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# PHYSICAL AND MECHANICAL PROPERTIES OF NEW PORTLAND- LATEX COMPOSITE FOR CEMENTING OIL WELL SUBJECT THE STEAM INJECTION

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**Abstract** – The development of new materials applied in the cement oil well subject the injection steam had increased. These materials are submitted to thermal cycles typical of advanced oil recovery techniques, the cement sheath may crack due to mismatches in the thermal expansion coefficients and elastic module of the cement, rock and metallic casing. In the work, the effect of latex non-ionic on the physical and mechanical properties of composite is studied. The results mechanical strength, microstructural, morphological properties and grain size of the $Ca(OH)_2$, ettringite and CSH are showed by SEM, XRD using Rietveld method.

Portland cement has been widely used as construction material for its hydraulic behavior, i.e., it develops mechanical strength in the presence of water upon room temperature setting. Although superior compressive strength values are often achieved after ageing periods of 7 to 28 days, Portland components depict little or no deformability and fracture toughness whatsoever. Oil well cements, for instance, are bonded to both rock formations and the metallic casing responsible for carrying produced oil and/or gas. As these materials, and their connecting interfaces, are submitted to thermal cycles typical of advanced oil recovery techniques, the cement sheath may crack due to mismatches in the thermal expansion coefficients and elastic module of the cement, rock and metallic casing [1].

The addition of latex to Portland cement has provided a promising solution to grant deformability and fracture toughness to the composite without significantly affecting the rheological behavior and hydraulic properties of the material. In addition, latex nonionic is stable at temperatures up to 300℃, providing the necessary resistance for thermal cycling. Commercially available latex includes powdered and aqueous solutions. Portland-latex composites containing contents up to 25% were prepared and evaluated.

The results revealed that the compressive strength of the composite decreased with respect to plain Portland. On the other hand, both the deformation ability and fracture toughness of the material increased. The microstructure and mechanical behavior of the composite was affected by latex nonionic. Where the latex solution combined with the cement to form a plastic co-matrix. The rheology of the system was affected by the addition of latex nonionic

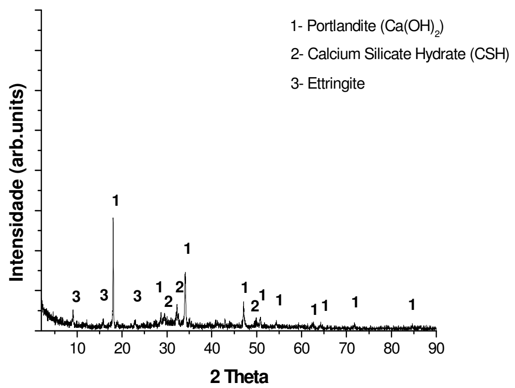


**Figure 1:** XRD diffractogram of th Portland-25 % latex non ionic composite:

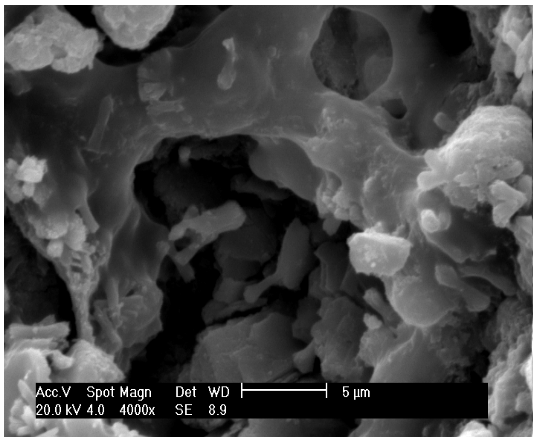


**Figure 2:** SEM image of th Portland-25 % latex non ionic composite – showed polymeric film on microparticles of cement.

## References

[1] A. R. Cestari, E.F.S. Vieira, A. A. Pinto, F.C. da Rocha: Journal of Colloid and Interface Science. Vol. 327 (2008), p. 267-274.