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PVC AND AGALMATOLITE COMPOUND CHARACTERIZATION

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The blending versatility of PVC resin, one of the worldwide most used thermoplastics represents an important commercial advantage since that polymeric compounds offer a way to produce new materials by using available raw materials ,reducing development costs¹. The use of alternative mineral fillers has been noted ,with a result increase in the variety of the types of PVC compounds. In this work, PVC compounds for electrical cable covering and insulation prepared with agalmatolite were characterized in their physical properties such as mechanical and flammability. The results were compared , using the same compositions and processing conditions.

The compounds were prepared by using a reference composition containing a PVC resin (SP 1000 from Trikem,; 100 phr), a plasticizer (dioctyl phthalate (DOP) , 40 phr), a stabilizer NAFTOMIX PB 7010 , 4 phr), titanium dioxide ,(2 phr) and different amounts (0, 10, 20, 30 and 40 phr) of Agalmatolite (Lamil Lage Minerios -Brazil). They were prepared by a previous homogenization of the premixed compound powder by using a two roll laboratory mixer (Mecanoplast) at 165 °C, followed by compression molding at the same temperature. For mechanical testing, the final sheets were obtained under pressure of 100 Kgf.cm⁻² at 170 °C. Dumbbell shaped test specimens were cut from these sheets in accordance with the ASTM D 638-91 method. The tensile properties were measured by using a universal testing machine. In accordance to the method, 8 samples were used for the tensile tests for each composition and only the average of 8 results was taken as the reported value. The flammability was obtained in the Flammability Unit Station Redcroft.

The mechanical properties are often the most important ones to characterize composites and compounds materials, because all service conditions and the majority of end-use applications involve some degree of mechanical loading ^{2,3}. Table I shows the mean values for the tensile properties and flammability obtained for PVC/agalmatolite and reference compound.

Table I. Tensile properties of the compound.

| Tensile Property | Strain at Break (%) | Stress at Break (MPa) | Flammability(%O ₂) |
|------------------|---------------------|-----------------------|--------------------------------|
| 10 phr | | | |
| Agalmatolite | 112 ± 5 | 19 ± 0,4 | 27 |
| 20 phr | | | |
| Agalmatolite | 92 ± 16 | 19 ± 0,2 | 27 |
| 30 phr | | | |
| Agalmatolite | 90 ± 14 | 18 ± 0,6 | 27 |
| 40 phr | | | |
| Agalmatolite | 75 ± 25 | 17 ± 0,9 | 27 |
| Reference | | | |
| 0 % Fillers | 86 ± 7 | 19 ± 0,3 | 26 |

Results and discussion

As observed in table I, it is possible to make PVC compounds for electrical cables covering and insulation prepared with agalmatolite. The best proportions are between 10 and 20 phr. The addition of the agalmatolite to the PVC compound improves the properties of the finished materials. The addition of the agalmatolite filler increases the strain at break for contents up to 30 phr. Higher levels decrease that property. The addition of the filler decreases the stress at break, but changes very slightly the flammability properties.

Bibliography

1. WENGUANG, M., La MANTIA, F. P. J. Appl. Polym. Sci. 59 (1996) 759-767.
2. JAMENEZ, A., BEREGUER, V. J. Appl. Polym. Sci. 50 (1993) 1565-1573.
3. BELTRÁN, M. I., GARCÍA, J. C., MARCILA, A., HIDALGO, M., MIJANGOS, C. Polym. Degrad. Stab. 65 (1999) 65-73.

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