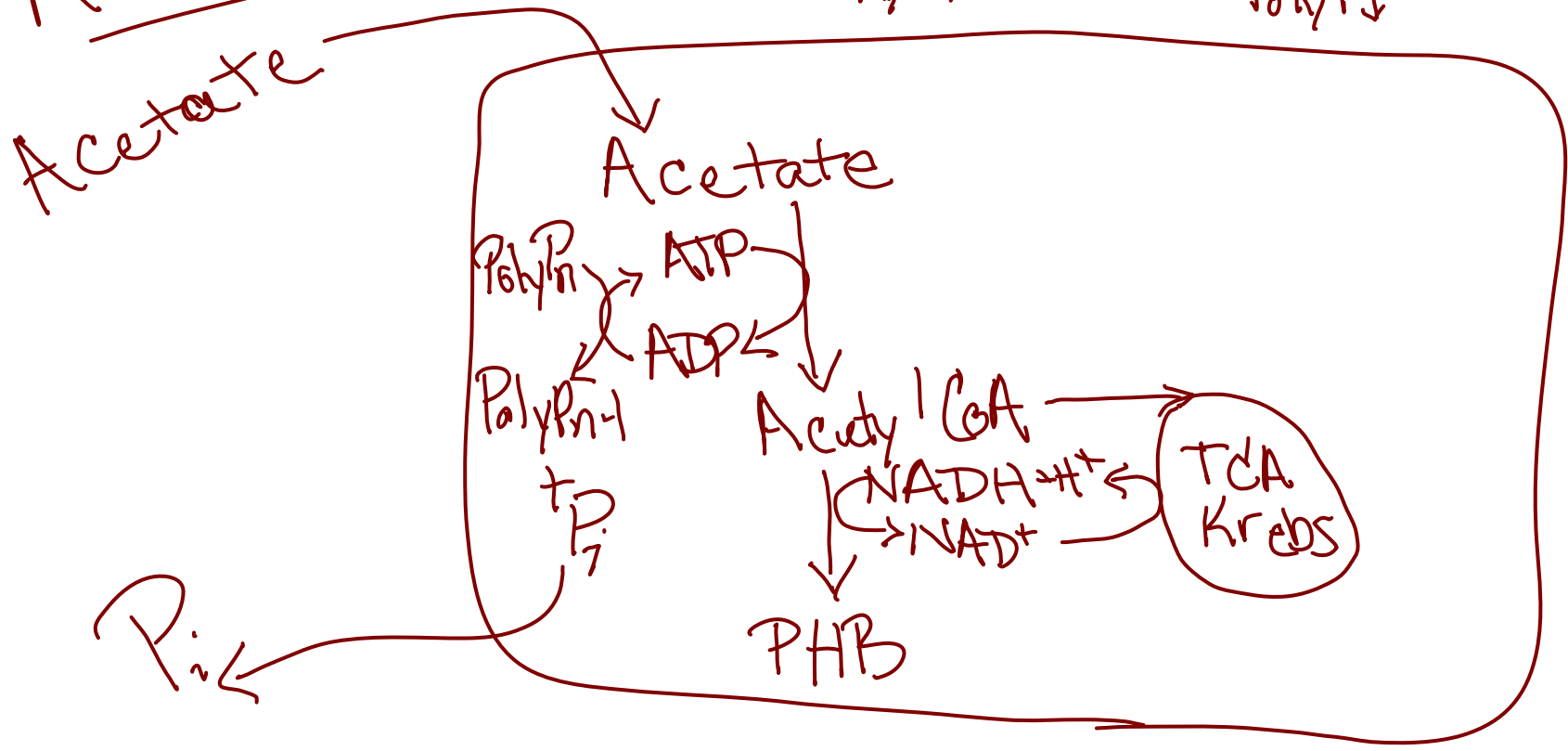


# PAO Metabolism

Anaerobic

Outside Cell	Inside Cell
Acetate ↓	PHB ↑
P <sub>i</sub> ↑	Poly P ↓



