ESRF	**Experiment title: High Pressure Diffraction Study of the New Superconducting Compound $(Sr_{1-x}K_x)BiO_3$**	**Experiment number:** HS 617
Beamline: ID9	**Date of experiment:** from: 02/09/98 to: 06/09/98	**Date of report:** 7/2/2000
Shifts: 12	**Local contact(s):** M. Hanfland	*Received at ESRF:*

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Report:

From resistivity measurements under pressure on $Sr_{0.4}K_{0.6}BiO_3$, we found out that the superconducting transition temperatureTc was increasing slightly with pressure [3]. In order to check whether this increase of Tc was related to a change in symmetry, we have carried out a diffraction experiment under pressure on the ID9 beam line at ESRF (HS 617). Diffraction data have been collected up to 20GPa. The refinements have been done up to 10GPa only. We have observed a regular increase of the c/a ratio with pressure, indicating that the tetragonal distorsion increases. The 6 Bi-O distances decrease and, as the two Bi-O1 ones diminish more rapidly than the four Bi-O2 ones, the distortion of the octahedra increases. Therefore, the increase of Tc is not related to an increase of the symmetry even on a local scale.

We have noticed a variation of the tilt angle of the BiO_6 octahedra around the c axis until a saturation at roughly 33° (45° is the value corresponding to the absence of tilt in the cubic symmetry) for a pressure of about 7GPa which is close to the pressure value at which the T_c is maximum.

At room pressure, we have calculated the formal valence on the Bi and (Sr,K) sites using the Bond Valence Sum method and the constants B and r_0 reported by Brese et al.. We found v(Bi)=+ 5.2 v.u., which is larger than the value +4.6 deduced from the chemical composition. This indicates that, at room pressure, the Bi site is compressed. For increasing pressure, it is not trivial to calculate the valences since we don't know how B and r_0 change. However, it is possible to follow the evolution with pressure of the ratio of the average distances $(C\text{-}O)_P/((C\text{-}O)_{P=0}$ where C represents either Bi or (Sr,K). One observes that the external pressure affects more the (Sr,K) site than the Bi one. This can be taken, in other words, as an indication of a decrease of the charge on the Bi site; by analogy with the high Tc cuprates, pressure would therefore induce a change from an overdoped towards an optimally doped state.