Mitsui Chemicals

Introduction of AAM Technology License

Bio Chemical Dept.
Personal Care Material Div.
Heath Care Business Sector

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1-1. General Information on Acrylamide (AAM)

Acrylamide (AAM, CH2＝CH-CONH2) is consumed mainly in the production of polyacrylamide (PAM).

PAM is expected to be consumed mainly for following industries and applications:

1. Industrial & Municipal - for wastewater treatment
2. Pulp & Paper – for paper strength resin
3. Oil & Gas – for Enhanced Oil Recovery (EOR)

AAM has been produced by Chemical process, but Mitsui Chemicals Inc.(MCI) is producing AAM by **patented innovative Bio-process with our epoch-making Bio Catalyst**.

1-2. Brief Introduction of MCI's AAM

Water-soluble monomer
Produced by bio-enzyme method
(High purity & Low environmental load)
Stable supply from 2 domestic sites

■ Application

Polymer Coagulant for wastewater treatment
Paper Strength Resin
EOR (Enhanced Oil Recovery)

■ Specification

Purity 50% Water Solution
40% Water Solution
pH 6.5～7.1 etc

■ Packing

50% Water Solution (ISO Container, Lorry, IBC Container)
40% Water Solution (200KG Drum, Lorry)

■ Others

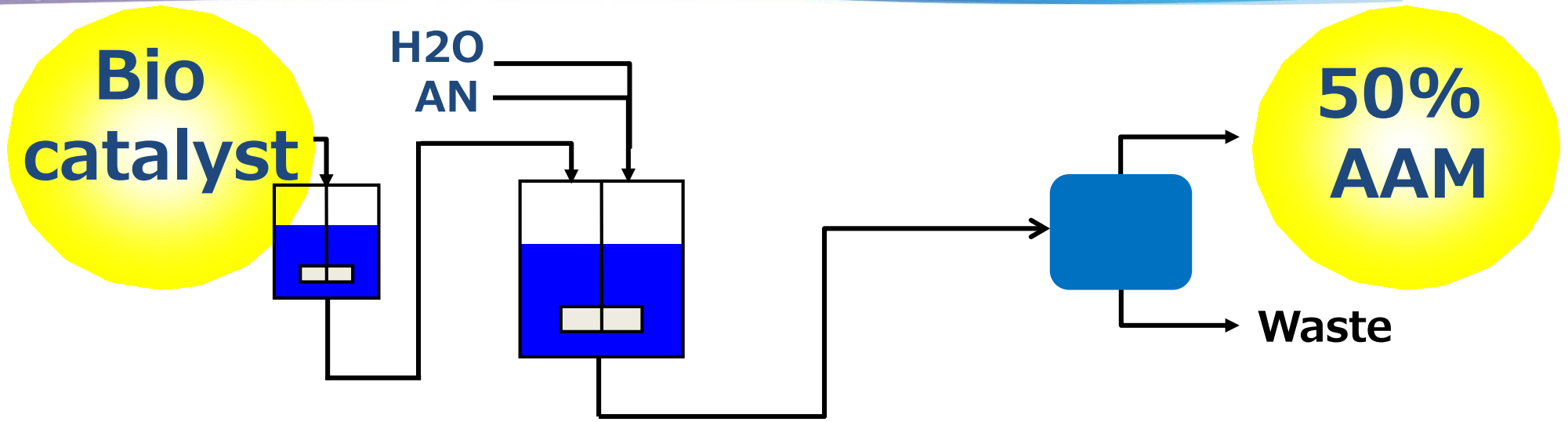
Achievements in Licensing of Bio-enzyme method Production Technology

1-3. MCI's AAM History

MCI has been producing AAM for 40 years since 1972, and MCI's process is reliable and cost competitive!

1972	Commercialized Chemical process at Mobara Factory in Japan
1974	Commercialized Chemical process at Osaka Works in Japan
2002	Commercialized Bio-process at Yongsan Mitsui Chemicals* in Korea *A subsidiary of MCI
2009	Converted from Chemical process to Bio-process at Mobara Factory in Japan
2010	AAM Bio-technology License to Black Rose Industries
2012	Converted from Chemical process to Bio-process at Osaka Works in Japan
2013	AAM Bio-technology License to Kemira OYJ

2-1. Introduction of MCI's AAM Process



1. Catalyst	2. Reaction	3. Purification	4. Product
High-activity bio catalyst enables low consumption rates of raw materials and utilities	Reaction at room temperature and common pressure. Extremely high conversion rate w/ high selectivity of AN	Bio catalyst is removed by efficient filtration process Low wastewater	50% purity AAM can be directly obtained w/o any concentration process

2-2. Strengths of MCI's AAM Technology

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Charm Points

1. **Low Investment & Running Cost**
   with simple continuous process
2. **Low Environmental workload**
   with lower GHG emission
3. **High Efficiency**
   Profitable even starting w/ 5,000MT/y
4. **High Scalability**
   Easy to scale out the capacity
5. **High Performance**
   50% AAM can be directly obtained

2-3. Introduction of MCI's Bio Catalyst

Item	Value
Catalyst Activity	**Please ASK!** **We are confident!**
Catalyst Consumption rate	
Solid Content	9 ~ 17 Wt.%
Number of Living Cell	Zero

Delivery

✓ 20 ft/ 40 ft Reefer container
✓ Store under – 25 degree C

Package

245 mm * 245 mm * 385 mm
per 20 liter container

3. What MCI can offer

MCI can offer either or both of following solutions.

1. **License of AAM Process Technology**
   - **MCI can grant a license of whole AAM manufacturing technology**
   - **Partial technology license may also be considered depending on request**

2. **Sale of Bio Catalyst**
   - **You may use the high-activity bio catalyst with your existing equipment**
   - **MCI can give a sample for your evaluation with NDA execution**

MCI can support your Feasibility Study on 1 & 2 above.

Contact

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Please fill out Contact Form for further information and any request.

Contact Form

*Select “Acrylamide” under Products

Looking forward to

Future Collaboration!!

Thank you.

Mitsui Chemicals