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NCR Biochemical Lux

Chemistry
at the service of
Industry

Biological WWTP Training Course 4/4 technology overwiev

Different main technology

Biological Treatment are mainly divided in the following category:

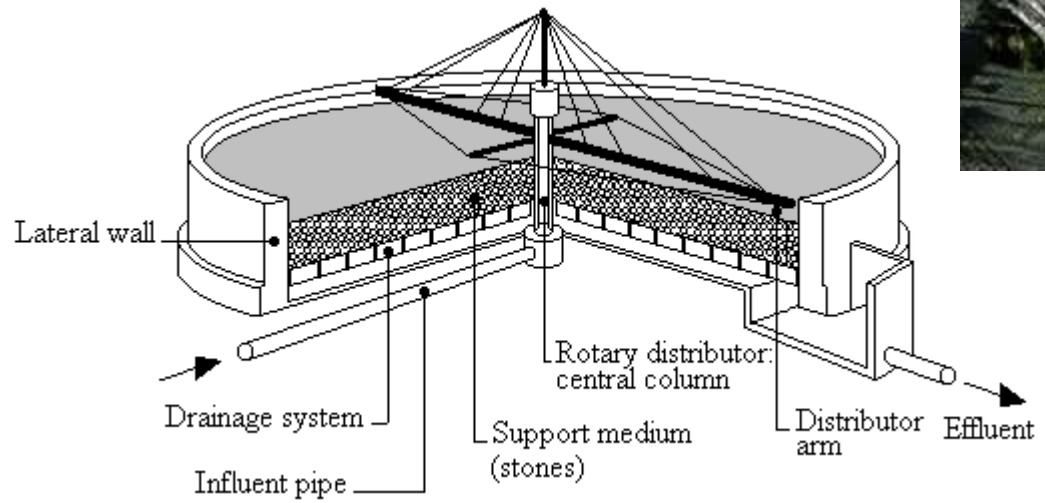
With attached biomass or on a fixed support, microorganisms develop on support materials (as: trickling filter, RBC, FBBR, MBBR, IFAS, MABR).

A suspended or dispersed biomass, in which microorganisms are agglomerated in colonies suspended in the liquid medium (activated sludge in general as: CAS, PFR, CCAS, Ox. Ditch, MBR, SBR).

Granular Biomass in which microorganisms gather in granular agglomerations with high settling capacity (as: AGS, SBBGR)

