

## Mitsubishi Chemical Maleic Anhydride Technology

### Maleic Anhydride: (MAH)

Maleic anhydride was traditionally manufactured by the oxidation of benzene or other aromatic compounds. Currently only a few smaller plants continue to use benzene due to rising benzene prices, and most Maleic anhydride plants now use n-butane as a feedstock. Maleic anhydride is industrially applied for the production of 1,4-Butanediol, Unsaturated polyester resin, Fumaric acid, Succinic acid, Plastic additives and  $\gamma$ -Butyrolactone.

### Introduction of Mitsubishi Maleic Anhydride Technology

For more than 50 years, Mitsubishi Chemical (MCC) has run Maleic Anhydride business (Production and Sales). MCC has developed its own State-of-Art technology and offers Process Technology (32,000 ton/year up to 60,000ton/year as single line plant) together with Mitsubishi high performance catalyst. MCC currently runs 32,000ton/year MAH plant in Japan and one licensed plant (60,000ton/year world largest scale) is operating in Asia from March 2013.

Further MCC also has the production technologies for Maleic Anhydride Derivatives such as  $\gamma$ -Butyrolactone (GBL) and N-methylpyrrolidone (NMP).

### Feature of Mitsubishi MAH process

Mitsubishi MAH process uses n-butane as feedstock and produce Maleic anhydride.

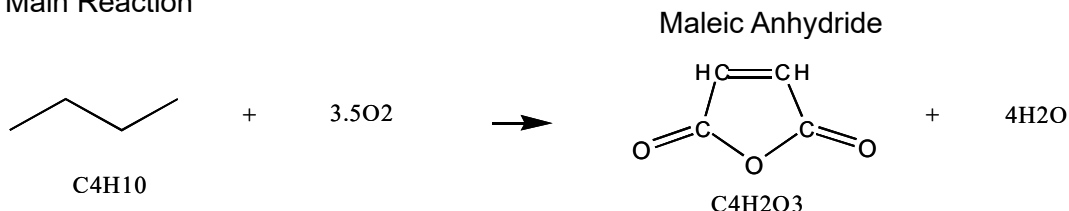
Features of this process are as follows;

- (1) High Performance Fluidized Bed Oxidation Reactor
- (2) Excellent MAH absorption system with Organic Solvent
- (3) Efficient MAH purification System
- (4) High efficiency energy recovery system
- (5) Reliable process safety control system

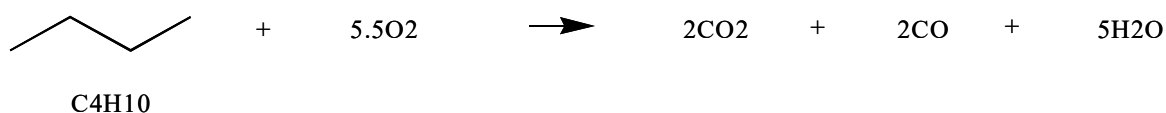
Especially Fluidized Bed Oxidation Reactor with Mitsubishi high performance catalyst can realize stable, safe and optimum oxidation reaction.

