



Fig. 3. Portions of X-ray diffraction traces made using  $\text{CuK}\alpha$  radiation illustrating the transformation from Ge IV to a non-crystalline product. Note that the Ge I peak does not increase in intensity, whereas the broad non-crystalline background does. (a) immediately after run, (b) after  $\approx 48$  h at ambient conditions, (c) after  $\approx 150$  h at ambient conditions.

substantially lower than those obtained for crystalline Ge when subjected to the same conditions [7,8]. Small amounts of Ge IV were detected after treatment at 90 kbar and room temperature.

Fig. 2 also shows the results obtained at higher temperatures at various pressures. These experiments essentially produced higher yields of Ge III in the lower pressure region, and these results agree with the earlier results obtained for crystalline Ge [7,8]. However, Ge III and Ge I were also found well into what was thought to be the stability field of Ge IV [8]. Ge IV was only found in very low concentrations.

Previously [8] Ge IV was reported to transform at atmospheric pressure to an amorphous product over a period of 3 h. Bates [8] used a dry-ice cooling technique to prevent this transformation. In the present work this transformation was confirmed, but no special cooling was used as this transformation was spread out over a number of days. Fig. 3 illustrates the process.

The products obtained when using a high-density ( $6.0 \pm 0.3 \text{ g/cm}^3$ ) non-crystalline Ge are substantially different. Table 1 lists the results obtained and fig. 2 shows them in relation to the boundaries obtained for crystalline Ge. The most significant feature is that Ge III was never obtained in any run done on the high-density non-crystalline Ge. After treatment at room temperature and up to 80 kbar, no increase in Ge I con-