The Ways to Utilize Synthetically & Naturally Derived Polymers

Thousands of years ago, burying wastes have already been an effective way in helping the environment. However, because of the increase in population in the present time, digging a hole is not enough. With the larger number of human population, equates larger amount of wastes, much of which is not biodegradable.

In 2016, the Annual Per Capita Food Consumption of shrimps and prawns in the Philippines per year is 0.5 kilograms. A tablet is a widely used pharmaceutical dosage form that is usually composed of one or more powdered active ingredients and excipients compressed altogether to form a solid dosage form. On the other hand, coating is a procedure wherein a dry, outer layer of coating material is put to the surface of a dosage form. This is done to produce benefits such as facilitating product identification and modifying drug release from dosage form. After making a good tablet, one must often coat it.

Internationally, numerous researchers are investigating the potential utilization and optimization of synthetically and naturally derived polymers in different fields particularly in the vast variation of therapeutic functions. In the previous two decades, extensive advances for the development of biodegradable polymers have been made through comprehensive studies and researches, predominantly in different areas of applied sciences and pharmaceuticals. They are commonly centered for study because of their capability to adapt, compatibility to other compounds and decomposability properties which makes them easy to tailor to suit desired advantages.

The process of enteric coatings stems from the way the polymers react to differences in composition of the gastric and intestinal environment, most commonly in regards to pH. Currently available enteric coatings are mostly weakly acidic in nature that remains undissociated in the low pH environment of the stomach but readily dissolve when the pH rises above 5.

The logic behind this is to preserve the drug as it passes the acidic medium of the stomach but not depriving drug release in the intestine where higher pH is observed (Gennaro, 2011). Chitin is second to cellulose as the most abundant naturally occurring biopolymer. It is commonly found in the outer covering of crustaceans, such as crabs and shrimps, in cell walls of fungi and other natural materials (Andrady & Xu, 1997).

According to Bourtoom (2008), Chitin is mainly polymer derived from glucose which has

identical structure to cellulose except for the substitution of acetamide group on the carbon atom.Chitosan is an amino polysaccharide that can be retrieved by processing inedible outer covering of shrimp, which is basically considered waste, and deacetylation of chitin from which it is derived.

Researchers and biochemists have claimed that chitosan is a biocompatible, biodegradable and non-toxic substance that can be made as potential excipient in pharmaceutical applications. This research is mainly centered on the chemical derivation of chitosan, which is expected to be a potential agent that can be utilized in the field of pharmaceutical formulation especially in the design of delayed or controlled drug delivery systems (Puvada et. al, 2012).

Cellulose acetate phthalate is one of the oldest used synthetic polymers for enteric coating due to its pH-dependent solubility. It is highly resistant to acidic medium but easily solubilizes in the basic medium of the intestine (Rhodes & Porter, 1998).Chitin and chitosan, although they do not occur in organisms that produce cellulose, are still often considered as cellulose derivative since they identical structure. They demonstrate unlimited possibilities in the field of pharmaceutics because not only they are naturally abundant and renewable polymers but also bio-compatible and non-toxic (Dutta & Tripathii, 2004).

Chitin and chitosan are ionized in medium with pH of 6 and ionization increases as pH decreases but a modification of this polymer with phthalic anhydride, which is widely used in synthesis of cellulose acetate phthalate; could greatly affect its solubility profile. The compound formed, Chitosan phthalate, could present a favorable potential as enteric-coating for tablet formulation (Giraud et. al, 2017).