Parameters

box_vol = 1.5 m^3

flow_rate = 9.8 $\frac{m^3}{d}$

t_din_0 = 0.0005 $\frac{mol}{m^3}$

t_fuc_0 = 0.010 · 20 $\frac{mol}{m^3}$

km_din_fuc = 0.0002 $\frac{mol}{m^3}$ *

fuc_grow_gam = $3.75 \cdot 10^{-6}$ $\frac{mol}{mol \cdot d}$ *

mu_0_fuc = 0.477 d^{-1}

resp_0_fuc = 0.007 d^{-1}

Gammarus grating

$750 \frac{Ind}{KOB}$ → Vol = 1,5 m³ $500 \frac{Ind}{m^3}$

15 mg FM / Ind.d (anstatt 0,17 mg $\frac{FM}{Ind.d}$)

$* 500 \frac{Ind}{m^3}$

→ $= 7500 \frac{mg\ FM}{m^3.d}$

$= 7,5 \frac{g\ FM}{m^3.d}$

$= 1,9 \frac{\mu mol}{l.d}$

mit $0,7 \frac{mg\ FM}{Ind.d}$

$= 0,09 \frac{\mu mol}{l.d}$

Units

$$1\,\frac{mol}{m^3} = 1\,\frac{mmol}{l}$$

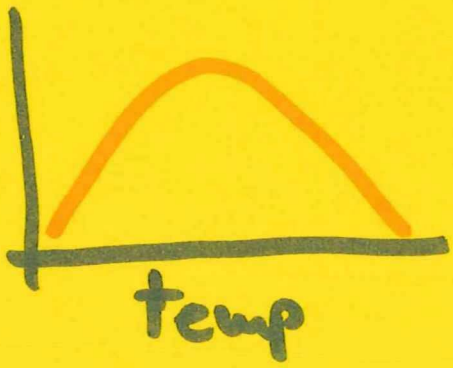
$$1\,\frac{kmol}{m^3} \cdot 1e^6 = 1\,\frac{\mu mol}{m^3}$$

$$1\,\frac{kmol}{m^3} \cdot 1e^3 = 1\,\frac{mmol}{m^3}$$

$$= 1\,\frac{\mu mol}{l}$$

Quadratic Model

$$f(temp) = x_0 + x_1 \cdot temp + x_2 \cdot temp^2$$



R: $lm(y \sim x + I x^2)$

Q_{10} - temperature rule

for respiration

$$r = r_0 \cdot e^{0.0693 \cdot T}$$

$$r_1 = r_0 \cdot e^{0.0693\,(T+10)}$$

$$r_1 = r_0 \cdot e^{0.0693 \cdot T + 0.693}$$

$$r_1 = \underbrace{r_0 \cdot e^{0.0693 \cdot T}}_{r} \cdot e^{0.693}$$

$$0.693 = \ln(2)$$

$$r_1 = r \cdot e^{\ln(2)}$$

$$r_1 = r \cdot 2$$

Unit check of process equations

- DIN import/export

$$\left[\frac{mol}{m^3}\right] \cdot \left[\frac{m^3}{d}\right] \cdot \left[\frac{1}{m^3}\right] = \left[\frac{mol}{m^3 \cdot d}\right]$$

- Fucus N-assimilation

$$\left[\frac{1}{d}\right] \cdot F_T \cdot F_{DIN} \cdot \left[\frac{mol}{m^3}\right] = \left[\frac{mol}{m^3 \cdot d}\right]$$

- Fucus respiration

$$\left[\frac{1}{d}\right] \cdot F_T \cdot \left[\frac{mol}{m^3}\right] = \left[\frac{mol}{m^3 \cdot d}\right]$$

- Gammarus grazing

$$\left[\frac{ind}{m^3}\right] \cdot \left[\frac{mol}{ind \cdot d}\right] \cdot F_T = \left[\frac{mol}{m^3 \cdot d}\right]$$

