

# PHARMICELL Bio-Chemical Division

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Your trusted partner in chemical solutions



# Bio-Chemical Division

## *We provide chemical solutions for your successful business.*

Pharmicell is one of the most trusted business partners for chemical solutions.

We offer a wide range of bio-chemicals including nucleosides, mPEGs, dNTPs, and industrial chemicals including flame retardants, low dielectric constant resin, and industrial catalysts in various scales.

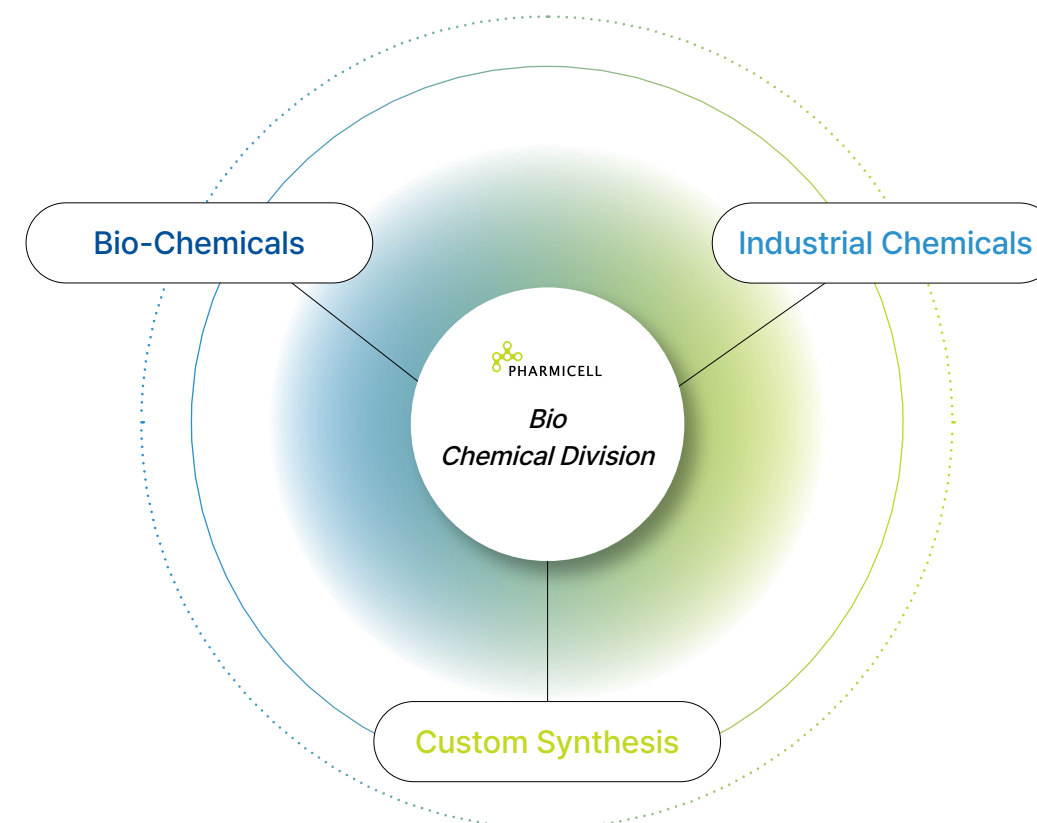
Our modular expandable facilities, located in South Korea's Onsan National Industrial Complex, are one of the most advanced manufacturing facilities for nucleosides and mPEGs.

We are committed to delivering the highest quality products to our customers as promptly and safely as possible.

## HISTORY

2002	2005	2006	2008	
Established as ID Biochem, Inc.	Acquired ISO 9001 Certificate	Accredited as Innovative Enterprise (INNO-BIZ)	Recognized as Promising Medium Enterprise	
2010	2013	2018	2020	2022
Recognized as Bluechip Venture Enterprise	Merged into Pharmicell Co., Ltd.	Started to operate new #1 factory	Awarded for 10 million dollar export ( Korea International Trade Association)	Started to operate #2 factory

## Business Areas



PHARMICELL's **Bio-Chemical Division** offers total solutions based on its R&D and quality control capabilities and cutting-edge manufacturing facilities.

