CYCLE DE CONFÉRENCES DE CHIMIE

Avec le concours de : **Manufacture Française des Pneumatiques MICHELIN**
Ecole Nationale Supérieure de Chimie de Clermont-Ferrand
Institut de Chimie de Clermont-Ferrand (ICCF UMR 6296)
U.F.R.S.T. Département de Chimie

Jeudi 12 Décembre 2013 à 15h

Amphi de Chimie Paul REMI - (Site des Cézeaux)

Mr. Jean-Marc SENECOT

Owens Corning Chambéry International

Wettability measurement on glass fabrics: compatibility assessment between fabric and resin.

Adhesion at resin/glass interfaces of fabrics is critical for a composite material. The information of these interfaces is controlled by impregnation process, which is governed by the wetting characteristics of both materials. Classically, the wettability analysis is studied measuring the contact angle of liquid on surface and this contact angle is linked to the surface energy. In the present study, the contact angle measurement on fabrics is based on a modified Washburn model, well adapted for isotropic porous media. This basic model has been improved in order to take into account the specific aspects of glass fabric, like non-isotropy , existence of two populations of pores (macro- and micro-pores corresponding respectively to the space between glass yarns - made of hundreds of filaments - and the space between glass filaments), large exchange surface area (evaporation of the wetting liquid) and, finally, coupling of perpendicular yarns (double front of capillary progression).

The surface energy (dispersive component) is calculated by Fowkes approach without none-dispersive approximation (owens approach for example). The acid/base concept (Lewis Sense) with the donor-acceptor approach is preferred.

With these considerations, a method for the characterisation of glass fabrics has been proposed and validated. It leads to the determination of capillary radii into the porous structure as well as dispersive components of surface energy and acid/base character of glass surface.

Then, to evaluate de compatibility between fabrics and resin, the dispersive component and acid/base character of resins are also characterised. Different index numbers by mathematical combination of specific parameters (RS, $\square$SD, $\square$LD,WSLAB) are proposed. These numbers are based on various theoretical concepts (Fowkes, Acid/Base interaction, Interfacial tension, …).

One industrial application on electronic market has been presented and shows that the index number where acid/base interactions between fabric and dry resin are taken into account is close to customer classification. Besides, the result shows that the classical approach with Owens's equation or Good's equation with interfacial tension is wrong.

Coordinatrice : Christine MOUSTY, Institut de Chimie de Clermont-Ferrand (ICCF-UMR 6296)
Université Blaise Pascal, 24, avenue des Landais, BP 80026 63171 Aubière cedex-France
☎ 33 473 407 598– fax : 33 473 407 108 courriel : Christine.Mousty@univ-bpclermont.fr