NMR spectroscopy for structural analysis of microbial P(HB/HV) copolymers

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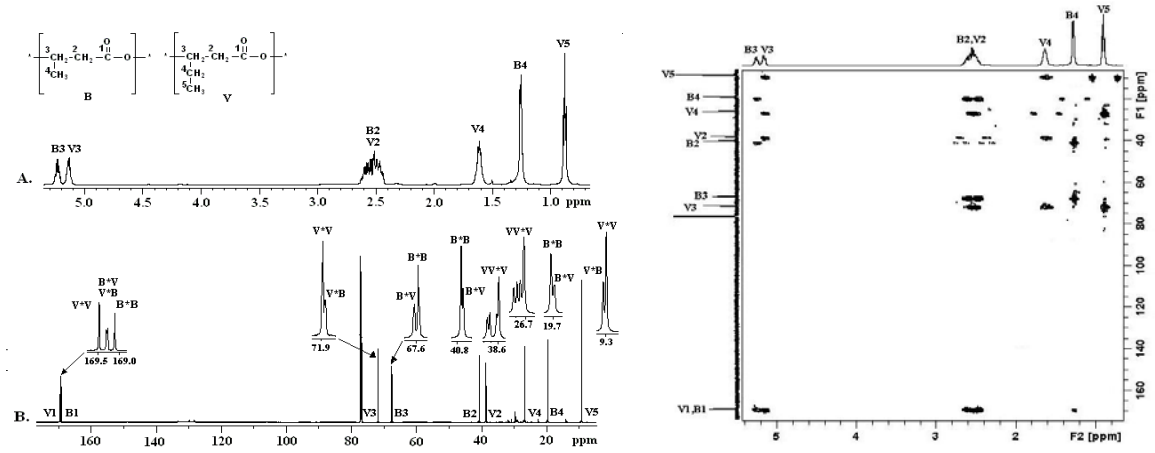
The bacterially synthesized poly(hydroxyalkanoate)s (PHAs), being biodegradable and biocompatible thermoplastics, are potentially useful and attractive materials which can be produced from varied renewable resources (sugars, fatty acids).[1] The structure of PHAs, including chemical composition and distribution of the monomer units, determines their physical and mechanical properties, and practical applications.[1,2] Nuclear magnetic resonance spectroscopy (NMR) is a powerful technique which can generate a large quantity of structural information and can be successfully applied for structural characterization and monitoring of the chemical composition and distribution of monomer units of polymers.[3]

Here we report ^{1}H and ^{13}C NMR-based spectral study for quantitative and qualitative analysis of the chemical composition and microstructure of bacterially synthesized poly(3-hydroxybutyrate-co-3-hydoxyvalerate) copolymers P(HB/HV) by mixed cultures at several different feeding strategies.[1,2] The monomer sequence distribution of the bacterially synthesized P(HB/HV) co-polymers has been defined on the base of analysis of 1D and 2D (HSQC and HMBC) spectral data (Fig 1). The results have been verified by statistical methods and suggest a blocky-monomer distribution of the P(HB/HV) co-polymers studied.



References

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