

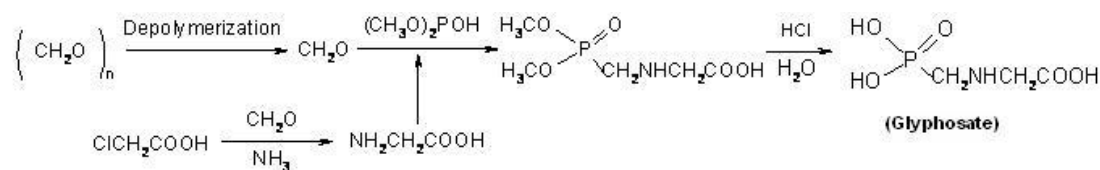
**Note: Key data/information in this sample page is hidden, while in the report it is not.**

## 2 AEA pathway

### 2.1 Description

AEA pathway, with chloroacetic acid as the starting raw material and glycine the main raw material, was developed by Shenyang Research Institute of Chemical Industry in the 1980s, which is only used in China. ....

Figure 2.1-1 Brief pathway of AEA route for glyphosate technical production in China



Source: CCM

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### 2.3 Theoretical consumption of raw materials for AEA pathway

The unit cost of each raw material in Oct. 2014 is ...

Table 2.3-1 Raw material cost of AEA route for glyphosate technical production in China, Oct. 2014

Raw material	Unit consumption, t/t	Unit price*, USD/t	Unit cost, USD/t
Glycine (Industrial grade)	XXXX	1,949	XXXX
Paraformaldehyde (37%)	XXXX	784	XXXX
Triethylamine (99.5%)	XXXX	1,686	XXXX
Methanol (95%)	XXXX	377	XXXX
DMP	1.02	XXXX	XXXX
Hydrochloric acid (30%)	2.14	XXXX	XXXX
Liquid caustic (32%)	2.78	XXXX	XXXX
<b>Total</b>			XXXX

Note: The unit price is not only based on the ordinary market price but also the degree of economic scale, operating rate and backward integration of glyphosate manufacturers.

Source: CCM

Figure 2.3-2 Forecast on raw material cost of AEA pathway for glyphosate technical production in China, Nov. 2014-Nov. 2015, USD/t

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Source: CCM

## 5 Comparison of different pathways and development trend

Table 5-1 Comparison of three routes for glyphosate technical production in China

Route		AEA	DEA	IDAN
<b>Strong point</b>		Simple process, mature technology, easily available raw materials, small investment and low technology barrier	High yield and good product quality, good safety control during production and mature technology	High yield and good product quality, available raw materials and low production cost
<b>Shortcoming</b>		XXXX	XXXX	XXXX
<b>Raw material supply</b>		Sufficient	XXXX	XXXX
<b>Wastewater</b>		There are nearly saturated inorganic salt, organophosphorus compounds of high concentration and glyphosate isomer in the wastewater, which is with biological toxicity.	<b>PMIDA wastewater from condensation process:</b> There are organophosphorus compounds of high concentration in the wastewater, ...	
			<b>PMIDA oxidation:</b> There are organophosphorus compounds of high concentration in the wastewater, which is .....	
<b>Major recyclable by-products</b>		XXXX	XXXX	XXXX
<b>Date of initial application in China</b>		1986	1995	2005
<b>Current situation</b>	<b>Capacity, '14, t/a</b>	XXXX	XXXX	XXXX
	<b>Capacity share, '14</b>	XXXX	XXXX	XXXX
	<b>Estimated output, '14, tonne</b>	XXXX	XXXX	XXXX
	<b>Operating rate, '14</b>	XXXX	XXXX	XXXX
	<b>Total production cost in Oct. 2014, USD/t</b>	XXXX	XXXX	XXXX
<b>Typical company</b>		XXXX	XXXX	XXXX

Source: CCM

## 6 Wastewater treatment technology

### ✓ Environmental protection polices update (2012-2014)

- According to the *Announcement No. 1744 of the Ministry of Agriculture of China* released on 26 March, 2012, the application for field test and pesticide registration of mixed glyphosate SL formulations (including temporary, formal or renewed ones) with content of glyphosate lower than 30% will not be accepted or approved since the issuing date of the announcement.

- In May 2013, the Ministry of Environmental Protection in China announced that the environmental protection verification (EPV) for glyphosate (PMIDA) will be launched in the following years. It is required that the during the pollution control procedure:

1. the yield of glyphosate technical (AEA pathway) shall be no less than 70%;
2. the yield of glyphosate technical (IDA pathway) shall be no less than 75%;
3. the comprehensive utilization rate of phosphorus element shall be no less than 80%;
4. the recycling rate of sodium chloride shall be no less than 85%.

Table 6-1 Name list of four glyphosate (PMIDA) manufacturers passing the environmental protection verification launched by the Ministry of Environmental Protection of China in 2014

No.	Manufacturer	Production route	Main product	Major method to dispose of mother liquid
1	Zhenjiang Jiangnan Chemical Co., Ltd. (Jiangsu Province)	AEA	Glyphosate	XXXX
2	XXXX	AEA & IDAN	Glyphosate	XXXX
3	Youth Chemical Co., Ltd. (Jiangsu Province)	DEA	Glyphosate	XXXX
4	XXXX	AEA	Glyphosate	XXXX

Source: *The Ministry of Environmental Protection of China*

### ✓ Waste treatment technology update (2011-2014)

Due to the stricter environmental protection policies in China, more and more glyphosate manufacturers have increased investment in their waste treatment equipment. At present, the disposal of glyphosate (PMIDA) mother liquid remains the main focus of the waste treatment technology; the membrane method and the burning method are two major application methods on the market.

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