### Bio-Chemicals

#### Nucleosides

- World-class quality
- One of the leading producers in the world

#### mPEGs (Polyethylene glycol)

- High quality & patented technology
- One of the leading producers in the world

#### dNTP solutions

- Chemically manufactured
- High purity and high quality

### Industrial Chemicals

#### Flame retardants

- Eco-friendly phosphorus-based

#### Other industrial chemicals

- Low dielectric constant resin for 5G
- Industrial catalysts

### Custom Synthesis

#### Full range of services for synthesizing custom synthetics

- Technology for synthesizing various derivatives for mass production
- Analysis capability for high purity products



# Bio-Chemicals

## Various nucleoside derivatives

Nucleosides are important biological molecules that function as signaling molecules and as precursors to nucleotides needed for DNA and RNA synthesis.

Pharmicell is dedicated to manufacturing and supplying high purity nucleoside derivatives to customers worldwide.

### Nucleosides

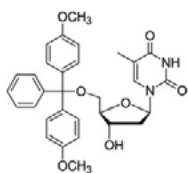
We are a leading supplier of nucleosides for applications in pharmacology, cell biology, and molecular biology.

Our key products include DMT-DNAs, DMT-LNAs, and various types of DMT-RNAs.

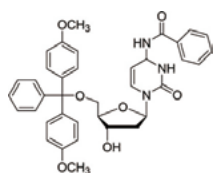
Pharmicell is at the forefront of developing new forms of nucleosides.

### DMT-DNAs

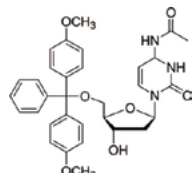
Product	CAS No.	Product	CAS No.
5'-DMT-thymidine	40615-39-2	5'-DMT-N2-isobutryl-2'-deoxyguanosine	68892-41-1
5'-DMT-N4-benzoyl-2'-deoxycytidine	67219-55-0	5'-DMT-N4-benzoyl-5-methyl-2'-deoxycytidine	104579-03-5
5'-DMT-N4-acetyl-2'-deoxycytidine	100898-63-3	5'-DMT-2'-deoxyuridine	23669-79-6
5'-DMT-N6-benzoyl-2'-deoxyadenosine	64325-78-6	5'-DMT-N2-(DMF)-2'-deoxyguanosine	172361-60-3



