Information Note

Renewable Raw Materials in Offset Printing Inks

Renewable raw materials are generally understood to be substances that originate from living matter and are used by humans for purpose outside the food and feed sectors.[1]As far back as the time when letterpress printing was invented by Gutenberg, renewable raw materials such as vegetable oils and natural resins derived from trees have been widely used for the manufacture of printing inks. As a result of the industrialization of the printing sector, diversification in printing methods and the constantly growing demands on technical applications, synthetic raw materials have become increasingly important components of the formulation. Today, the printing ink industry is using raw materials from renewable resources as well as petrochemical based ones; this has become necessary in order to be able to produce high- performance printing inks with consistent properties for all printing processes.

In offset printing, particular attention should be paid to the binders, which account for 50-80 wt% of the ink formulation on average. In oilbased ink they are mainly based on rosin from tree resins and, in the case of alkyd binders, on vegetable oils. In conventional sheetfed offset, moreover, mineral oil was successively replaced as liquid component more than 20 years ago by vegetable oils or fatty acid esters derived from them. Increasing the proportion of renewable raw materials in web offset inks (newspaper and heatset) is also part of current technical developments.

UV-/ LED UV and EB radiation curable sheetfed and web offset inks are mainly based on UV/EB acrylates (oligomers and monomers) derived from various non-renewable chemical backbones such as polyol, polyester, polyurethane, polyether, epoxies and acrylics.
Today more and more new acrylates are developed based on renewable acrylic acid, polyols etc.

Additives such as driers, photoinitiators, waxes, antioxidants, and dispersants originate from the petrochemical industry in most cases, as the relatively small proportion of these ingredients in the formulation does not allow large fluctuations in quality and technical properties. However, particularly in the case of waxes, the development of variants based on renewable feedstocks is well advanced and the first products are already available on the market. In the case of pigments, which make up around 10-20 wt%, restrictions will continue to apply in the foreseeable future. The predominantly used organic pigments are produced by classical synthesis chemistry with petrochemical starting materials. Currently, no alternatives based on renewable raw materials are available that meet the required color/fastness standards and are obtainable in the required quantities.

The development of processes for the production of bio-based precursors such as ethanol, glycerol, acrylic acid and various polyols is promising, since these in turn can serve as starting materials for a wide range of other chemicals and polymers, not only in the printing ink sector, but also in the entire chemical industry.[2] The motivating forces behind the trend

[1] Mann, S. (1998); Nachwachsende Rohstoffe, Stuttgart, ISBN 3800141264

[1 2] F. Aeschelmann, M. Carus (2015); *Bio-based Building Blocks and Polymers in the World*, nova-Institute GmbH

towards using renewable raw materials include performance benefits in some areas of application, preservation of the finite crude oil resources and of course ecological aspects. It is important to note, that most of the renewable raw materials only achieve their full effectiveness when they are adapted to the respective application by chemical and/or physical processes.

The general return to renewable raw materials is in the interest of circular economy and the desired reduction of CO_2 emissions. In this context, the increasing utilization of residual materials, which are much more than just “waste”, gains importance. “Renewable” is not automatically synonymous with “sustainable”, so the life-cycle must be considered holistically when selecting raw materials.

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