

Drying of solvent-borne coatings with pre-loaded drying gas

The drying of solvent-borne polymer coatings is an important step in the manufacturing process of products like e.g. LCD-foils or protective topcoats in various applications. In industrial applications usually a mixture of different solvents with various properties are used to create favoured qualities in products. Multi-component systems and the occurring phenomena are hardly investigated. First experimental results with multicomponent mixtures with pre-loaded gas phase were already presented at ECS 1999 [1].

Diffusion coefficients in solvent-borne systems are strongly depended on the solvent content in the polymer. In some cases like in our system polyvinylacetate (PVAc) with toluene the dependence of the diffusion coefficient is so strong, that due to drying the system shows a skin formation (so called "diffusional skinning"). For an improved drying of such films the generation of the skin should be avoided. For this purpose the coating surface should be kept wetted to prevent the drop of the diffusion coefficients within this thin layer. This can be attained by pre-loading the drying air with a solvent. Due to the absorption of this solvent, according to its gas-liquid equilibrium, the coating surface remains moistened and inhibits thus the formation of a dry skin. In a successive drying step with dry air, this solvent component should be easily removable from the coating. Thereupon reasoning, the air should be pre-loaded with a volatile solvent component with a high diffusion coefficient in the coating to achieve the desired effect of an overall reduced drying time. The results of measurements from former works [2] with FT-IR-Spectroscopy have shown that preloading the drying gas with a selected solvent can avoid this unintentional phenomenon, see figure 1. New experimental results about this topic will be reported in this contribution.

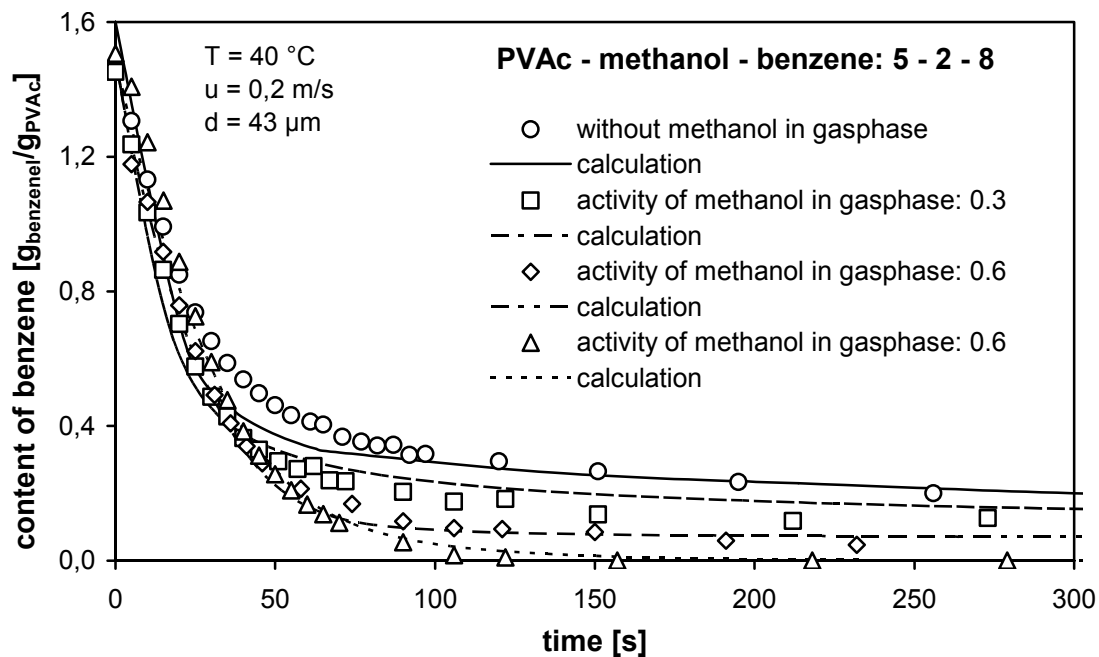


Figure 1: Influence of preloading from [1]

- [1] Wagner, G.R. Enhancing the drying rate of polymeric solvent coatings using a preloaded gas phase.
 Schabel, W.
 Schlünder, E.-U. Proceedings ECS 99, 3rd European Coating Symposium, 417-422, 1999