Green synthesis of Lidocaine

In this experiment, we synthesized lidocaine in multiple steps using a design that is meant to reduce the use and generation of hazardous substances. Lidocaine, an anesthetic that stops nerves from sending messages of pain to the brain when ingested is an interesting target because it is hypoallergenic and has the advantage of a more rapid onset and longer duration than other anesthetics. Lidocaine was prepared in three steps by the reduction of 2-nitro-*m*-xylene, the acylation of 2,6-xylidine with chloroacetyl chloride and nucleophilic substitution with diethylamine. These reactions are interesting because they are reactions that are presented in most Organic Chemistry classes and we understood how they work after observing first-hand the concepts of the reactions in practice. Since the "traditional" synthesis of lidocaine utilizes solvents, reagents and conditions that are harmful and hazardous to the environment, a more environmentally friendly method had to be applied. In the first step of the reaction, $SnCl_2.2H_2O$, a carcinogenic reducing agent was replaced with Zn and H_2O, reagents that are less expensive, readily available and non-toxic to humans. In addition to that, glacial acetic acid, a flammable solvent was replaced with water because it is a readily available environmentally friendly solvent. In the third step of the reaction, the solvent toluene, a teratogenic solvent was replaced with pentane because it is not a teratogen.