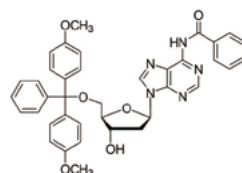
5'-DMT-thymidine



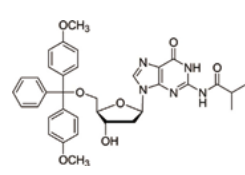
5'-DMT-N4-benzoyl-2'-deoxycytidine



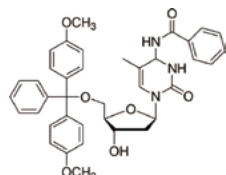
5'-DMT-N4-acetyl-2'-deoxycytidine



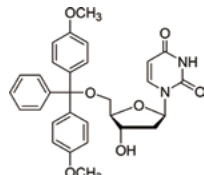
5'-DMT-N6-benzoyl-2'-deoxyadenosine



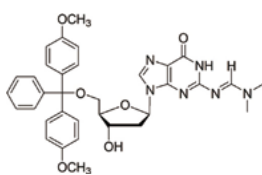
5'-DMT-N2-isobutryl-2'-deoxyguanosine



5'-DMT-N4-benzoyl-5-methyl-2'-deoxycytidine



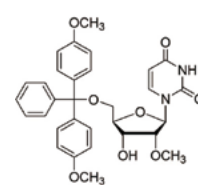
5'-DMT-2'-deoxyuridine



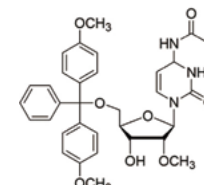
5'-DMT-N2-(DMF)-2'-deoxyguanosine

### DMT-2'-OMe-RNAs

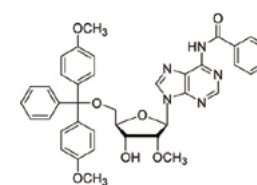
Product	CAS No.	Product	CAS No.
5'-DMT-2'-OMe-uridine	103285-22-9	5'-DMT-2'-OMe-N6-benzoyladenosine	110764-72-2
5'-DMT-2'-OMe-N4-acetylcytidine	199593-08-3	5'-DMT-2'-OMe-N2-isobutrylguanosine	114745-26-5



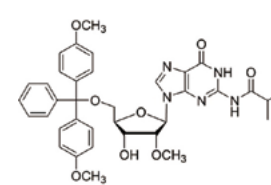
5'-DMT-2'-OMe-uridine



5'-DMT-2'-OMe-N4-acetylcytidine



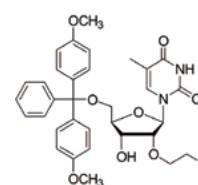
5'-DMT-2'-OMe-N6-benzoyladenosine



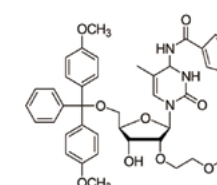
5'-DMT-2'-OMe-N2-isobutrylguanosine

### DMT-2'-MOE-RNAs

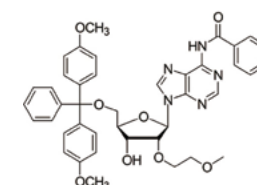
Product	CAS No.	Product	CAS No.
5'-DMT-2'-MOE-thymidine	163759-50-0	5'-DMT-2'-MOE-N6-benzoyladenosine	251647-48-0
5'-DMT-2'-MOE-N4-benzoyl-5-methylcytidine	182496-01-1	5'-DMT-2'-MOE-N2-isobutrylguanosine	251647-50-4



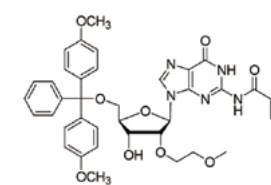
5'-DMT-2'-MOE-thymidine



5'-DMT-2'-MOE-N4-benzoyl-5-methylcytidine



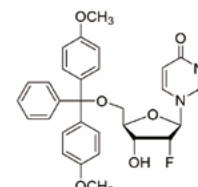
5'-DMT-2'-MOE-N6-benzoyladenosine



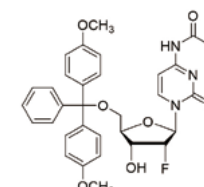
5'-DMT-2'-MOE-N2-isobutrylguanosine

### DMT-2'-F-RNAs

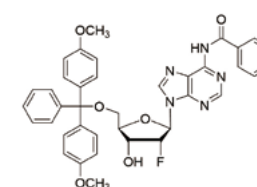
Product	CAS No.	Product	CAS No.
5'-DMT-2'-F-deoxyuridine	146954-74-7	5'-DMT-N6-benzoyl-2'-F-deoxyadenosine	136834-21-4
5'-DMT-N4-acetyl-2'-F-deoxycytidine	159414-98-9	5'-DMT-N2-isobutryl-2'-F-deoxyguanosine	144089-96-3