Attached biomass

Thrickling filter



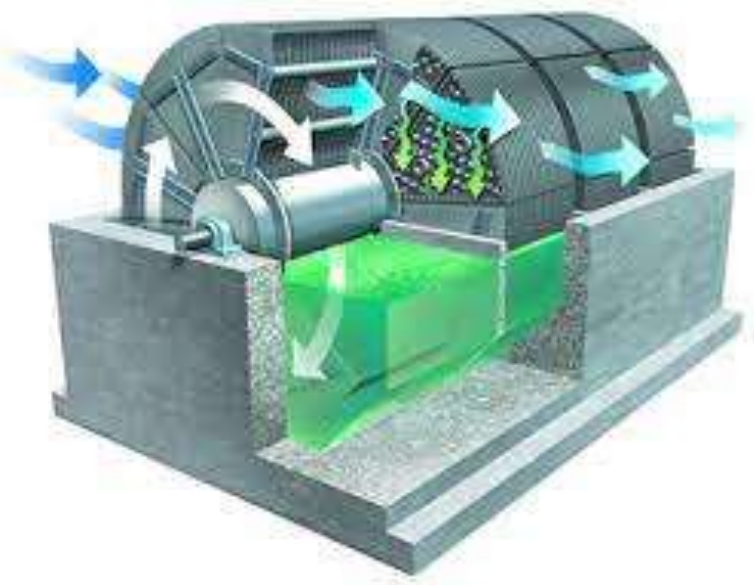
Also called Thrickling Tower

Adv: simple, low opex, low capex, suitable for cooling waste

Dis: old, low performance, rigid, distribution system, odor developement

Attached biomass

RBC



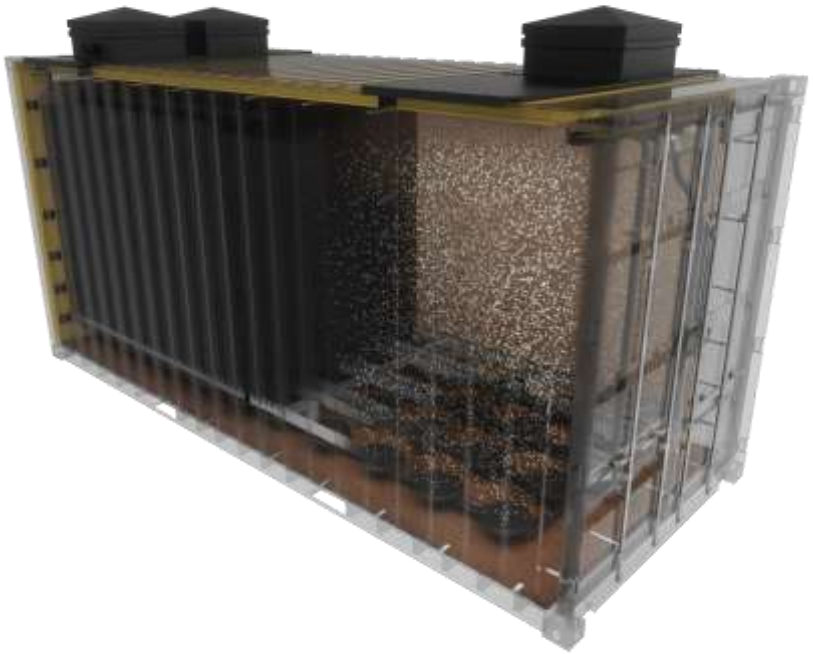
Rotating Biological Contactor

Adv: simple, low opex, low capex

Dis: old, low performance, rigid

Attached biomass

FBBR



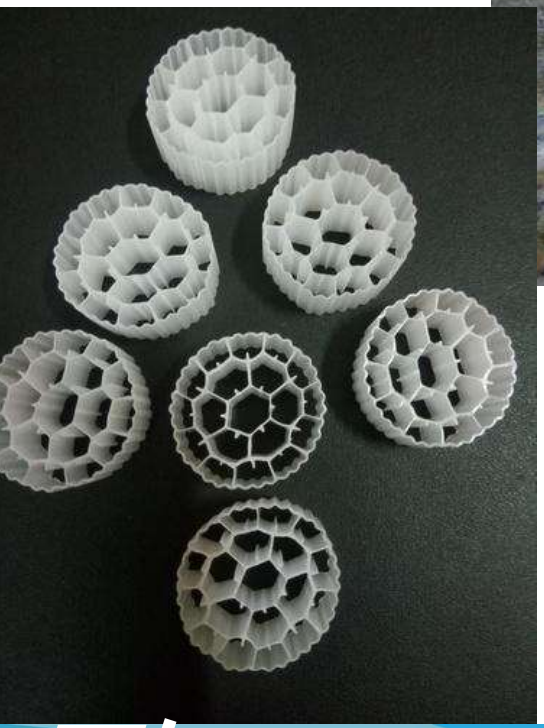
Fixed Biological Bed Reactor

Adv: low capex, suit. for upgrade, increase sludge age

Dis: easy to clogging, pre-treatments become critical

Attached biomass

MBBR



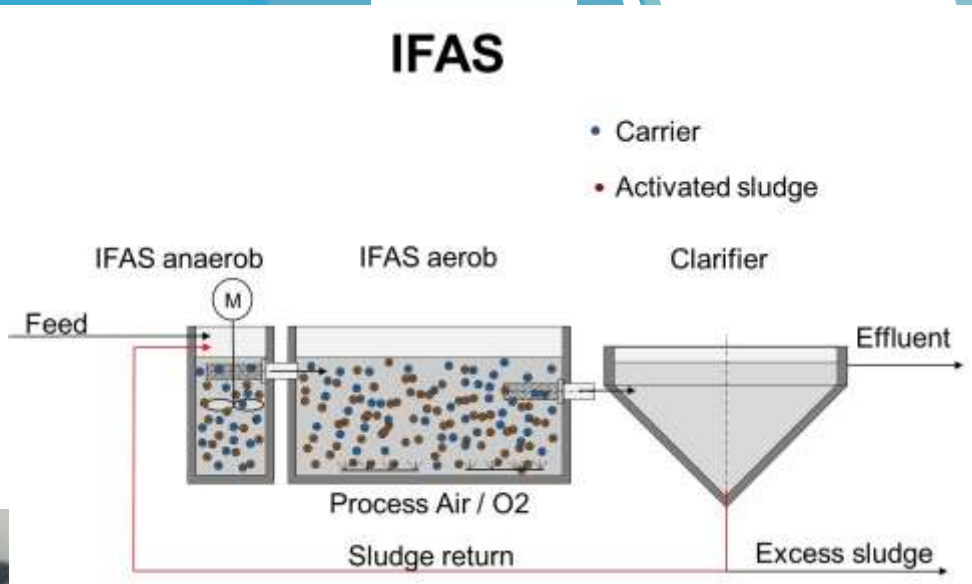
Mobile Biological Bed Reactor

Adv: low capex, suit. for upgrade, increase sludge age, space saving, reduce sludge handling, claryfier not needed, «hybrid» MBBR high flexible

Dis: pre-treatments become critical, «pure» MBBR quite rigid, carrier easy to clogging

Attached biomass

IFAS



Integrated Fixed Film Activated Sludge

Adv: low capex, suit. for upgrade, increase sludge age, space saving, «hybrid system» with high flexibility

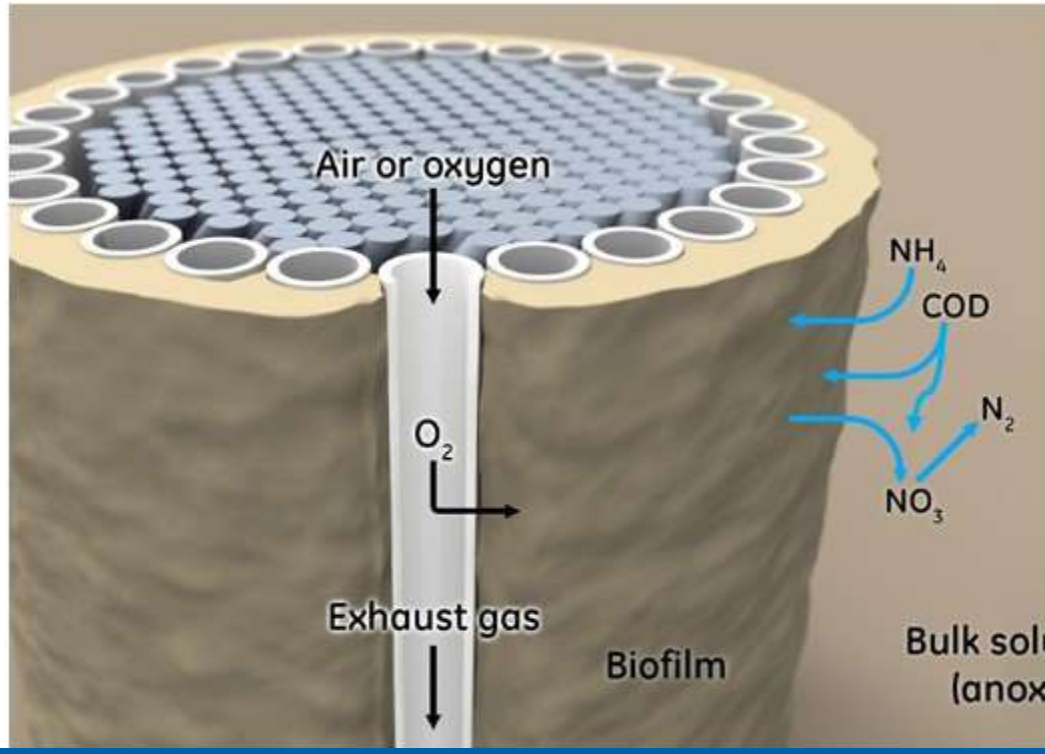
Dis: pre-treatments become critical, carrier easy to clogging

Attached biomass

MABR

Membrane Aerated Biofilm Reactor

NEW prototype technology using:
-membrane technology,
-low oxygen requirement,



Dispersed biomass

CAS

Conventional Activated Sludge

Adv: good performance, sludge stabilization, low capex, toxic dilution, flexibility, reliability

Dis: bulking, overflow, f/m management

Dispersed biomass

PFR

Plug Flow Reactor

Adv: good performance, sludge stabilization, low capex, f/m management, flexibility, reliability

Dis: overflow,

Disperse biomass

CAS and **PFR** are suitable for more process configurations:

AO	(Anoxic-Oxic) for DN-N and nitrification process
A_2O	(Anaerobic-Anoxic-Oxic) for EBPR process
CS	(Contact Stabilization)
AC	(Alternatig Cycles) for DN-N or EBPR process

Dispersed biomass

CCAS

Counter-Current Aeration System

Adv: low energy requirement, possibility to integrate with claryfier

Dis: mechanical failure

Dispersed biomass

Oxydation Ditch (Caroussel)

