Frequently asked questions

1. **Explain common dewatering processes.**

   Common dewatering processes use mechanical means of separation such as screens, screw presses, belt presses, vacuum filters and centrifuges, which can all be combined with additional forces to remove the water – such as using an electric field, ultrasonics, vibrations, chemical treatments, etc. In any dewatering application there is a definite advantage in combining multiple dewatering fields to promote the synergy of separation forces. There are several dewatering methods such as Belt filter press, Screw press dewatering, Rotary and centrifugal presses, Membrane filter press, Electro-osmotic dewatering, Dissolved air flotation separation and even combined dewatering methods such as Electro-osmotic belt filter, Ultrasonic vibrations, Electro-acoustic dewatering, Vapour pressure dewatering are considered to be more effective.

2. **What are the steps involved in conversion of organics to methane**

   The overall conversion process is often described as a three-stage process which may occur simultaneously in an anaerobic digester. These stages are: (1) hydrolysis of insoluble biodegradable organic matter; (2) production of acid from smaller soluble organic molecules; (3) methane generation. The three-stage scheme involving various microbial species can be described as follows: (1) hydrolysis and liquefaction; (2) acidogenesis; (3) methane fermentation.

3. **Discuss the factors under consideration during on-site composting**

   When considering On-Site composting or Food Waste Drying Systems there are several questions that are important, such as a) Space Availability, b) Staff Resource for separating food scraps from trash as well as operating the equipment etc; c) Infrastructure availability (whether it is just electrical requirements or sewer considerations); d) End Use for the finished product; e) local support and cooperation or obstacles from nearby businesses or residences and; f) approvals from local enforcement agencies. Of course, approvals and permit requirements from local agencies will depend upon the type and volume of food being composted.

4. **Briefly explain common on-site methods.**

   The most common on-site methods are in-vessel composting; vermicomposting and anaerobic digestion

In-Vessel Composting

This process involves temperature, moisture and aeration controlled systems where organic materials are fed into equipment which has mechanisms for turning or agitating the material for proper aeration. This type of system can generally process large amounts of waste without taking up too much space and can accommodate almost any type of organic waste (meat, biosolids, food scraps etc).

Vermicomposting

With this process, worms are used to break down the organic materials. Animal products or grease cannot be composted using this method but (when applicable) this process can break down organic materials into high value compost faster than In-Vessel composting.

The use of a variety of annelid worm species is one alternative approach that has received fairly regular reawakenings of interest over the years, having been variously termed worm composting, vermicomposting, vermiculture or our preferred annelidic conversion, a term first attributed to H. Carl Klauck of Newgate, Ontario. The description worm composting and it's like is somewhat misleading, since the process from both biological and operational criteria is quite distinct from true compost production in two significant ways.

Anaerobic Digestion

Anaerobic digestion is an alternative option which has been receiving increasing interest over recent years. In many respects, it is a regulated version of the natural events of landfill, in that it results in the controlled release of methane-rich biogas, which offers the potential for a very real form of energy from waste. It has been used successfully to process agricultural and household wastes. In this process in the absence of free oxygen, anaerobic bacteria convert the large organic molecules mainly into methane CH_4 and carbon dioxide CO_2. The actual progression of this breakdown is chemically very complex, potentially involving hundreds of intermediary reactions and compounds, many of which have their own additional requirements in terms of catalysts, enzymes or synergistic chemicals.

5. Name different types of bacteria involved in anaerobic digestion process.

There are four main groups of bacteria involved in anaerobic digestion, they are

• Hydrolytic fermentative bacteria – *Clostridium* and *Peptococcus*.

• Acetogenic bacteria – *Syntrophobacter* and *Syntrophomonas*.

• Acetoclastic methanogens – *Methanosarcina* and *Methanothrix*.

• Hydrogenotrophic methanogens – *Methanobacterium* and *Methanobrevibacterium*.

6. Discuss on landfilling method

Landfill is a natural process of solid waste management. All discarded biological waste gradually undergoes a natural process of biodegradation, typically beginning with autolysis and culminating in putrefaction. The speed at which this progresses is governed by a number of factors such as the nature and freshness of the material, the temperature, moisture and so on. When this happens in the open air, or in the upper levels of the soil, decomposition is aerobic, the organic material being mineralized and carbon dioxide (CO_2) released as the major gaseous product. However, though biowaste awaiting collection in dustbins and even, to some extent, when only recently delivered to landfill, initially begins to break down in this way, older putrescible material, buried deeper, experiences conditions effectively starved of oxygen. In this environment, the degradation process is anaerobic and mineralization continues with broadly equal amounts of methane (CH_4) and carbon dioxide being produced. This resultant mix is known as landfill gas and typically contains a number of trace gases of varying chemical composition. At the functional level, the mechanism of this reaction is very complex, with hundreds of intermediary reactions and products potentially involved and many requiring additional synergistic substances, enzymes or other catalysts.