

INNOVATIONS: FROM LABORATORY TO THE PLANT

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WHAT IS INNOVATION ?

- **A NEW PROCESS, PRODUCT OR APPROACH
IMPROVING THE STATE OF THE ART**
- **NEW PROCESS IMPROVING THE ECONOMICS
OF PRODUCTION**
- **NEW PRODUCT WITH BETTER QUALITY AND
LOWER COST**
- **NEW APPROACH FOR A KNOWN PROCESS
IMPROVING THE QUALITY OF PRODUCT AND
REDUCING THE COST OF PRODUCTION**

INNOVATIONS IN WASTEWATER TREATMENT

- **DEVELOPMENT OF COST EFFECTIVE WW TREATMENT APPROACHES**
- **DEVELOPMENT OF NEW AND MORE EFFECTIVE PROCESSES:**
 - **COMPACT TREATMENT SYSTEMS**
 - **COMBINATION OF CHEMICAL-BIOLOGICAL TREATMENT**
 - **DEVELOPMENT OF MORE EFFICIENT ORGANISMS FOR EFFECTIVE BIODEGRADATION**

OBSTACLES IN REALIZING INNOVATIONS

- **LACK OF COMMUNICATION BETWEEN THE INNOVATORS AND COMPANIES**
- **LACK OF PILOT PLANT TEST FACILITIES**
- **LACK OF VENTURE CAPITAL**
- **LACK OF MEDIATORS BETWEEN THE INNOVATORS AND THE COMPANIES**
- **LACK OF INCENTIVES FOR INNOVATORS**

WHAT CAN BE DONE ?

- **DEVELOPMENT OF VENTURE CAPITAL FOR NEW APPLICATIONS**
- **ESTABLISHMENT OF NATIONAL/ INTERNATIONAL INNOVATION CENTERS**
- **ESTABLISHMENT OF MEDIATOR INSTITUTIONS**
- **ESTABLISHMENT OF R&D FACILITIES BY THE COMPANIES AND UNIVERSITIES**
- **BETTER COLLABORATION BETWEEN ACADEMIA AND INDUSTRY**

SOME EXAMPLES OF NOVEL APPROACHES FOR WW TREATMENT

1. **USE OF STAINLESS STEEL WIRE MESH SPONGE PARTICLES IN FLUIDIZED BED BIOREACTORS:**
 - **HIGH BIOMASS RETENTION CAPACITY:**
55 g/L SPONGE (20-25 g/L in literature)
 - **EFFECTIVE INTRA-PARTICLE MASS TRANSFER**
 - **IMPROVED TREATMENT YIELDS WITH COMPACT VOLUME**

NOVEL APPROACHES IN WW TREATMENT

- 2. ROTATING PERFORATED TUBES AND
ROTATING BRUSH BIOFILM REACTORS**
 - HIGH BIOMASS CONCENTRATIONS: 100
g dw/m²**
 - EFFECTIVE AERATION BY DIRECT
CONTACT WITH AIR DURING ROTATION**
 - GOOD CONTROL OF BIOFILM**
 - EFFECTIVE FOR TOXIC WASTEWATER**
 - HIGH TREATMENT EFFICIENCY WITH
COMPACT VOLUME**

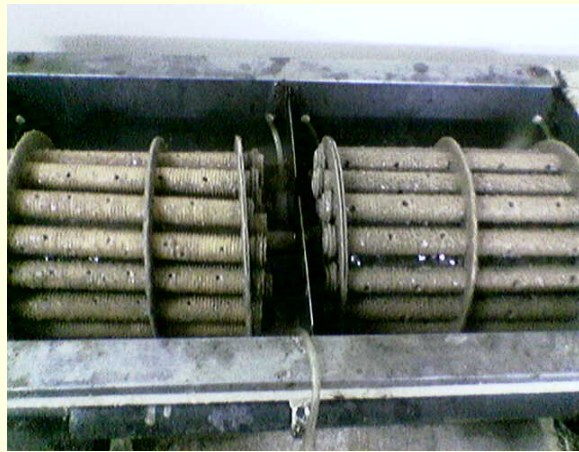
NOVEL APPROACHES TO WW TREATMENT

- 3. AERATED PERCOLATER BIOFILM
REACTORS WITH POROUS PARTICLES**
 - HIGH BIOMASS CONCENTRATIONS**
 - GOOD AERATION AND MIXING BY
PERCOLATION OF AERATED WW**
 - EFFICIENT TREATMENT WITH COMPACT
VOLUME**

ROTATING BRUSH BIOFILM REACTOR



ROTATING TUBES BIOFILM REACTOR



AERATED PERCOLATOR BIOFILM REACTOR

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