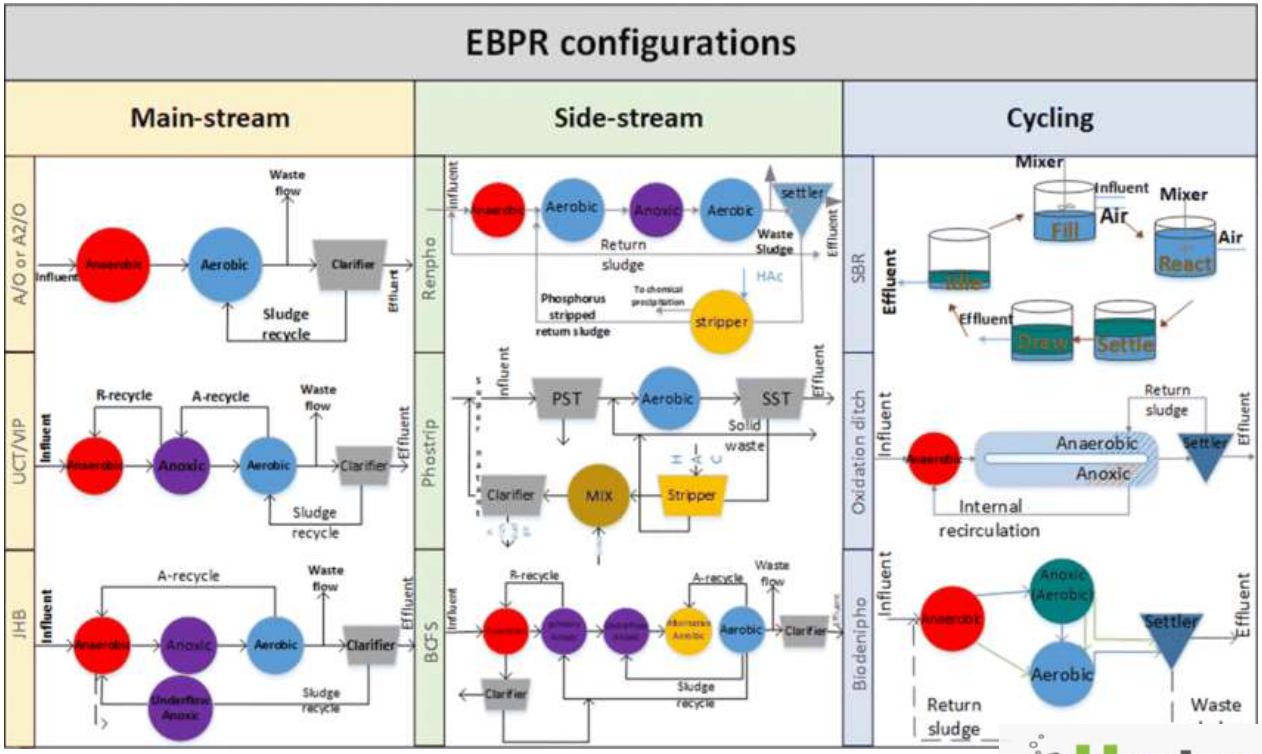
Caroussel

Adv: good performance, separated anoxic compartment not needed, M-L recirculation not needed

Dis: energy consumption compare to CAS/PFR

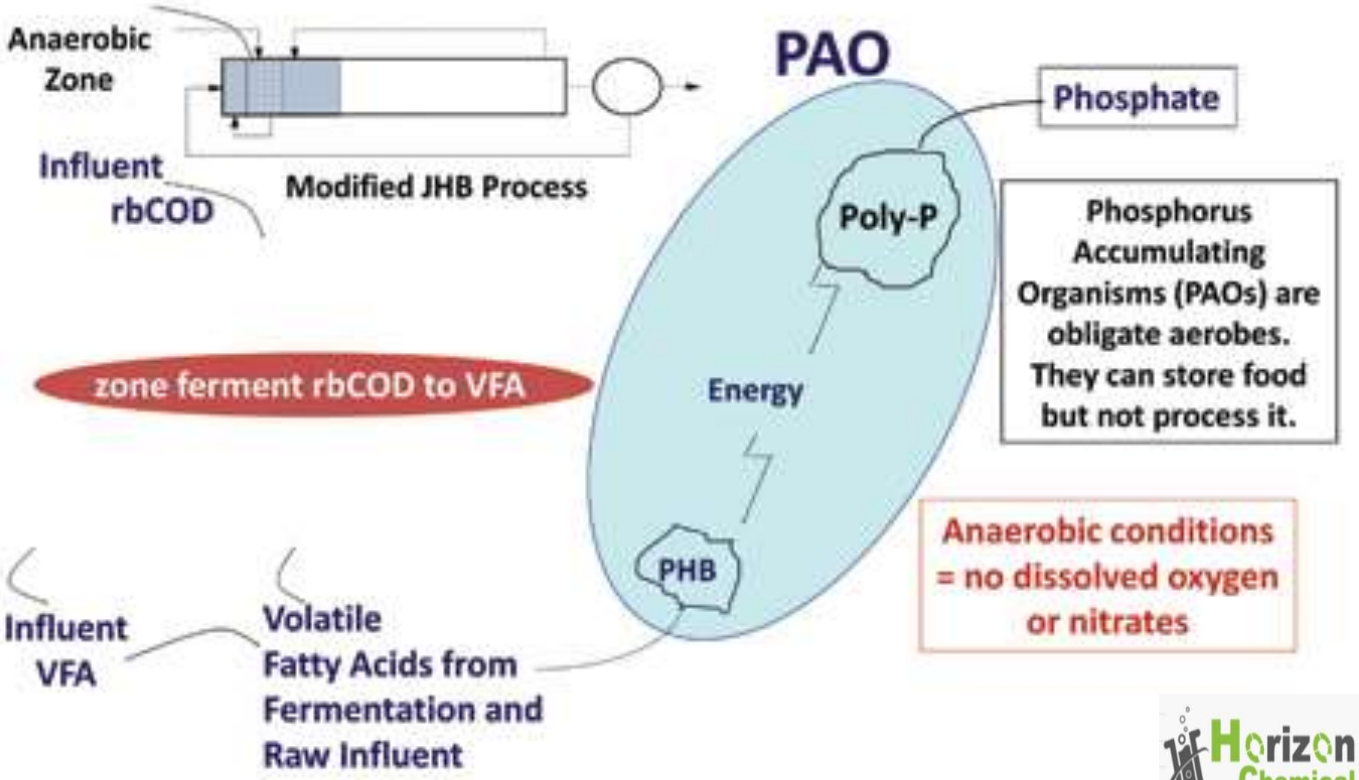
Dispersed biomass

EBPR (Varoius multicompartments configurations, A_xO, Bardenpho, Side Stream 2s-EBPR,…..)



