

Wm. K. Johnson - St. Louis, General Offices

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Biphenyl - By-product from
Dealkylation Units

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Biphenyl

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We have completed a preliminary investigation of biphenyl from toluene dealkylation units. Attached you will find information developed by Jim Beightol on the U. S. rated capacity for dealkylation units. Relatively few non-domestic dealkylation units exist but they are listed in the attachments. The dealkylation of toluene to benzene is currently a popular method. It is dependent to a large extent on the price differential between benzene and toluene. If the differential becomes less, it is not good business to dealkylate toluene, and therefore, will be sold as is.

As you can see, the major firms involved in the processing are petroleum companies. Primarily they are located in the Texas Gulf area.

I have consulted with Monsanto personnel from PP&R and find, as a general rule, that approximately 1% of a biphenyl/methylbiphenyl mixture results in the effluent from a dealkylation unit. As you can see, the amount of biphenyl available from such processing could be enormous. However, the streams can be recycled and the biphenyl and methylbiphenyl reconverged to benzene. It is difficult to even guesstimate the amount of biphenyl which might be made available from dealkylation units. It depends on how each individual operates his furnaces and the recycle techniques. For the most part, however, material that is not recycled will be blended off into gasoline and other products when this opportunity exists. As mentioned above, most of the dealkylators are oil companies with the exception of Dow and Bethlehem. As we have seen, Dow has chosen to place their product on the market, and Bethlehem possibly diverts theirs for fuel or some other application.

Our people in Texas City estimate that the break-even point for our effluent which is rich in biphenyl (approximately 25%) is 19¢/gallon. This figure was developed at a benzene price of 25¢/gallon and the purchase price of naphthalene at 4-1/2¢ per lb. This value is somewhat greater than the raw materials themselves in that it includes return on capital to construct facilities to store and load product. It is estimated that

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there could be as much as 20% lbs. per year in the stream. Our stream is much different than that of other dealkylators in that our feed contains naphthalene derivatives. The Monsanto stream is not candidate for biphenyl isolation because of the naphthalene content (can't separate).

Theoretically, it should be possible for a toluene dealkylation unit to provide high quality biphenyl. Providing toluene is the exclusive feed, biphenyl and methylbiphenyl are the primary by-products. The methylbiphenyl can be recharged under appropriate conditions into the dealkylator and transformed into biphenyl without disturbing the aromatic nucleus. When toluene is the feedstock, little if any methylnaphthalenes or polynuclear aromatics are obtained as by-products.

In summary, it is difficult to determine the amount of biphenyl which could potentially be available from dealkylation units. In most instances, streams containing the product will be blended off into other hydrocarbons. Good quality biphenyl should be available from dealkylation technology providing one is interested in adjusting conditions. Sulphur, naphthalene and other undesirable contaminants will not be present if feed stock is properly treated.

I hope that the above information will assist you in appreciating the biphenyl potential from dealkylation units.

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UNITED STATES BENZENE CAPACITIES FROM TOLUENE

<u>COMPANY</u>	<u>LOCATION</u>	<u>BENZENE CAPACITY M GAL/YR</u>
Ashland	Catlettsburg, Kentucky	6
Bethlehem	Sparrows Point, Md.	8
Coastal States Petrochemical	Corpus Christi, Texas	20
Cosden	Big Spring, Texas	20
Crown Central	Houston, Texas	13
Dow	Bay City, Michigan	13
Dow	Freeport, Texas	30
Enjay	Baytown, Texas	30
Gulf	Philadelphia, Pennsylvania	12
Moncanto	Alvin, Texas	25
Shell	Odessa, Texas	15
Signal	Houston, Texas	12
South Hampton	Silsbee, Texas	6
Sunray DX	Tulsa, Oklahoma	12
Sunrise	Corpus Christi, Texas	15
Texaco*	Westville, New Jersey	70

*Under construction--completed in first quarter 1968.

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BENZENE FROM TOLUENE CAPACITIES IN FOREIGN COUNTRIES

CANADA

<u>Company</u>	<u>Plant Location</u>	
British American Oil	Montreal, Quebec	20,000
Canadian Oil Co. Ltd.	Corunna, Ontario	23,000

ITALY

<u>Company</u>	<u>Plant Location</u>	<u>Existing Capacity</u>
Mobil	Naples	34,000
Italiana	Naples	65,000

NETHERLANDS

<u>Company</u>	<u>Plant Location</u>	
Esso-Nederlands	Botlek (North Rotterdam)	300,000

* Source: Temple Press

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Compiled by:

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