pH - Triggered Release from Ester-Bearing Polyamide Microcapsules

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The majority of current pH-triggered release systems are designed to respond to either low or high pH. Encapsulants based on ampholytes are an example of materials that respond to both acidic and basic pH owing to the coexistence of cationic and anionic groups, but generally possess low loading capacity and poorly controlled release. The current work utilizes interfacial polymerization between polyamines and a pyromellitic diester diacid chloride to form high capacity "liquid core-shell" polyamide microcapsules, which are stable in a dry or non-polar environment but undergo steady controlled release at pH 7.4 and accelerated release at pH 5 and pH 10. The rate of release can be tuned by adjusting the amine cross-linker feed ratio, presumably due to varying degrees of cross-linking in the polymer shell. With the demonstrated barrier properties and tunable dual acid/base-triggered release, the ester-bearing microcapsules design could see applications in a wide range of pH environments.

A Highly Reactive Manganese Catalyst for Intramolecular C(sp^3)—H Amination: From Benzylic to Primary

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A highly reactive catalyst, manganese tert-butylphthalocyanine [Mn(ᵗBuPc)], for intramolecular C—H amination across all types of C(sp^3)—H bonds is reported. [Mn(ᵗBuPc)] functionalizes benzylic C—H bonds in good yields, including challenging electron-deficient substrates. Aliphatic C—H bonds, even 1° C—H bonds (BDE of ~101 kcal/mol) are readily aminated. Significantly, 1° C—H bonds are the least reactive in metallonitrene C—H amination reaction and functionalization of this bond type is rare. The high reactivity of [Mn(ᵗBuPc)] observed in relatively simple molecules is maintained in more topologically and functionally complex natural product settings. Derivatives from leelamine, betulinic acid and dihydropleuromutilone are readily aminated in high yield and high regioselectivity, demonstrating the ability of predictively installing nitrogen into a broad range of C—H bonds.