

## Microstructural and properties changes observed in the AISI 310S steel during aging at 600°C and 800°C

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Austenitic Cr-Ni stainless steels are usually selected to continuous services at high temperatures. The AISI 310S is a wrought grade usually selected to high temperatures services [1], due to the high chromium contents. The stable austenitic structure is creep resistant and also proper for low temperature services. However, important microstructural changes may take place during high temperature usage above 600°C.

In this work the phase transformations occurring in the 600-800°C range were studied. The influence of the microstructural changes on the hardness and toughness were also determined. Figures 1(a) and 1(b) show the variations of hardness and toughness with aging time at different temperatures. Figures 2(a) and 2(b) show the microstructures of specimens aged at 600°C and 800°C for 200 hours, respectively. The microstructural characterization by optical and scanning electron microscopes have shown that chromium carbides precipitate at 600°C and 650°C and, as the aging temperature is raised, increasing amounts of sigma phase are observed.

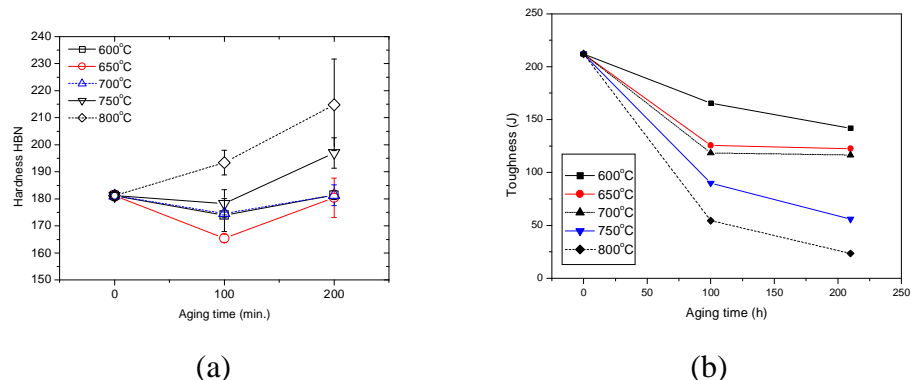


Figure 1: Effects of aging time and temperature time on hardness (a) and toughness (b).

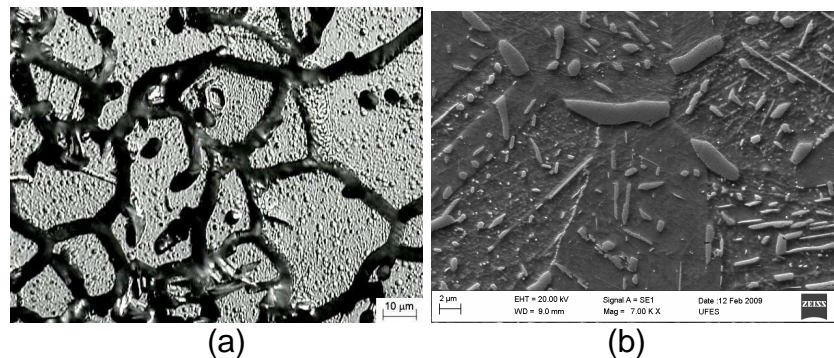


Figure 2: (a) Specimen aged at 600°C for 200 hours. Electrolytic etching in 10% acid oxalic solution (b) specimen aged at 800°C for 200 hours. Vilella's etching.

### References

- [1] Standard PETROBRAS N253-Rev.H, "Projeto de Vaso de Pressão" (Pressure Vessels Project), Brazil: PETROBRAS; 1996.



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