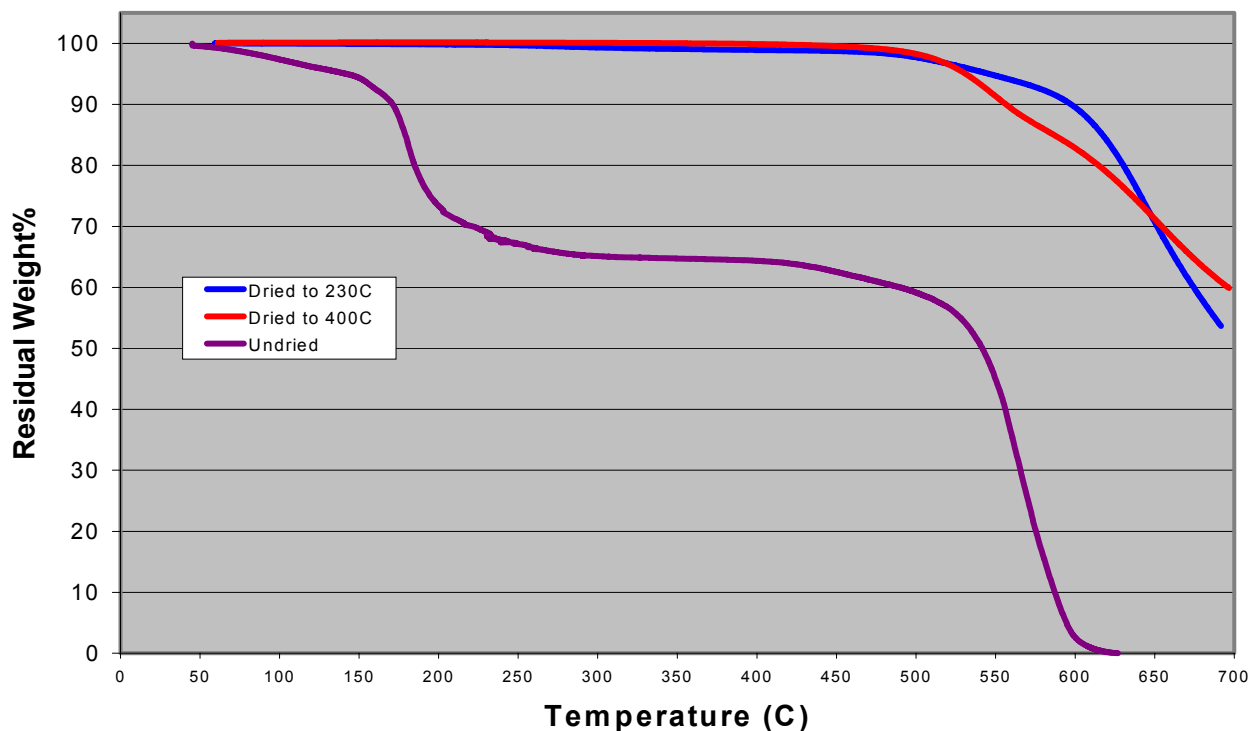


Thermal Stability and Processing of Hydrosize® HP-1621 High Performance Aqueous Solution

Thermogravimetric analysis (TGA) was utilized to investigate the drying conditions and thermal stability of Hydrosize® HP-1621. All samples were heated at 20°C/min in an air.

After Hydrosize® HP-1621 is applied to a surface, the film must be dried and completely “cured” to obtain optimal performance in a film or a composite. Initially, the solution contains about 85% water and the majority must be removed before heating to high temperatures. As illustrated by the purple line in the graph, the film has very poor thermal stability and no char yield at 600°C. To prevent this problem, volatilize the water by ramping the temperature during the drying cycle.



The onset of cure is 200°C. However, it is recommended to heat to a minimum of 225°C or higher (up to 300°C) to ensure complete cure and prevent future out-gassing and formation of voids. A sample of HP-1621 (no fiber) was heated in the TGA instrument to 230°C. After cooling to 60°C, the sample was heated a second time to 700°C (1292°F) (blue line). HP-1621 showed a weight loss of 0.009 % at 371°C (700°F). The inherent thermal stability of HP-1621 was observed up to approximately 500°C (932°F) where a 2 % weight loss occurred. The highly aromatic polymer has a 54 % char yield at 700°C (1292°F). Another sample of HP-1621 was treated the same way; however, it was heated to 400°C (752°F) (red line). The thermal stability of this sample is very similar to the sample dried to 230°C. The second sample has a steeper drop in weight but a little higher char yield. This data shows the importance of drying and the effect on thermal stability.