# PAO Metabolism

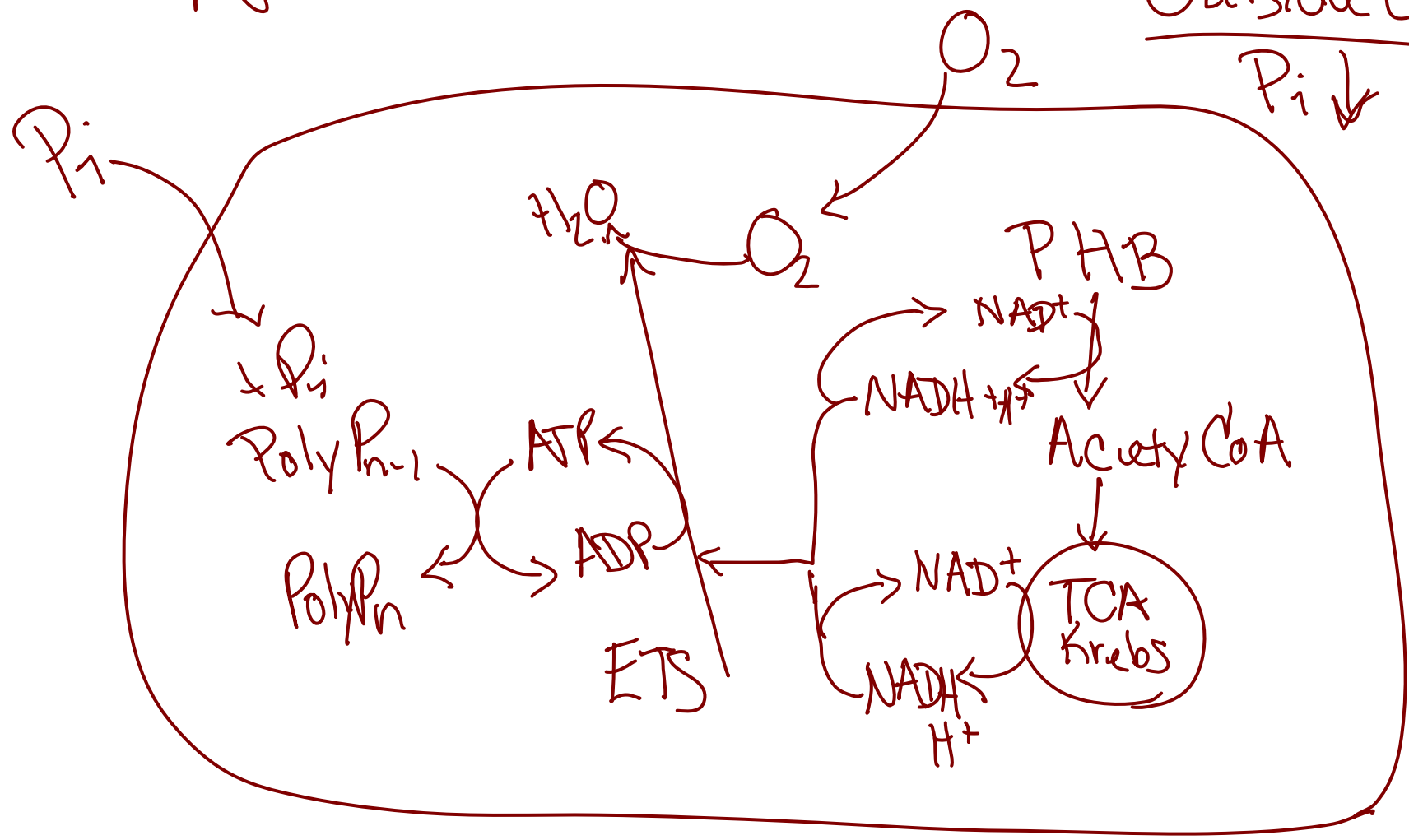
Aerobic Environment

Inside Cell

Poly P ↑  
PHB ↓

Outside Cell

Pi ↓



ANOXIC

NO D.O.