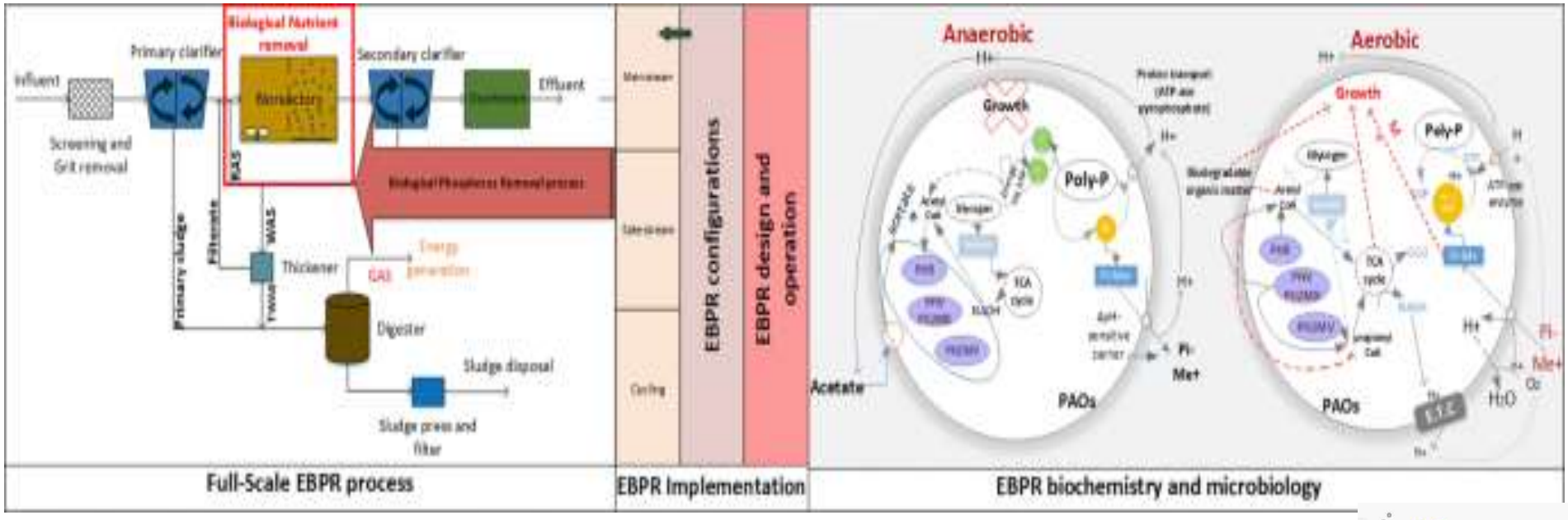
Dispersed biomass

EBPR (generic pathway)



Dispersed biomass

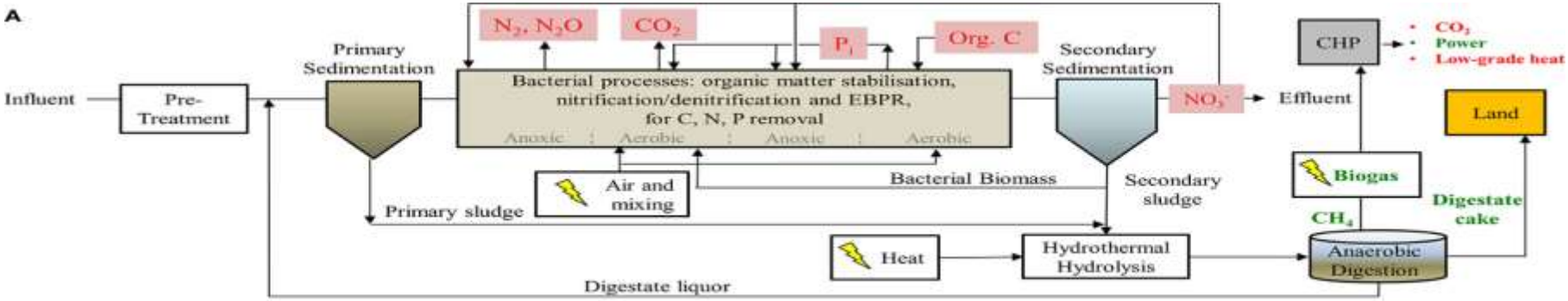
EBPR (generic pathway)

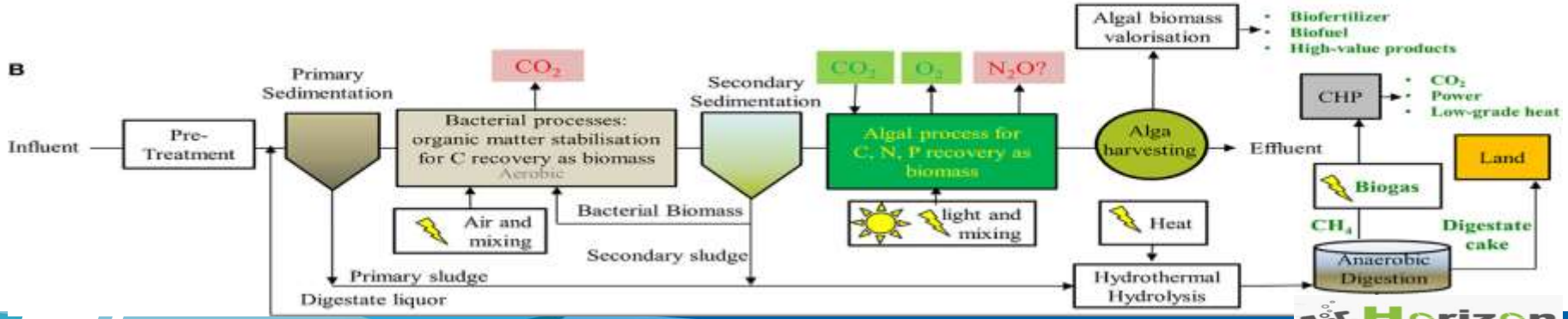


Dispersed biomass

EBPR (Algal process derivate's)

NEW prototype technology





Dispersed biomass

SBR

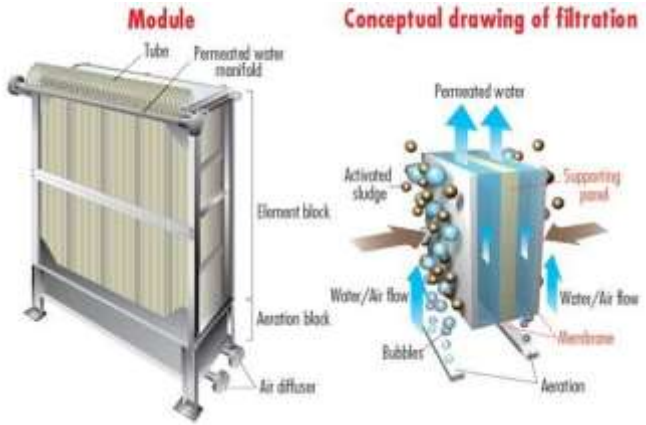
Sequential Batch Reactor (BNR-EBPR applications)

