**Global equations**

1. Carbohydrates dynamic
2. Proteins dynamic
3. Lipid dynamic
4. Hemicellulose dynamic
5. Cellulose dynamic
6. Lignin dynamic
7. Inert material dynamic
8. Soluble carbohydrate dynamic
9. Soluble protein dynamic
10. Soluble lipid dynamic
11. Soluble hemicellulose dynamic
12. Soluble lignin dynamic
13. Xmb dynamic
14. Xtb dynamic
15. Xma dynamic
16. Xta dynamic
17. Xmf dynamic
18. Xtf dynamic
19. Xdb dynamic
20. CO2 dynamic

CO2 cumul ?

1. Water dynamic

1. dynamic
2. Emission of NH3
3. Xa dynamic
4. NO3- dynamic
5. N2O and N2 dynamic
6. CH4 dynamic

(Ge et al., 2016) suggest that the production of methane rate is correlated with the hydrolysis rate by a methane yield coefficient Ych4. We assume that product hydrolysis from aerobic microoganisms are used by anaerobic microorganisms for methane production.

According to (Arah and Stephen, 1998), this methane production is inhibited by dissolved oxygen:

The oxidation rate follows a Michaelis-Menten kinetic:

(Watson et al., 1997)

The emission of methane rate is:

1. Bilan thermique

The heat generated by biological activities:

(de Guardia et al., 2012)

: consumption rate of oxygen (mol.h-1)

: heat released per mole of oxygen consumed (kJ.mol-1)

(Lin et al., 2008)

Total growth rate of aerobic microorganisms (mol.h-1)

: Biomass yield on oxygen (mol.mol-1)

: growth rate of aerobic microorganism i (kg.h-1.kgTM-1)

Molar mass of microorganism i (kg.mol-1)

TM: Initial total mass of compost (kgTM)

The heat loss by the wall of the composting reactor:

The convective heat loss by air flow:

Osygen