|  |
| --- |
| Reaction mechanism |
| **Hydrolysis phase by mesophilic bacterias** |
| Carbohydrates hydrolysis |
|
| Protein hydrolysis |
|
| Lipid hydrolysis |
|
| **Hydrolysis phase by thermophilic bacterias** |
| Carbohydrates hydrolysis |
|
| Protein hydrolysis |
|
| Lipid hydrolysis |
|
| **Thermophilic hydrolysis phase of macro-molecules** |
| Hydrolysis of hemicellulose by thermophilic actinomycetes |
|
| Hydrolysis of cellulose by thermophilic fungi |
|
| Hydrolysis of lignin by thermophilic fungi |
|
| **Mesophilic hydrolysis phase of macro-molecules** |
| Hydrolysis of hemicellulose by mesophilic actinomycetes |
|
| Hydrolysis of cellulose by mesophilic fungi |
|
| Hydrolysis of lignin by mesophilic fungi |
|
| **Growth of mesophilic bacterias** |
| Growth on |
|
| Growth on (ammonification) |
| Growth on |
| **Growth of thermophilic bacterias** |
| Growth on |
| Growth on |
| Growth on |
| **Growth of mesophilic actinomycetes** |
| Growth on |
| Growth on |
| Growth on |
| Growth on |
| **Growth of thermophilic actinomycetes** |
| Growth on |
| Growth on |
| Growth on |
| Growth on |
| **Growth of mesophilic fungi** |
| Growth on |
| Growth on |
| Growth on |
| Growth on |
| Growth on LG |
| **Growth of thermophilic fungi** |
| Growth on |
| Growth on |
| Growth on |
| Growth on |
| Growth on LG |
|  |
| **Nitrification** |
|  |
| **Denitrification** |
|  |
| **Production of methane**  **Hydrolysis**  Insoluble substrate: G, P, L, HE, CE  **Anaerobic digestion**  **Oxidation of methane** |
| **Death of micro-organisms** |
| Death of MB |
| Death of TB |
| Death of MA |
| Death of TA |
| Death of MF  (le coefficient z pour équilibrer l’équation) |
| Death of TF |
| Death of autotroph microorganisms |
| **Lysis of micro-organisms (tiré de Oudart)** |
|  |
|
| **Growth limiting functions** |
| Temperature   * Mesophilics i = 1, Thermophilics i =2 |
| Dissolved oxygen |
| Moisture content   * If * If * If |
| Ammonia -ammonium |
| Substrate |
| Substrate availability   * Bacteria * Actinomycetes * Fungi |
| Processus physique : Transfert de masse |
| Liquid-gas transfer O2  (mass of O2 transferred to gas phase) (coherence of unities m and n)  Liquid-gas transfer CO2  Liquid-gas transfer NH3  Water evaporation-condensation |
| **Emission of gas component from gas phase to atmosphere**   * O2 * CO2 * NH3 |
| **Energy balance**   * Temperature of gas phase   (Verification if can be equal to Cp capacité calorifique)   * Temperature of solid-liquid phase   : heat transfer through container’s wall  : biological heat generation, proportional to the oxygen consumption rate |
| **Nitrogen cycle** |
| Growth of autotroph microorganisms   * Si WFPS < pWFPSdenit : * Si WFPS >= pWFPSdenit : |
|
|
|
|
| Death of autotroph biomass  \*La répartition du décès de la biomasse autotrophe entre M.I et RB est calculée dans les mêmes proportions que pour la biomasse hétérotrophe |
| Emission ammoniacale (transfert liquide – gas selon Sole-Mauri ?) |
|
|
|
|
| Dénitrification  Accepteur d’électron |
|
|
| **CH4 emission** |
| Methane generation  Oxidation of methane (limited by oxygen uptake rate) |