Conversion factors

Fucus

- molar mass $N = 14 \frac{g}{mol}$

- N-content $= \frac{1.8\ g}{100\ g\ DM}$

$= \frac{0.129\ mol}{100\ g\ DM}$

↴ 1 mol = 775 g DM

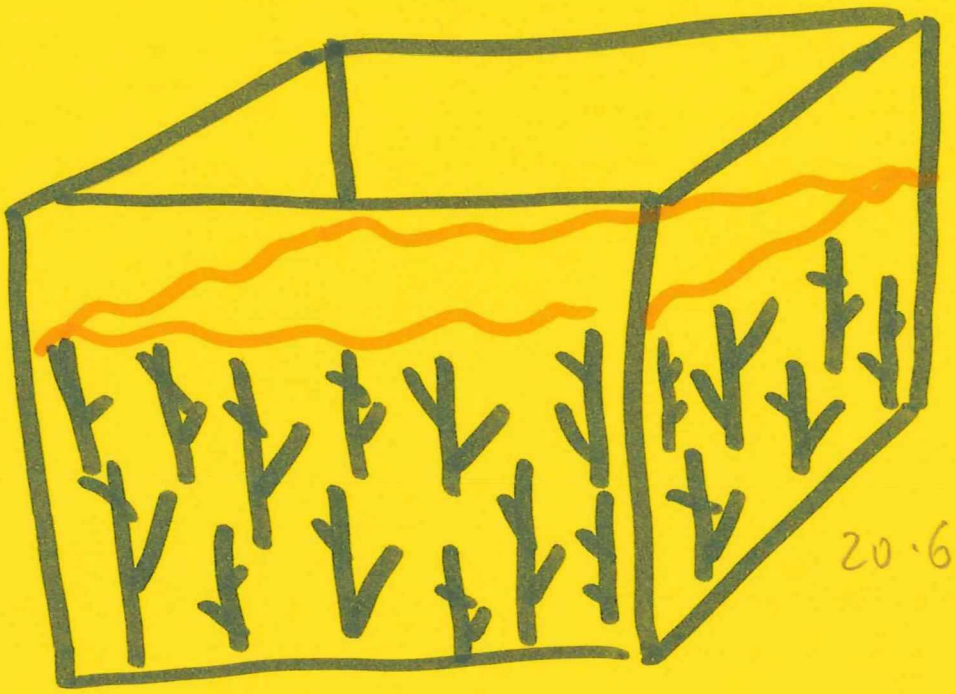
- water content = 80.5 %

100 g FM = 19.5 g DM

1 g DM = 5.1 g FM

↴ 1 mol = 4000 g FM

Fucus in KOB



20 · 60 = 1200 g in KOB

1 Fucus = 60 g FM

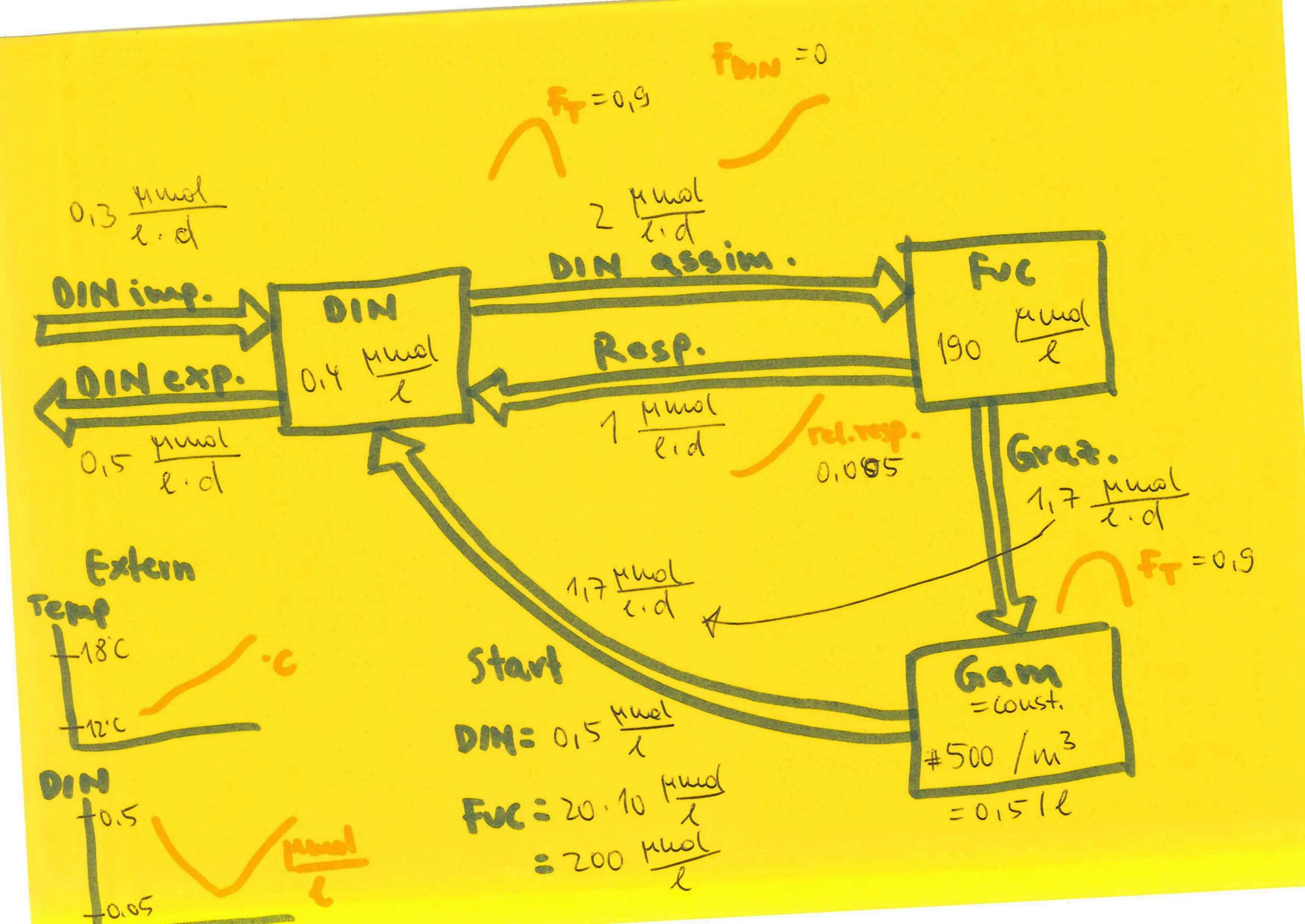
$\frac{x}{60g} = \frac{1 mol}{1000g}$

= 0.015 mol in 1.5 m^3 water

= 0.010 $\frac{mol}{m^3}$

↓ in KOB:

$20 \cdot 0.010 \frac{mol}{m^3}$


$f_{DIN} = 0$
$f_T = 0{,}9$
$0{,}3 \frac{\mu mol}{l \cdot d}$
$2 \frac{\mu mol}{l \cdot d}$
DIN assim.
DIN imp.
DIN
$0{,}4 \frac{\mu mol}{l}$
Fuc
$190 \frac{\mu mol}{l}$
DIN exp.
Resp.
$1 \frac{\mu mol}{l \cdot d}$
rel. resp.
0,095
$0{,}5 \frac{\mu mol}{l \cdot d}$
Graz.
$1{,}7 \frac{\mu mol}{l \cdot d}$
Extern
Temp
18°C
12°C
°C
$1{,}7 \frac{\mu mol}{l \cdot d}$
$f_T = 0{,}9$
Start
DIN: $0{,}5 \frac{\mu mol}{l}$
Fuc: $20 \cdot 10 \frac{\mu mol}{l}$
$= 200 \frac{\mu mol}{l}$
Gam
= const.
#500 / m³
= 0,5 l
DIN
0.5
0.05
$\frac{\mu mol}{l}$