Adv:, space saving, just one compartment all-in-one,

Dis: high automation costs,

Dispersed biomass

MBR



Membrane Biological Reactor

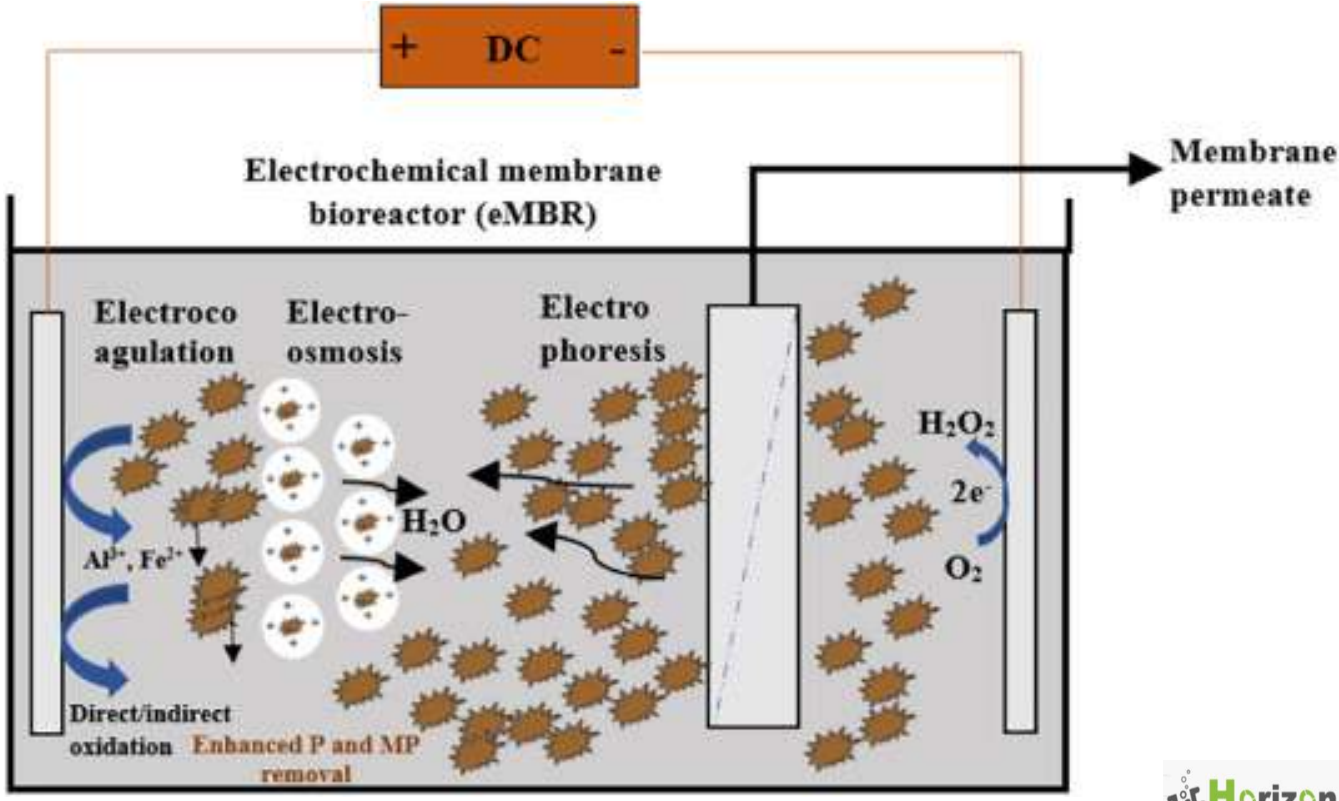
Adv: good performance, space saving, biocidal effect, no settling problem

Dis: energy consumption compare to CAS, membrane fouling/clogging, chemicals consumption, automation costs

Dispersed biomass

MBR

Electro-chemical (electrophoresis) MBR



NEW prototype technology

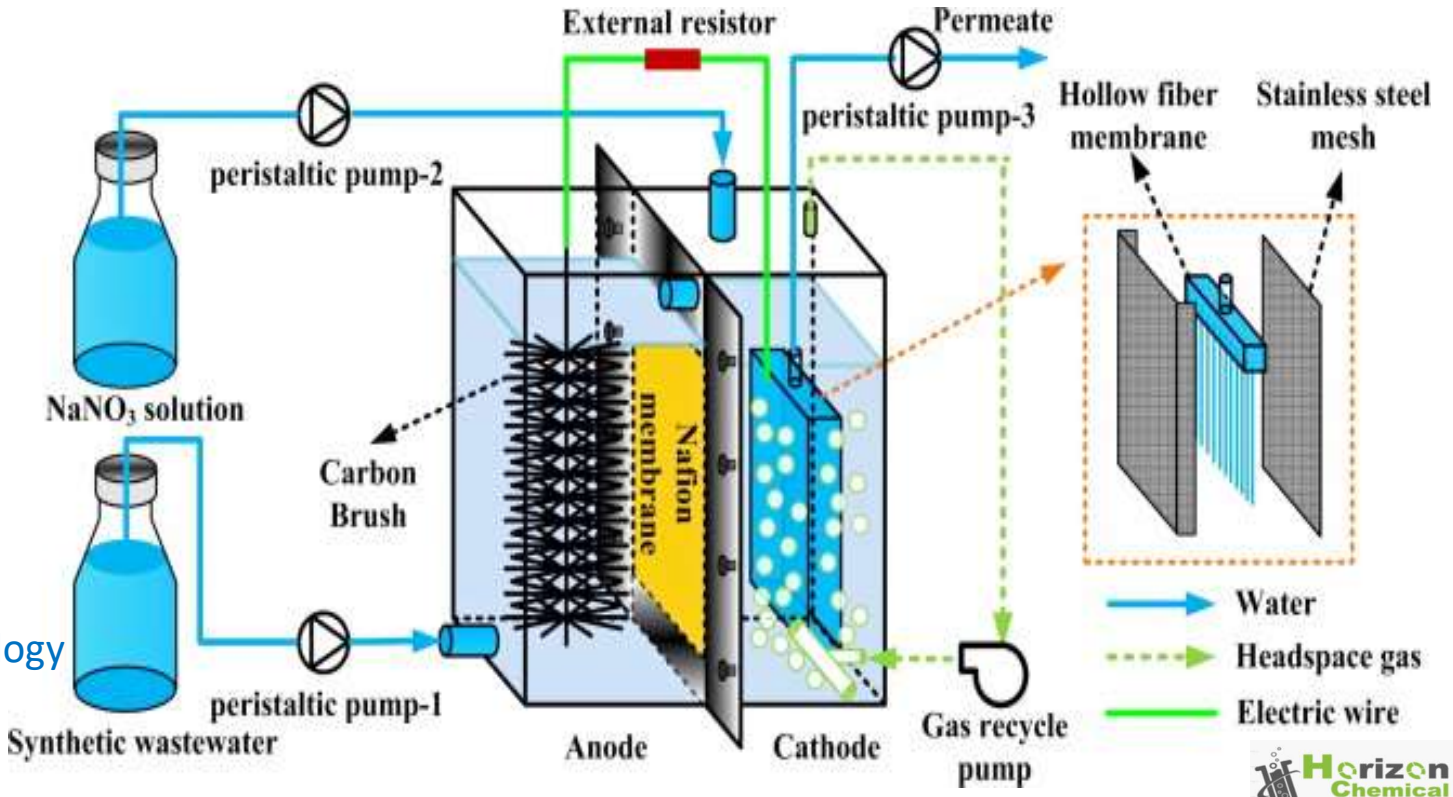
Dispersed biomass

MBR

Electro-chemical Anaerobic-MBR

(AnMBER)

