Predicting Porosity Formation in Phenolic Resins for RTM Manufacturing: the Porosity Map

Cédric Pupin, Annie Ross, Charles Dubois, Jean-Christophe Rietsch, Edu Ruiz

PII: S1359-835X(17)30206-3
DOI: http://dx.doi.org/10.1016/j.compositesa.2017.05.023
Reference: JCOMA 4675

To appear in: *Composites: Part A*

Received Date: 6 February 2017
Revised Date: 14 May 2017
Accepted Date: 18 May 2017

Please cite this article as: Pupin, C., Ross, A., Dubois, C., Rietsch, J-C., Ruiz, E., Predicting Porosity Formation in Phenolic Resins for RTM Manufacturing: the Porosity Map, *Composites: Part A* (2017), doi: http://dx.doi.org/10.1016/j.compositesa.2017.05.023

Predicting Porosity Formation in Phenolic Resins for RTM Manufacturing: the Porosity Map

Cédric Pupin[a,b], Annie Ross[a], Charles Dubois[c], Jean-Christophe Rietsch[d], Edu Ruiz[a]*

[a] NSERC-Safran Chair on 3D Composites for Aerospace, Polytechnique Montréal, Department of Mechanical Engineering, C.P. 6079, Station Centre-ville, Montréal (QC), H3C 3A7, Canada

[b] Ruiz Aerospace Manufacturing, 319 Boulevard Saint Elzéar O, Laval (QC), H7L 3N5, Canada

[c] Polytechnique Montréal, Department of Chemical Engineering, C.P. 6079, Station Centre-ville, Montréal (QC), H3C 3A7, Canada

[d] Safran Group, 75015 Paris, France

* Correspondence to: Edu Ruiz (E-mail: edu.ruiz@polymtl.ca)

Abstract

In this work, the formation of porosity generated during curing of a phenolic resin is investigated in the context of RTM. DSC and rheology analyses were conducted on the resin to model the cure kinetics and determine the gel point. Porosity formed in the cured matrix is due to saturation of the solid polymer by water during curing. Thermogravimetric analysis was carried out to measure the amount of water released during polymerization. Formation of porosity due to curing was studied using an innovative experimental setup that allows visual observation of the resin cure and gelation. It was observed that porosity starts appearing after resin gelation and that degassing the resin at the beginning of curing delays the onset of defects and reduces