B. Above 300°K

Various previous authors have measured the K of Si and Ge over part of the high-temperature range studied here. Consider Si first. Figure 7 shows how the present results on Si for $T>300$°K compare with some of the better previous data. The earliest K data on Si that has been reported is that of Koenigsberger and Weiss[14] in 1911 who found 0.84 W/cm deg at 290°K for an impure sample. Later authors,[13–24] who have measured K as a function of temperature for $T>300$°K, are listed in Table II. The recent values of K determined by Shanks *et al.*[23] from thermal diffusivity measurements are about 10% lower than the present ones between 300 and 900°K, and 20% higher at 1400°K. The absolute accuracy of the K values in the present experiment is ±5%, and this same limit of error seems to be present in the data of Shanks *et al.*, as judged from the scatter of the points and the size of the samples used. Thus the 10% difference is just within the combined limit of error. The almost temperature-independent K found by Shanks *et al.* for $T>1000$°K, however, is not confirmed. The K of Si continues to decrease with increasing temperature up to 1580°K, The high-temperature heat-capacity data used by Shanks *et al.* is in reasonably good (±2%) agreement with that given by Kelley,[25] so the conversion from thermal diffusivity to K should be accurate. The reason for the discrepancy in K determined by these two different methods is not as yet understood. The K results of Abeles *et al.*[21,22] from 310 to 1200°K, also determined from thermal diffusivity measurements, fall between the present curve and that of Shanks *et al.*

In reviewing the literature on the K of Ge it can be seen that the early measurements on Ge by Greico and Montgomery[26] gave $K=0.59$ W/cm deg at 298°K, in good agreement with the present value of 0.60 W/cm deg at 300°K. The temperature variation of K of Ge for temperatures near or above room temperature has been measured by many investigators. These are listed[6,21,22,26–36] in Table II. Some of these K versus T curves for Ge are shown along with the present results in Fig. 8. The agreement of the older results with the present ones is to within ±20% at 300°K, but becomes increasingly poor at the higher temperatures. The very abrupt rise in K suggested by the authors[6] in 1960 is not confirmed. The change in slope is much more gradual. The large range of values for K of Ge above 700°K found in the other curves in Fig. 8 can be attributed to experimental difficulties in measuring and controlling the thermal radiation losses. The K values deduced from thermal diffusivity measurements by Abeles *et al.*[21,22] are not subject to this source of error, and the agreement of these results with the present ones between 500 and 1070°K is very good. The 10% discrepancy between the present results and those of Abeles *et al.* at 300°K is about at the outer limits of accuracy

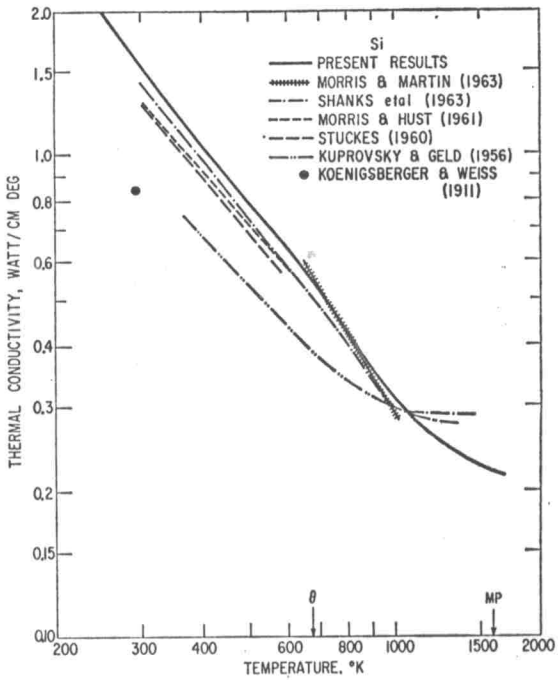

FIG. 7. Comparison of present and previous high-temperature K versus T results for Si.

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