TEA Nitrates

$\text{NO}_3^- > 5 \text{ mg/L}$

Denitrifying

ANAEROBIC

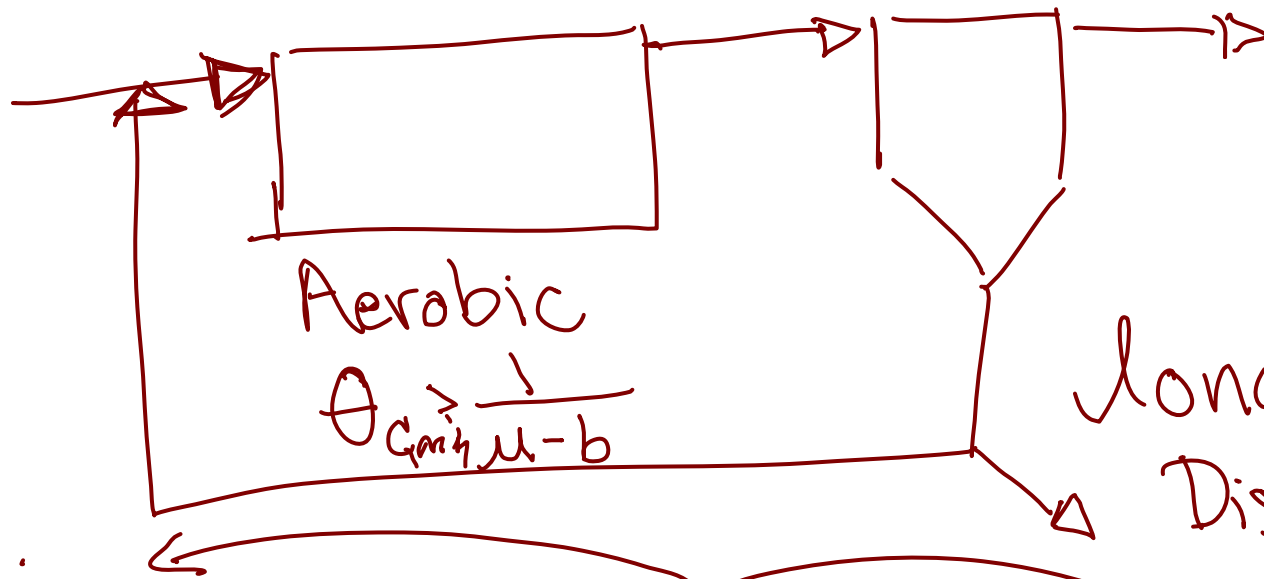
NO D.O.

TEA No Nitrates

$\text{CO}_2$   
 $\text{SO}_4^{2-}$

# 9.9) Nitrification

## One Sludge System



O<sub>2</sub> Cons.  
higher than  
for 2 sludge  
system

Biomass: Heterotrophs +

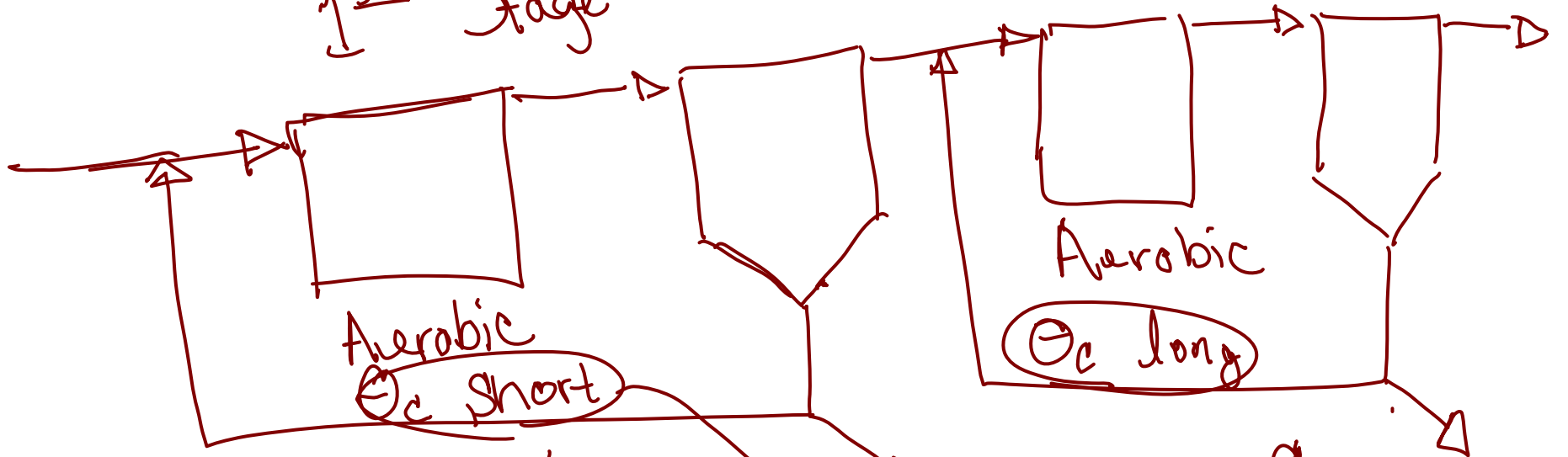
Nitrifiers

O<sub>2</sub> Consump.  
Similar to 2 stage

long SRT  
Dissolved O<sub>2</sub>  
pH, D.O.,  
Temp.