### Chemistry of this process

#### Main Reaction

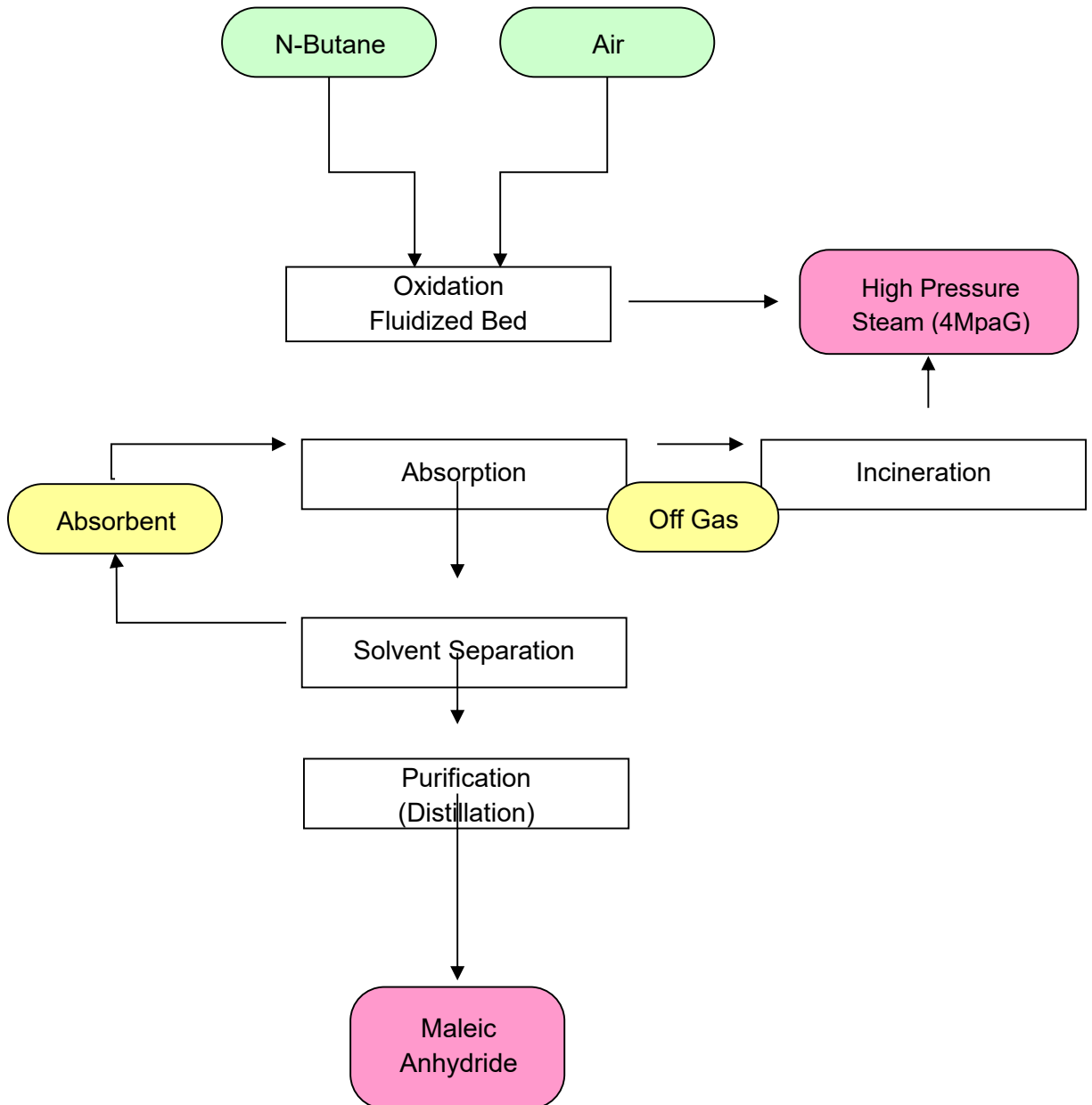


#### Major Side Reaction



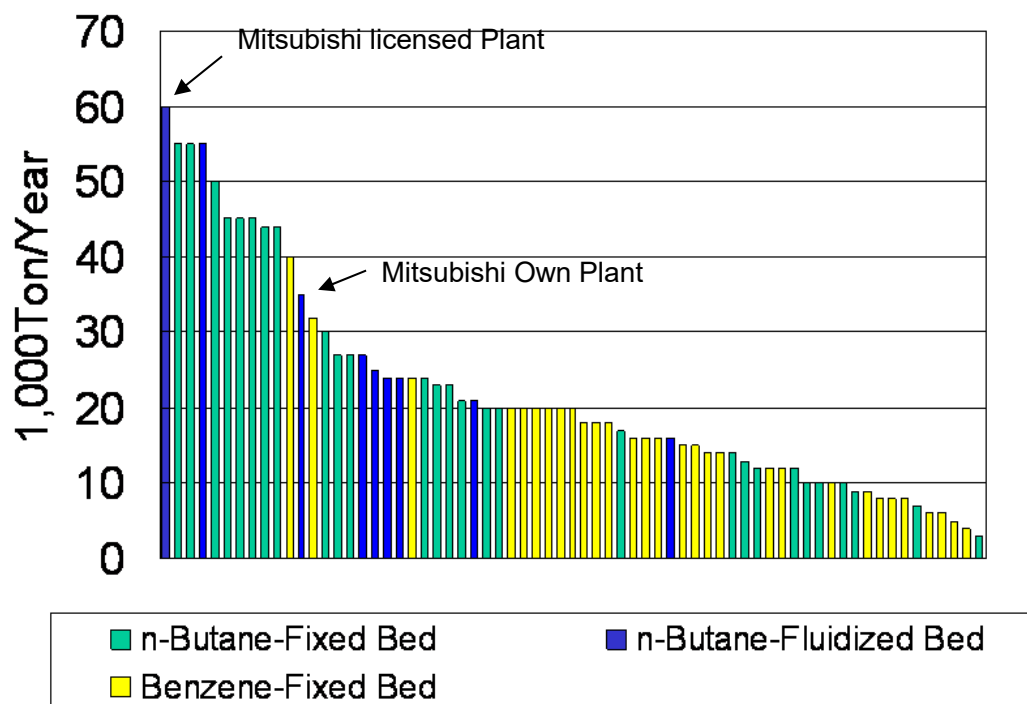


Simplified block flow and material balance



### World MAH Plant Capacity

In 2010, world MAH production capacity is 1,500,000 ton/year and actual production is 1,250,000 ton/year. Each MAH plant capacity in the world is as shown below;  
(Single line plant base)



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