In this work, the boronizing of low carbon microalloyed steels were carried out in a solid medium using the powder pack method. After boronizing, a boride layer and the presence of both FeB and Fe$_2$B phases in the boride layer were revealed by classical metallographic techniques and X-ray diffraction (XRD) analysis. On the other hand, the presence and distribution of alloying elements on the boride phases was measured using Glow Discharge Optical Emission Spectrometry (GDOES) and the depth from the surface to the substrate was taken as the layer thickness. It was found that higher boronizing temperatures resulted in an increase in layer thickness and from 7 to 105 μm. In addition, microhardness tests of the boronized steel samples showed a significant increase in surface hardness with boronizing temperature. The boride layer had a hardness of over 910 HV$_{0.1}$ and 1320 HV$_{0.1}$ for 973 K and 1273 K, respectively, while the substrate's hardness was approximately 145 HV$_{0.1}$. Kinetic studies showed that the diffusion process is thermally activated, with a mean value of activation energy close to 194 kJ/mol.