STAGES IN THE SLUDGE DIGESTION PROCESS:

Three distinct stages have been found to occur in the biological action involved in the natural process of sludge digestion. The stages are

1. Acid fermentation

2. Acid regression

3. Alkaline fermentation

1. Acid fermentation stage or acid production stage:

In this first stage of sludge digestion, the fresh sewage-sludge begins to be acted upon by anaerobic and facultative bacteria called acid formers. These organisms solubilize the organic solids through hydrolysis. The soluble products are then fermented to volatile acids and organic alcohols of low molecular weight like propionic acid, acetic acid, etc. Gase like methane, CO2, and H2S are also evolved. Intensive acid production makes the sludge highly acidic,and lowers the pH, value to less than 6.Highly putrefaction odours are evolved during this stage, which continues for about 15 days or so(at about 21°C). BOD of the sludge increases to some extent, during this stage.

2. Acid regression stage:

In this intermediate stage, the volatile organic acids and nitrogeneous compounds of the first stage are attacked by the bacteria, so as to form acid carbonates and ammonia compounds, small amount of H2S and CO2 gases are also given off. The decomposed sludge has a very offensive odour and its pH value rises a little, and to be about 6.8 t. he decomposed sludge also entrap st he gases of decomposition, becomes foamy and rises to the surface form scum. This sludge continues for a period of about 3 months or so. BOD of the sludge remains high even during this stage.

3. Alkaline fermentation stage:

In this final stage of sludge digestion more resistant materials like proteins and organic acids are attacked at broken up by anaerobic bacteria, called methane formers, into simple substances like ammonia, organic acids and gases. During this stage, the liquid seperates out from the solids, and the digested sludge is formed. This sludge is granular and stable, and does not give offensive odours (. It has a musty earthy odour). This digested sludge is collected at the bottom of the digestion tank and is also called ripened stage. Digested sludge is alkaline in nature. The pH value during this stage rises to a little above 7, in n the alkaline range. Large volumes of methane gas(having a considerable fuel value) along with small amount of CO2 and nitrogen are evolved during this stage. This stage extends for a period of about one month or so. The BOD o ft he sludge also rapidly falls down during this stage. It is thus, seen that several month s(about 4.5 months or so)are required for the complete process of digestion to take place under natural uncontrolled conditions at about 21°C. This period of digestion is however very much dependent upon the temperature of digestion and other factors.