

DESIGNED POLYMERS FOR PURIFICATION OF FLAVOR OILS

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'Designed polymers' are a new class of selective resins with engineered affinities for particular target molecules or 'classes' of molecules. Molecularly imprinted polymers are just one example of this type of resins. Designed polymers are obtained by careful design of their morphology and surface chemistry. The proper choice of suitable building blocks and its processing leads to materials with optimal properties for a given separation task. Designed polymers are able to exhibit exceptional selectivities and very unique separation capabilities. The tailored selectivity is often utilized to remove undesired impurities but can also be used for directed retrieval of valuable components from various solutions. The separation can be accomplished by a chromatography set-up or as a batch adsorption process.

An area where selective, designed polymers have significant practical applicability is in the preparative clean-up of liquid food stuffs.

Citrus essential oils are important ingredients in the food, flavour and fragrance industries. It is problematic for these industries that a considerable portion of the global citrus flavour oil batches are contaminated with sometimes unacceptably high levels of different agricultural residues, such as pesticides. Traditional unit operations such as distillation are not effective in the removal of pesticides without detrimental impact on taste and aroma.

To meet this challenge we have therefore designed and developed a novel type of polymeric adsorbent that is able to selectively remove a large number of different pesticides from citrus oils. The pesticides bind to special ligands on the polymer surface, whereas essential lemon oil constituents are not retained.

After only a single pass through the polymer resin, the concentration of pesticides in the flavour oils is reduced to levels below the detection limit. Purifications using special adsorbents can be run under very mild conditions which minimizes adverse effects on properties of the aroma and flavour profile. Hence, professional sensory panels approve the aroma and taste profile of the flavour oils purified by this adsorbent.

In this work, we would like to describe the area of designed polymers and their characteristics in general. More specifically, we would like to describe their performance towards the efficient and selective removal of pesticides from natural lemon oil.