



## Mitsubishi Chemical Bisphenol-A Technology

### Bisphenol-A: (BPA)

4,4'-bisphenol A (BPA) is an important industrial chemical, which is mainly used as a raw material of polycarbonate and epoxy resin. BPA is produced by acid catalyzed condensation reaction of two moles of phenol and one mole of acetone. Traditionally, commercial scale BPA production has been based on a strong mineral acid catalyst such as hydrochloric acid. Hydrochloric acid is highly corrosive, so the BPA plant requires expensive corrosion-proof materials. In addition, complicated waste water treatment facility is needed for the mineral acid catalyzed process. Since waste water from the process contains some amount of hydrochloric acid, it must be treated by neutralization with lime, precipitation of the calcium, and further bio treatment.

An alternative catalyst now widely used is cation exchange resin. This type of catalyst mitigates equipment corrosion. Some components, which contain thiol groups, can improve BPA production rate and its yield.

### Introduction of Mitsubishi BPA Technology

MCC has been improving BPA process to realize lower raw material consumption and the stable operation. Even now, MCC continues to exert effort to achieve effective BPA process. MCC's BPA process employs an improved ion exchange resin catalyst that exhibits higher activity and selectivity compared to other resin catalysts. Impurities are significantly reduced, leading to improved raw material efficiency and finished product color.

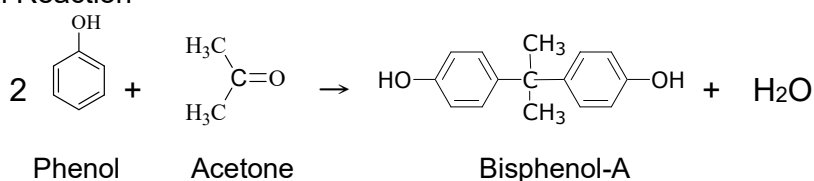
### Feature of Mitsubishi BPA process

The characteristic and superiority of MCC BPA process are as follows.

- (1) Superior Product Quality
- (2) High Catalyst Performance
- (3) Low Construction Cost
- (4) MCC's rich experience

### Chemistry of this process

#### Main Reaction

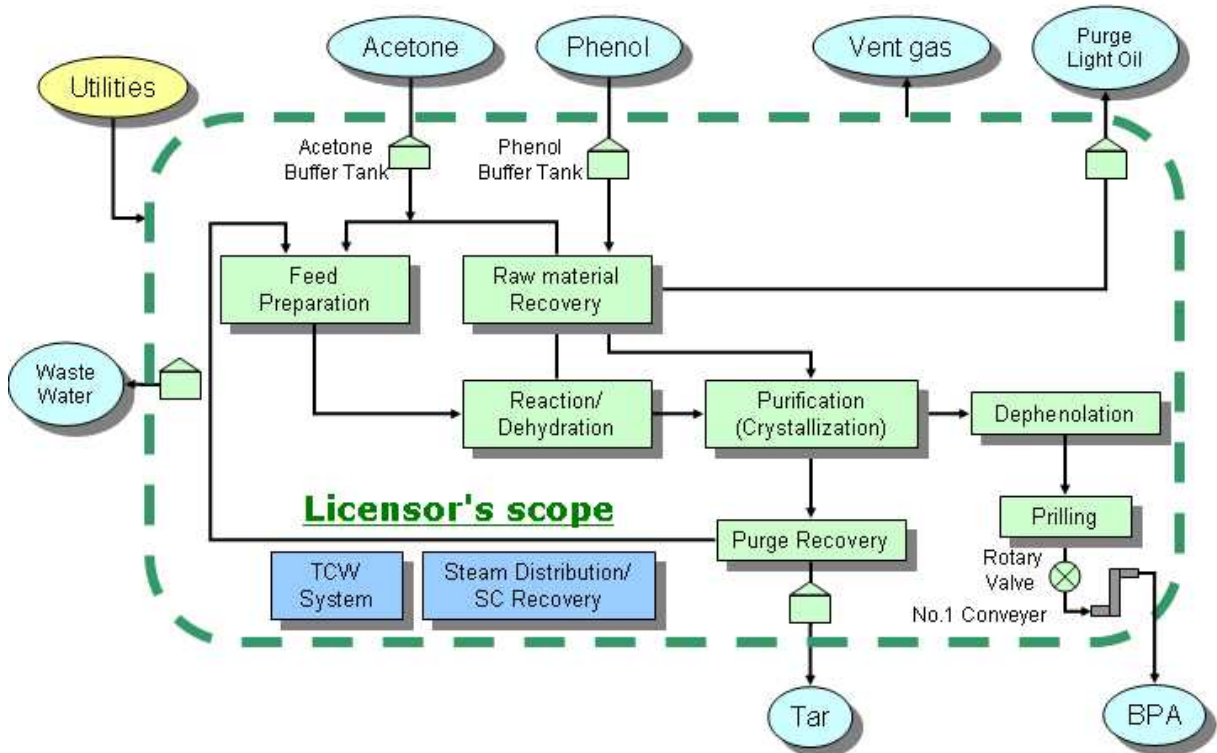




Besides Bisphenol-A, small amounts of following major impurities are produced.

