THE INFLUENCE OF MVC GRANULOMETRIC DISTRIBUTION ON R-VC POROSITY

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1. Introduction

Re-carbonized vitreous carbon (R-VC) is a new material produced from Monolithic Vitreous Carbon (MVC) powder that is uniaxial pressed and re-carbonized at 1.000°C. This material can be used in many applications, as electrodes, filter or substrate for space mirrors. However, for mirror applications, it is necessary that the surface present no defects, mainly porosity, as it influences directly on its roughness and specular reflection. The particles packaging has an inverse relationship with the porosity, which affects the material specific mass. The packaging depends on the proportion and on the appropriate size of the particulate material.

2. Experimental

The monolithic vitreous carbon is produced from a thermosetting resin, the furfuryl resin, which was produced from the reaction of furfuryl alcohol with an acid. The resin was catalyzed and carbonized to produce a monolithic vitreous carbon (MVC). The MVC was ground in a ball mill and high energy planetary mill. The particles were classified by sieving. The MVC particle size distribution of each sieve then was obtained. The classified powders were combined to form eleven groups of samples. These samples were uniaxial pressed and carbonized again, rising the re-carbonized vitreous carbon. The porosity and specific mass were characterized by the Archimedes method. This was done to determine the appropriate proportion of powders to produce the less porous R-VC samples [1].

3. Results e Discussions

The grain size and its distributions made samples of R-VC to present great variation in the apparent porosity and bulk density. Highlighting group 3 (aspect ratio containing 50% powder with size distribution around 20 μm and 50% of particles around 2 μm), with lower porosity value to 13.5 % and density of 1.40 g/cm³. The wider particle size distribution produced less porous samples, as the relation of proportion of particulate sizes better suited occurs when the larger voids between the particles are filled by smaller particles, voids which are again filled with particles even lower and so on.

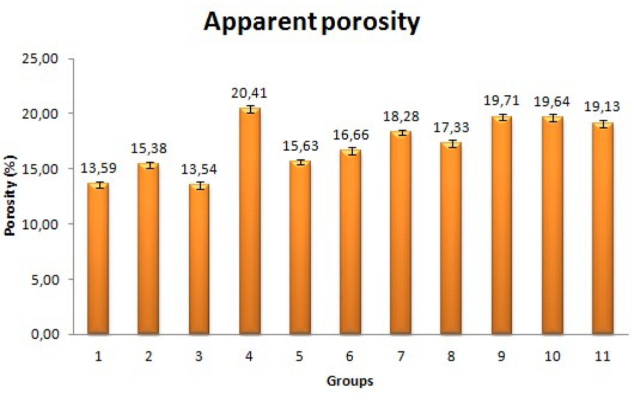

Fig. 1. *Average apparent porosity*.

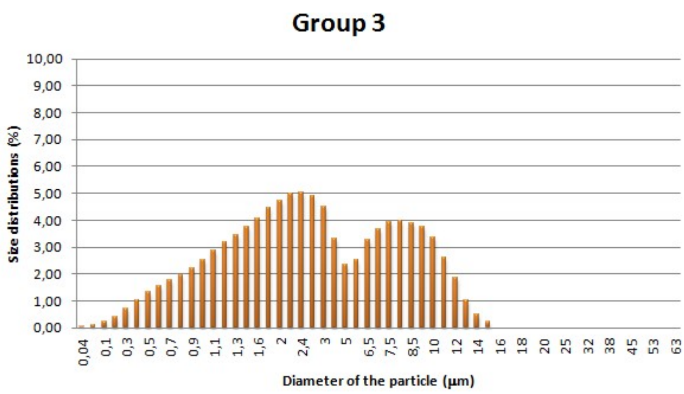

Fig. 2. *Particle size distribution of group 3.*

4. Reference

[1] - J. Siqueira, MSc Dissertation, ITA, June 2016.

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