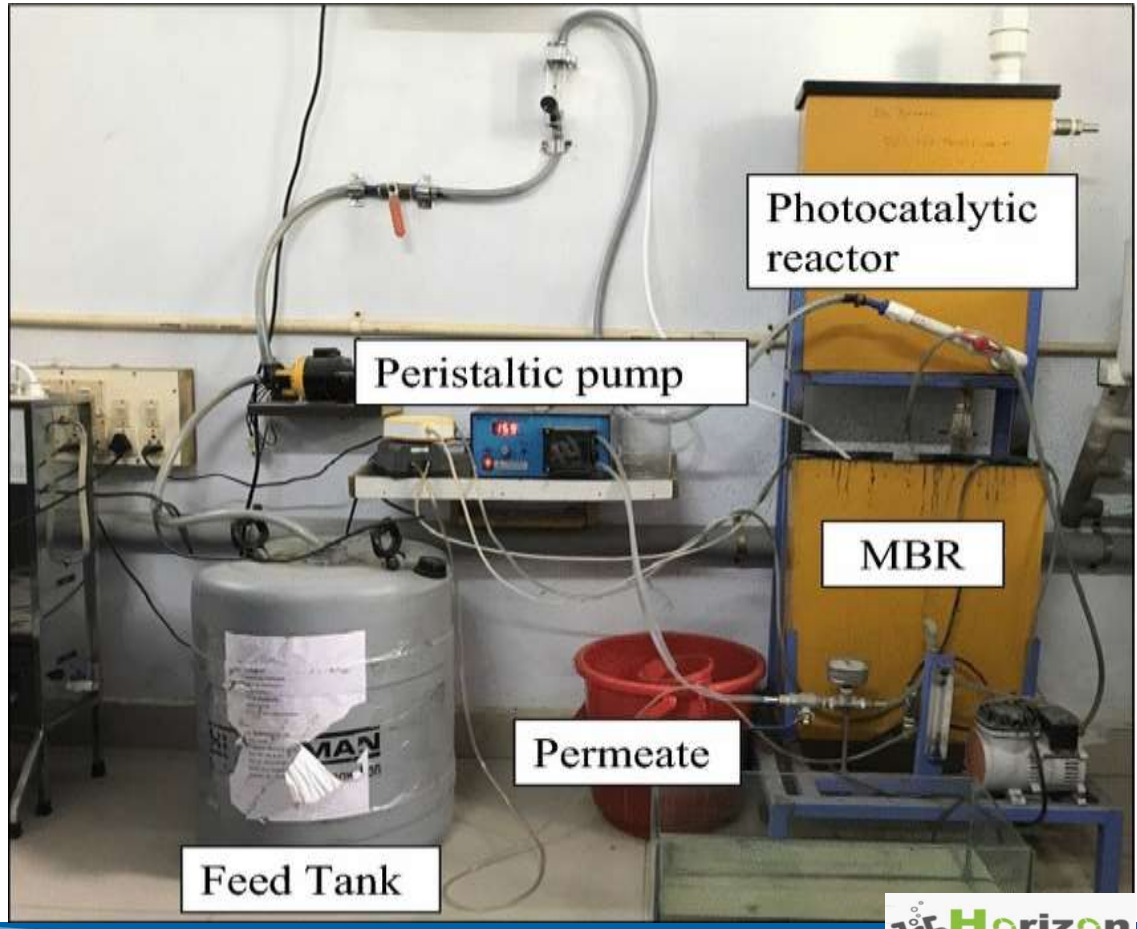
NEW prototype technology



Dispersed biomass

MBR

Photocatalytic
MBR



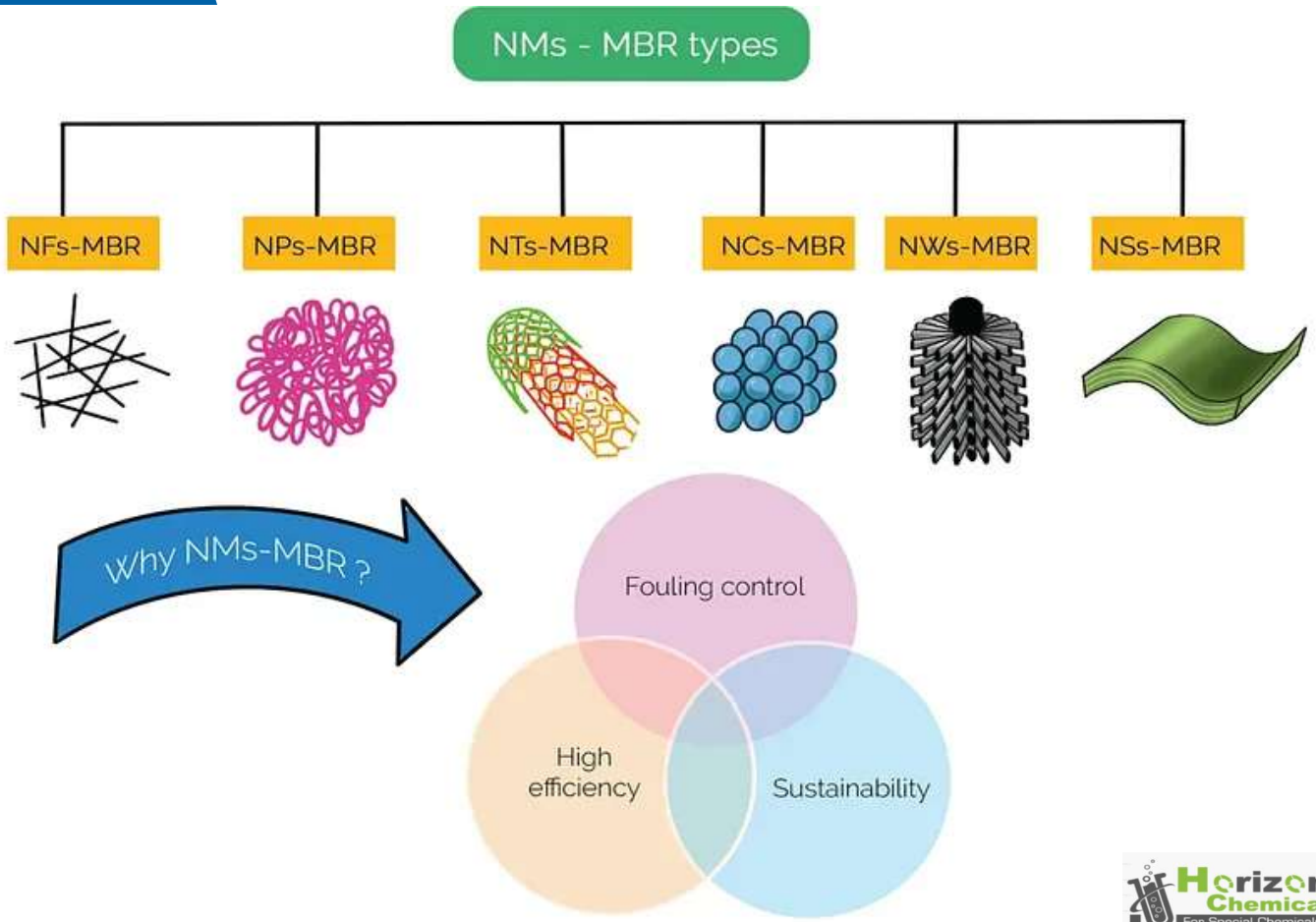
NEW prototype technology

Dispersed biomass

MBR

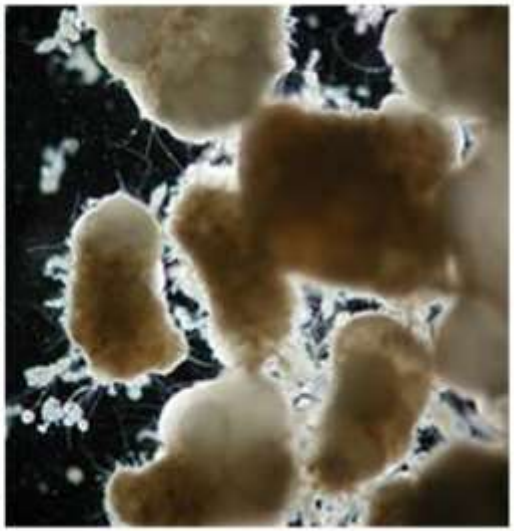
NanoMaterial's
Doped–Membrane

NMs-MBR



NEW emerging technology

Granular biomass



AGS

Aerobic Granular Sludge

NEW emerging technology

Adv:, low sludge handling, very high settling capacity, space saving,

Dis: granulation difficult, base on hydrodinamic conditions

