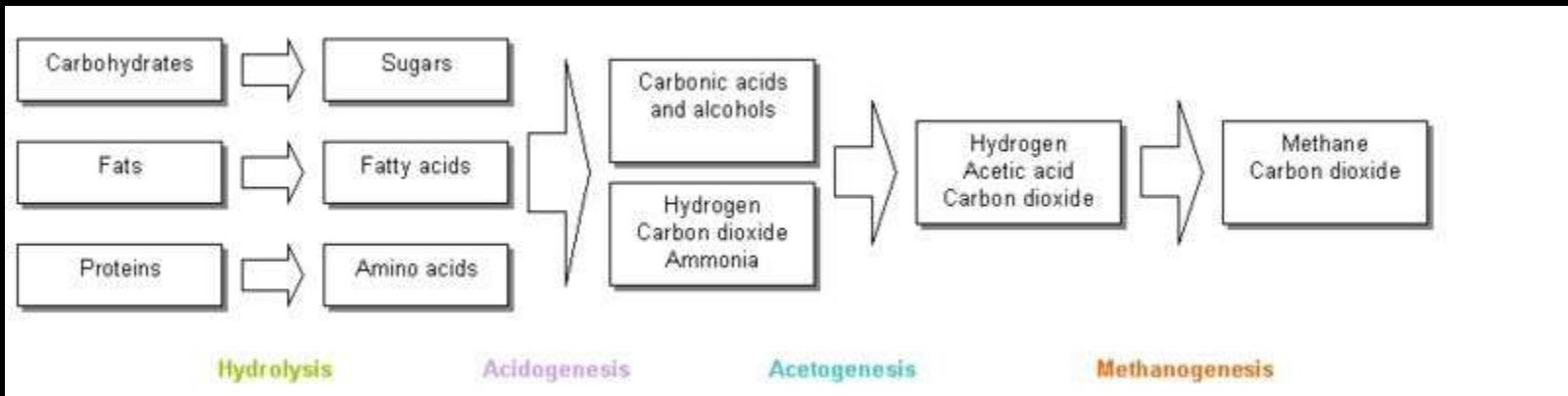


Anaerobic Digestion Simplified

Presented by Barbara Smith
For
IWEA Residuals Committee 2011

Waste Stabilization



Two Basic Steps

- Step one –
 - Convert the organic materials to volatile acids
 - pH is very important
 - Stay as close to 7.0 as possible
 - 6.6 or less – scum and odors
 - 7.5 and over – bugs slow down and stop completely
- Step two –
 - Convert volatile acids to methane

Introducing the Acid Formers

- aka – Saprophytic bacteria
- Eat organic material and convert it to volatile acids
- As acid is produced some will be absorbed by alkalinity (any additional acid added will cause the pH to drop)
- No waste stabilization occurs

411 on Acid Formers

- Food may be soluble (passes through the cell wall)
- Food may be insoluble (must create enzymes to break down the food)
- Leaves inert matter that will not break down
- Creates fatty acids also known as volatile acids
- Completes first stage of anaerobic digestion
- Grow quickly and are not very temperamental

Introducing the Gas Formers

- Aka – Methanogenic bacteria – aka – Methane fermenters
- Eat the volatile acids produced by the acid formers
- Strict anaerobes
- Stabilization takes place
- Completes digestion if both phases are occurring at the same time

411 on Gas Formers

- Eat the acid as fast as it is created
- Use the acid as food and converts the acid to carbon dioxide and methane
- Grow very slowly (because they get very little energy from the food)
- Very sensitive to changes in loading, pH and temperature and any oxygen

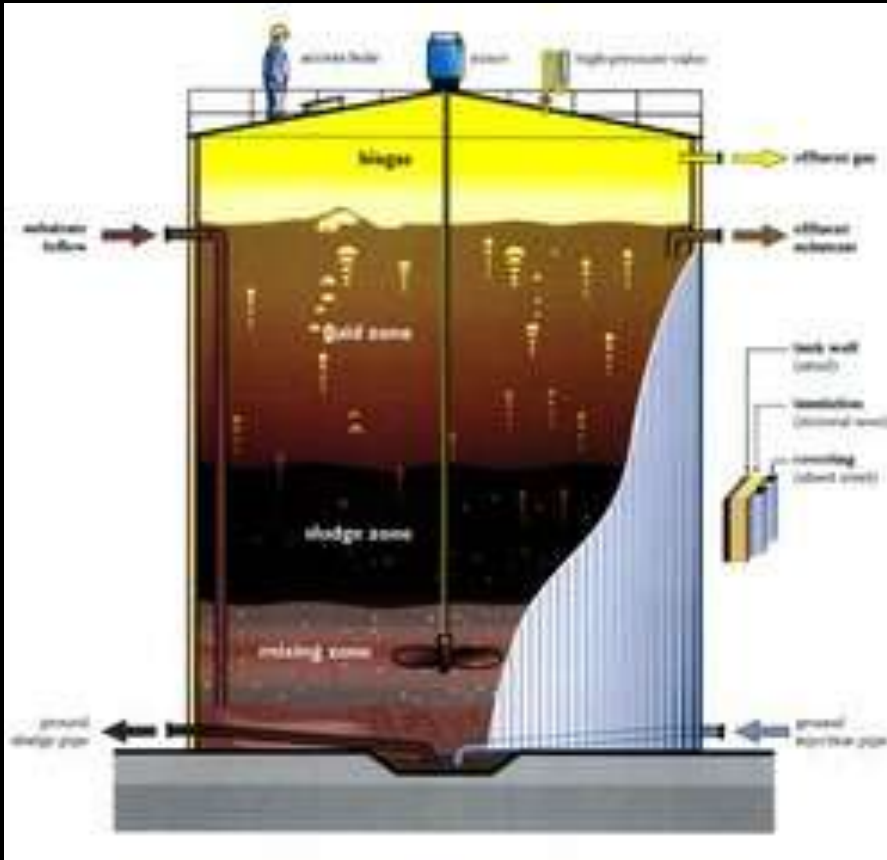
Factors Affecting Sludge Digestion

- Bacteria – Keep an eye on the ratio through the volatile acids/alkalinity ratio (V/A) <0.25
- Temperature – constant (between 90-98°F)
- Food – raw or primary works best
- Loading –
 - Concentration
 - Volatile solids concentration
 - Hydraulic loading
- Mixing
- pH – 7.8 to 7.2

Troubleshooting

- Sour:
 - V/A ratio \uparrow 0.35
 - Carbon Dioxide content \uparrow
 - Methane content \downarrow
 - pH may drop
- Extend mixing time
- Control heat
- Decrease withdrawal rates
- Pump seed sludge from secondary digester
- * Add lime or caustic soda

Treat the Anaerobic Digester Like Your Body



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Questions