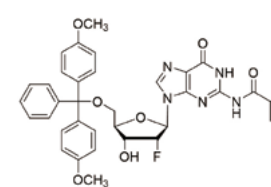
5'-DMT-2'-F-deoxyuridine



5'-DMT-N4-acetyl-2'-F-deoxycytidine



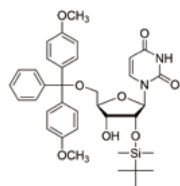
5'-DMT-N6-benzoyl-2'-F-deoxyadenosine



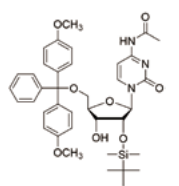
5'-DMT-N2-isobutryl-2'-F-deoxyguanosine

## DMT-2'-OTBDMS-RNAs

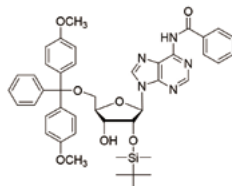
Product	CAS No.	Product	CAS No.
5'-DMT-2'-OTBDMS-uridine	81246-80-2	5'-DMT-2'-OTBDMS-N6-benzoyladenosine	81265-93-2
5'-DMT-2'-OTBDMS-N4-acetylcytidine	121058-85-3	5'-DMT-2'-OTBDMS-N2-isobutyrylguanosine	81279-39-2



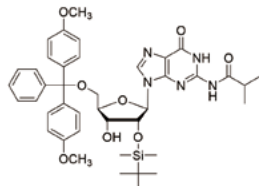
5'-DMT-2'-OTBDMS  
-uridine



5'-DMT-2'-OTBDMS-N4  
-acetylcytidine



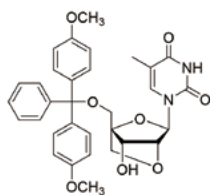
5'-DMT-2'-OTBDMS-N6  
-benzoyladenosine



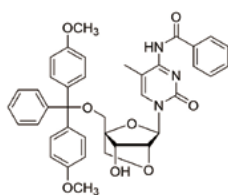
5'-DMT-2'-OTBDMS-N2  
-isobutyrylguanosine

## DMT-LNAs

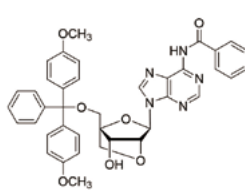
Product	CAS No.	Product	CAS No.
5'-DMT-LNA-thymidine	206055-71-2	5'-DMT-LNA-N6-benzoyladenosine	206055-74-5
5'-DMT-LNA-N4-benzoyl-5-methylcytidine	445012-77-1	5'-DMT-LNA-N2-(DMF)-guanosine	709641-78-1



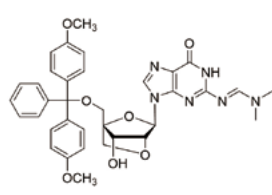
5'-DMT-LNA  
-thymidine



5'-DMT-LNA-N4-benzoyl  
-5-methylcytidine



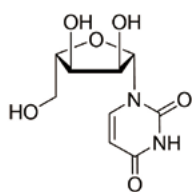
5'-DMT-LNA-N6  
-benzoyladenosine



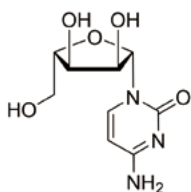
5'-DMT-LNA-N2-(DMF)  
-guanosine

## L-RNAs

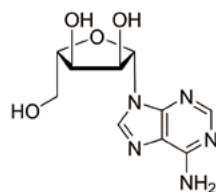
Product	CAS No.	Product	CAS No.
L-Uridine	26287-69-4	L-Adenosine	3080-29-3
L-Cytidine	26524-60-7	L-Guanosine	26578-09-6



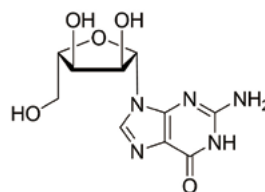
L-Uridine



L-Cytidine



L-Adenosine



L-Guanosine

## Highly purified, polyethylene glycol (PEG)

With 20 years of experience, we are committed to providing mPEG products of the highest quality to fit any applications.

### mPEGs

mPEG derivatives are known not only to increase drug circulation time, solubility, and stability but also to reduce immunogenicity and toxicity when attached to a drug. These traits of mPEG allow for a wide range of applications, including PEGylated protein/peptide drugs, hydrogels, liposomes for pharmaceutical uses, and PEGylated hemoglobin as an oxygen carrier. We supply various polyethylene glycol derivatives of high quality available at commercial scale.