# 9.9) Nitrification

4.6 mg O<sub>2</sub> / mg NH<sub>4</sub><sup>+</sup>-N  
2<sup>nd</sup> Stage

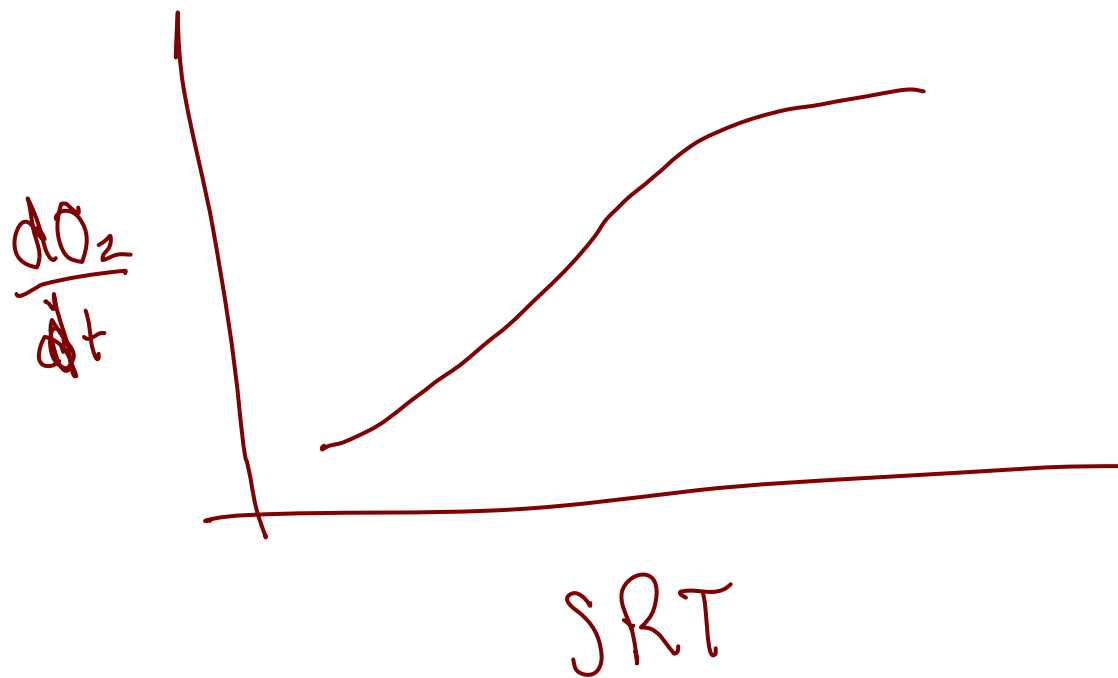


Organic/BOD Removal  
Heterotrophs  
No Nitrifiers  
Biomass

Reduce  
O<sub>2</sub> Consumption  
by Heterotrophs

Nitrification  
D.O., T, pH  
Nitrifiers  
Some Heterotrophs

# Oxygen Consumption



# MATRIX

Processes

	COMPONENTS				Reaction Rates
	1	2	3	4	
A	$\chi_{A,1}$		$\chi_{A,3}$		$\frac{dA}{dt} = \frac{\mu_A}{K_{eq}}$
B	—				
C	$\chi_{C,1}$				$\frac{dC}{dt}$
D					

Mass Balance

$$\frac{dI}{dt} = \chi_{A,1} \frac{dA}{dt} + \chi_{C,1} \frac{dC}{dt}$$

Chapter 16 (Drosche)

No  
PhotoStrip

#22

$\log_4$

$$K = 0.01 \text{ m}^2/\text{J}$$

$$t = 2\text{-min} = 120 \text{ s}$$

What is the average intensity

$$\frac{\text{mW}}{\text{cm}^2}$$

$$\ln \frac{N}{N_0} = -K \overset{D}{\wedge} (E) t \quad \frac{1}{10,000}$$

$$\ln \left( \frac{1}{10,000} \right) = -0.01 \frac{\text{m}^2}{\text{J}} \cdot E \cdot 120 \text{ s}$$