Granular biomass

SBBGR

Sequential Batch Biological Granular Sludge

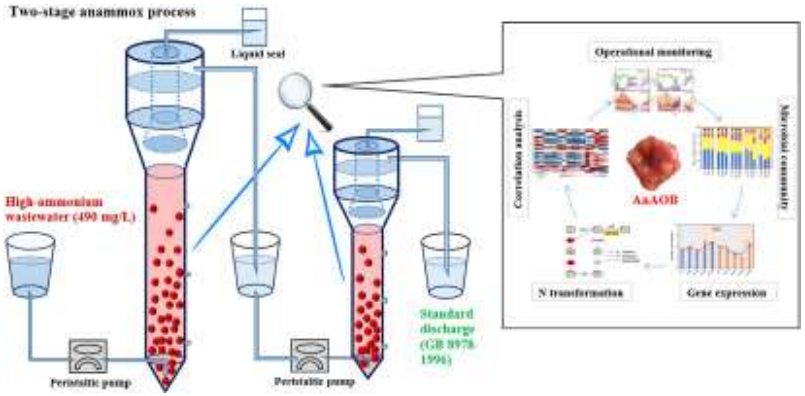
NEW emerging technology

Adv:, low sludge handling, very high settling capacity, space saving,

Dis: granulation difficult, base on hydrodinamic conditions

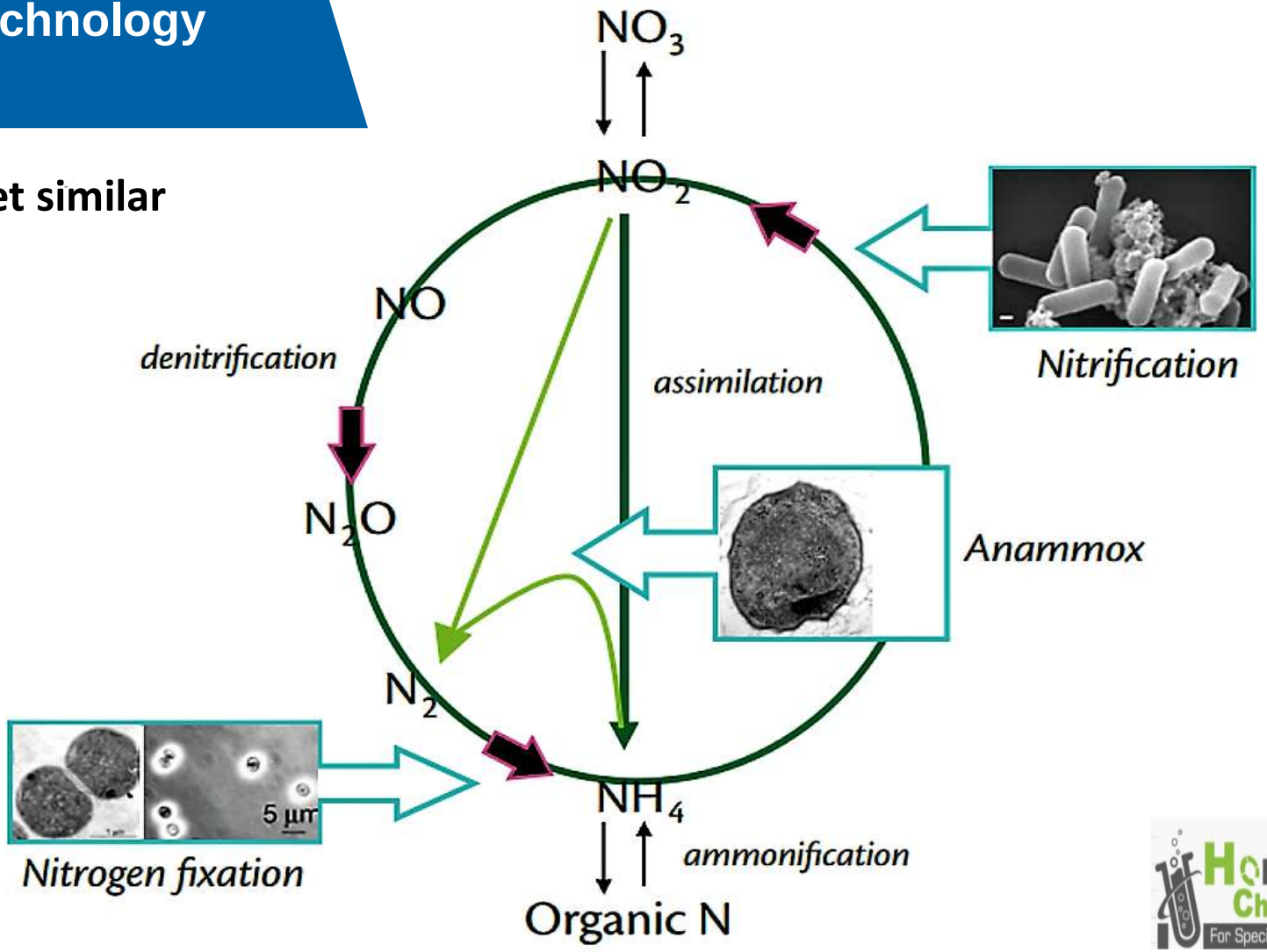
Frontier technology

ANAMMOX et similar



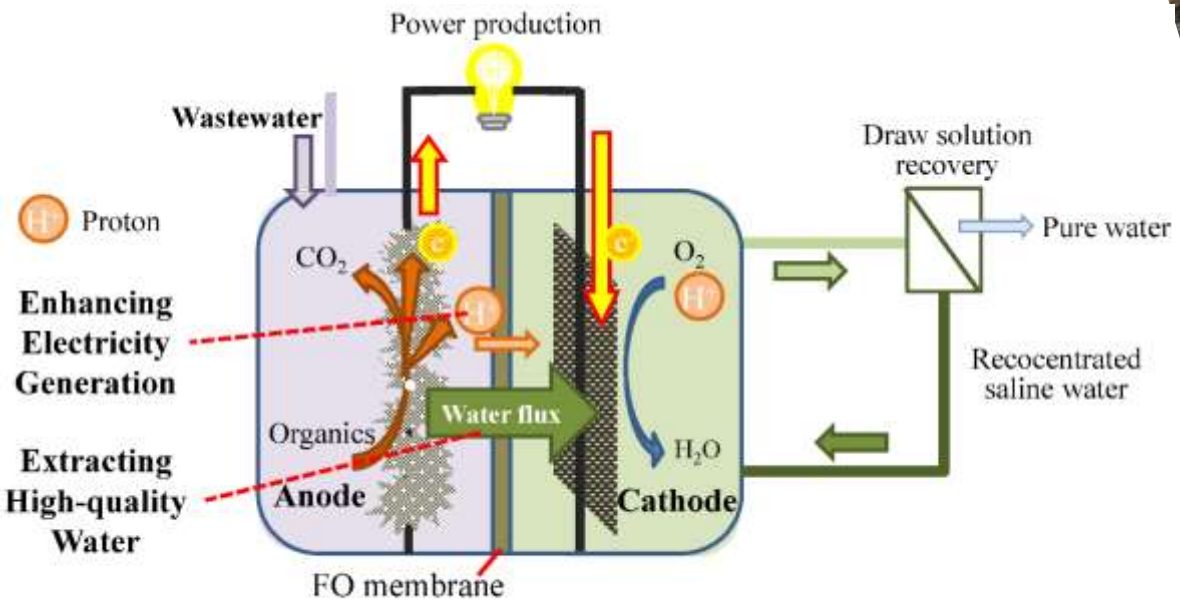
Frontier technology

ANAMMOX et similar



Frontier technology

Microbial Fuel Cell (MFC)