- 2,4-BPA isomer
- Methyl BPA
- Trisphenol
- Chromans
- p-Isopropenylphenol cyclic dimer
- p-Isopropenylphenol linear dimer

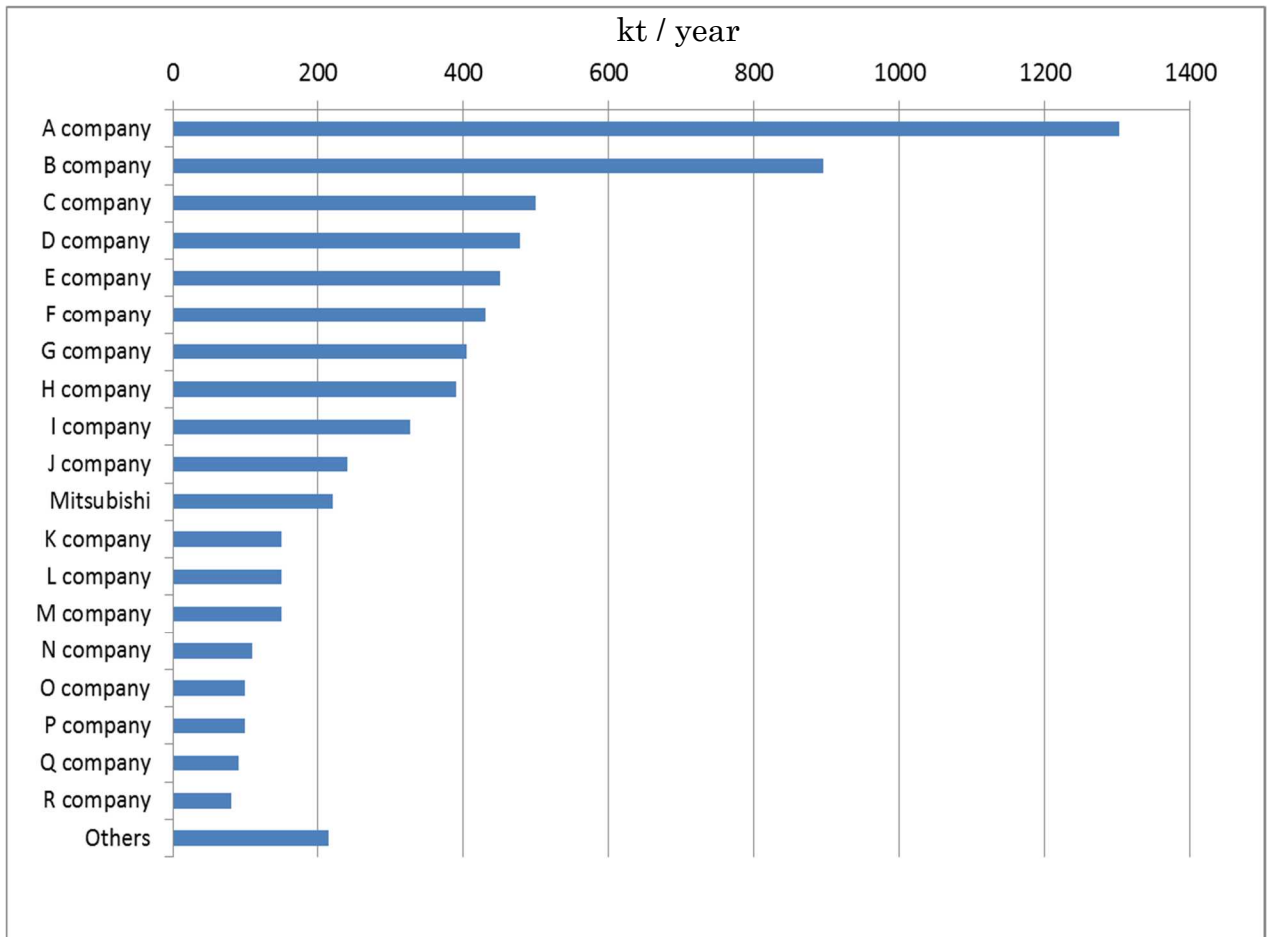
Simplified block flow





### World BPA Plant Capacity

In 2012, world BPA production capacity is around 6,800 kt/year. Each BPA supplier's capacity in the world is as shown below:



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