### mPEG Derivatives

**Methoxy-PEG** MW 2K/5K/10K/12K/20K/30K/40K  
(CAS No. : 9004-74-4)

### 4-arm-PEGs

**4-arm-PEG** MW 10K/20K/40K

### Intermediate & Activated PEGs

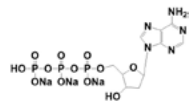
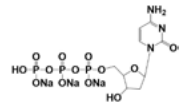
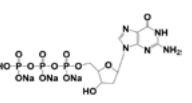
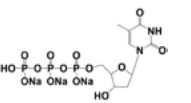
<b>Methoxy-PEG-amine</b>	MW 5K/10K/12K/20K/30K (Cas. No. 9004-74-4)
<b>Methoxy-PEG-maleimide</b>	MW 5K/20K
<b>Methoxy-PEG-NHS</b>	MW 2K/5K/10K/12K/20K
<b>Methoxy-PEG-Hydrazide.HCl</b>	MW 12K/20K
<b>Methoxy-PEG-NPC</b>	MW 20K
<b>Methoxy-PEG-Aldehyde</b>	MW 5K/20K
<b>Methoxy-PEG-acetic acid</b>	MW 2K
<b>Methoxy-PEG-SC</b>	MW 2K/5K/10K/20K
<b>4-arm-PEG-NHS</b>	MW 10K
<b>4-arm-PEG-amine</b>	MW 10K, 20K, 40K

Deoxynucleoside triphosphates

Pharmicell has been engaging in R&D and manufacturing of various nucleoside products for nearly 20 years, which has enabled us to successfully develop dNTPs with high purity and high quality.

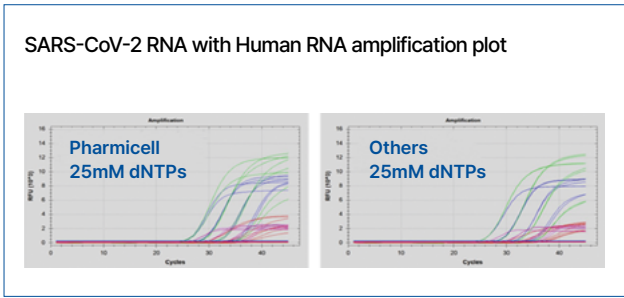
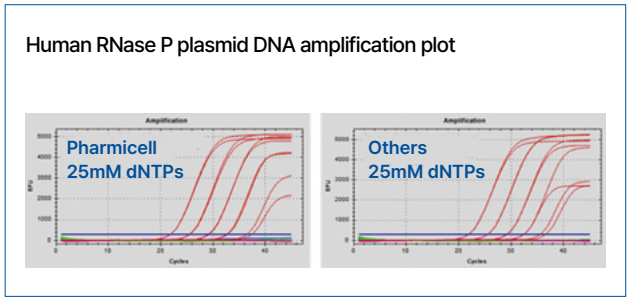
dNTP Solutions

Pharmicell's dNTPs are manufactured chemically, but have purity levels equivalent to enzymatically manufactured synthetics. Our products have excellent PCR amplification and show performance comparable to other commercially available dNTPs.

