agreement with their work, the ratio exhibits temperature variations which are far beyond the possible limits of experimental error – rising to 7.4 (700°) falling to 2.9 (900°) and rising to 7.2 (1200°) again before tailing off to 4.9. It is clear to us that there are phases of the meteorite in which there is a marked excess of Xe^{129} and it is most natural to suppose that these are the iodine bearing phases of the meteorite. We see no particular need to doubt that the Xe^{129} was formed from I^{129} decay *in situ*.

The 700° peak in the Xe^{129}/Xe^{132} curve occurs close to the temperature at which a yellow-brown sulfide deposit appears on the furnace wall (mentioned also by ZÄHRINGER and GENTNER); this observation suggests that one of the sulfide phases of the meteorite [5] may be relatively rich in iodine. We are investigating this possibility further.

One of us (J. H. R.) presently holds a research appointment in the Miller Institute for Basic Research in Science of this University. We are grateful to the Institute of Geophysics of the University and to the Alfred P. Sloan Foundation for supplementary support for this research program.

[5] K. R. DAWSON, J. A. MAXWELL, and D. E. PARSONS, Geochim. Cosmochim. Acta **21**, 127 [1960].

Massenspektrometrische Untersuchung der Entgasungsprodukte von Wasserstoff- und Silicium-haltigem Magnesium

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Im Zusammenhang mit Messungen der Atomwärme von Wasserstoff- und Silicium-haltigem Magnesium zwischen 12 und 300 °K fanden MANNCHEN und BORNKESSEL [1], daß beim Entgasen dieses Materials im Hochvakuum bei 500 °C sich mit dem Wasserstoff auch Silicium verflüchtigt. Analytische Untersuchungen ergaben, daß dies im Verhältnis Atom-% H : Atom-% Si $\approx 2:1$ erfolgt. Hieraus und aus der Bildung eines schwarzbraunen Spiegels (Si) an der ersten kalten Krümmung der Pumpleitung wurde auf das Entweichen von in der Kälte in die Elemente sich zersetzendem SiH_2 geschlossen [2]. Diese Schlußfolgerung sollte durch eine massenspektrometrische Untersuchung sichergestellt werden. Wir hofften dabei, daß eine noch nachweisbare Menge SiH_2 infolge Trägerwirkung von aus dem Magnesium ebenfalls entweichendem Wasserstoff bis zur Ionenquelle gelangen würde, falls die Entgasung unmittelbar am Massenspektrometer durchgeführt wird.

Entgast wurde bei Temperaturen zwischen 440 und 520 °C mit Hilfe der in Abb. 1 wiedergegebenen Anordnung. Die Pumpaggregate des Massenspektrometers dienten gleichzeitig zur Erzeugung des Vakuums im

[1] W. MANNCHEN u. K. BORNKESSEL, Z. Metallkde. **51**, 482 [1960].

[2] R. SCHÄFER u. W. KLEMM, J. prakt. Chem. **277**, 283 [1958].