OsMFC

Frontier Technology

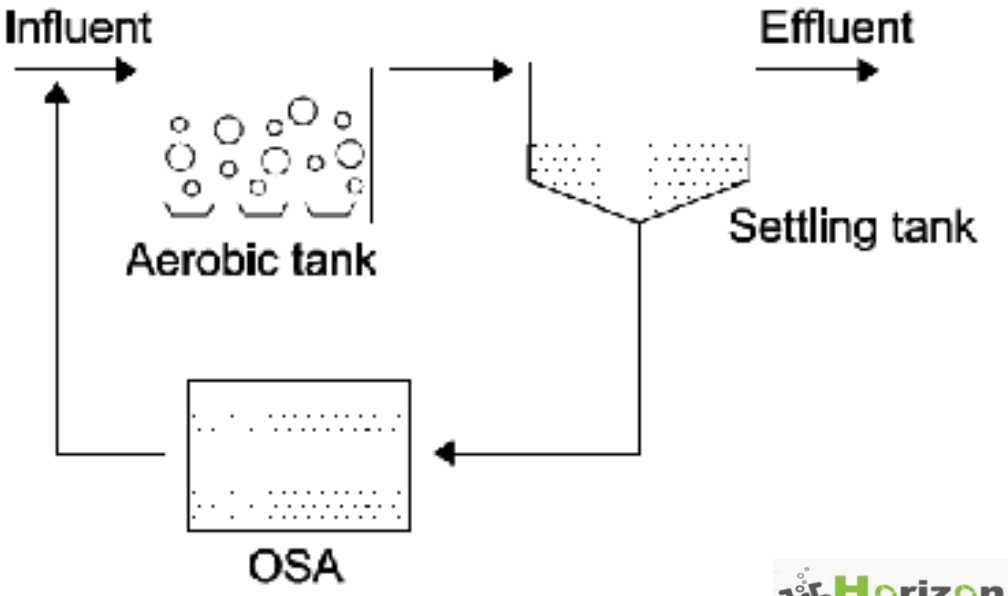
PBR
Photocatalytic Bio-Reactor

Frontier Technology

CME

Cyclic Methabolic Environment (Cannibal®)

For sludge waste reduction

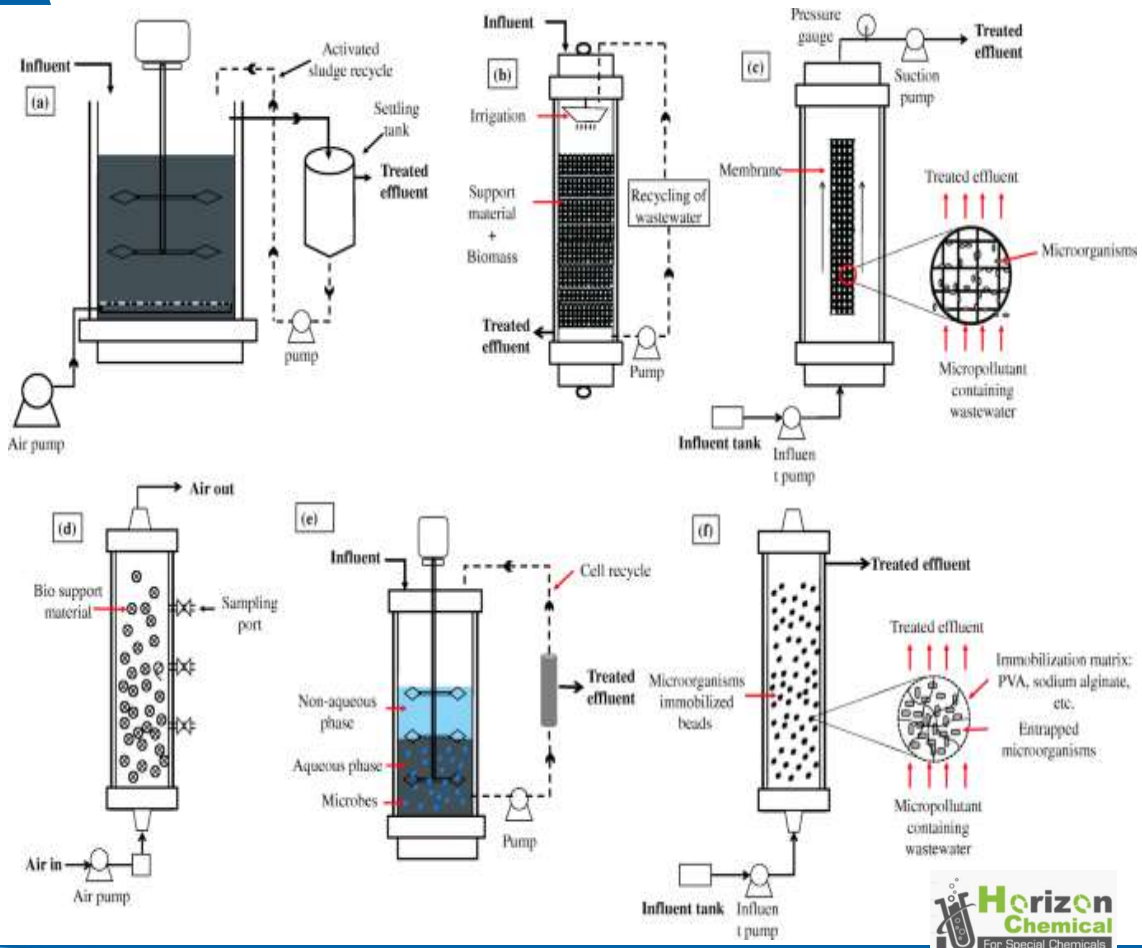


Frontier Technology

TPPBR

Two Partition Phase
Biological Reactor

For emerging organics
Micropolluttants



NEW prototype technology

Frontier Technology

The list of technological prototypes is not intended to be exhaustive. Research and development of new plants are continuous.

The same technologies illustrated here can be combined with each other in multiple configurations.

New hybrid configurations arise often based on the characteristics of a single wastewater

Question time

HORIZON
ACADEMY
INDUSTRIAL TRAINING ACADEMY

Horizon Chemical
For Special Chemicals

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