	dATP	dCTP	dGTP	dTTP
Nomenclature	2'-Deoxyadenosine 5'-triphosphate	2'-Deoxycytidine 5'-triphosphate	2'-Deoxyguanosine 5'-triphosphate	2'-Deoxythymidine 5'-triphosphate
Chemical structure				
CAS No.	54680-12-5	109909-44-6	93919-41-6	27821-54-1
Cation	Tri sodium salt	Tri sodium salt	Tri sodium salt	Tri sodium salt
Formula	C <sub>10</sub> H <sub>13</sub> N <sub>5</sub> Na <sub>3</sub> O <sub>12</sub> P <sub>3</sub>	C <sub>9</sub> H <sub>13</sub> N <sub>3</sub> Na <sub>3</sub> O <sub>13</sub> P <sub>3</sub>	C <sub>10</sub> H <sub>13</sub> N <sub>5</sub> Na <sub>3</sub> O <sub>13</sub> P <sub>3</sub>	C <sub>10</sub> H <sub>14</sub> N <sub>2</sub> Na <sub>3</sub> O <sub>14</sub> P <sub>3</sub>
Formula weight (g x mol <sup>-1</sup> )	557.1	533.1	573.1	548.1
Molar Extinction Coefficient [1]	ε = 15.1 l x mmol <sup>-1</sup> x cm <sup>-1</sup> ; 259 nm	ε = 8.9 l x mmol <sup>-1</sup> x cm <sup>-1</sup> ; 271 nm	ε = 14.2 l x mmol <sup>-1</sup> x cm <sup>-1</sup> ; 252 nm	ε = 9.5 l x mmol <sup>-1</sup> x cm <sup>-1</sup> ; 267 nm
Appearance	Clear colorless solution			

Optimal performance for RQ-PCR (Pharmicell vs Others)

Upon a comparative analysis of dNTPs in DNA and RNA amplification experiments, the Ct values have been found to be within the range of ±1 when compared with other commercial dNTPs. This observation unequivocally establishes that Pharmicell's dNTPs have performance levels equivalent to other commercial dNTPs.

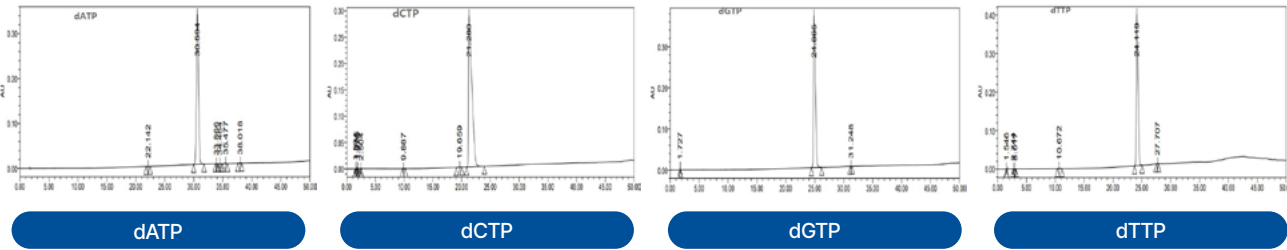


Specification comparison

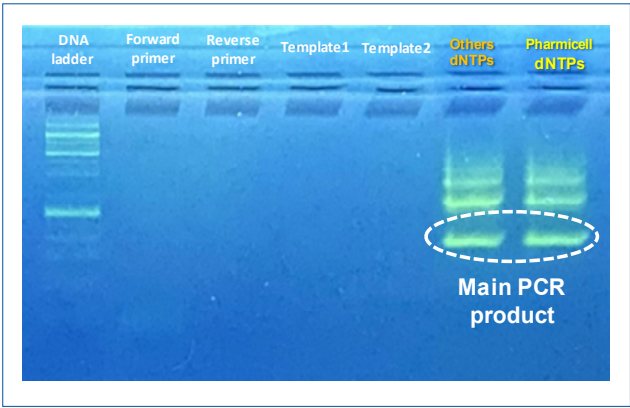
Pharmicell guarantees high purity and long term storage stability for our dNTP products, well above the quality control level of commercial dNTPs. We have secured improved manufacturing technology through vigorous R&D, and are able to supply high-quality dNTPs at a competitive price.

	Test	Specification			
		Commercial A	Commercial B	Commercial C	Pharmicell
Physical	Concentration	100~110mM	100±3mM	100~110mM	100~110mM
	pH	8.5±0.2(22°C)	7.5	7.5~8.1	8.0~8.5
	Stability	24 month	24 month	42 month	24 month
	Storage (°C)	-20	-20	-15~-25	-20
HPLC	dNTP	≥99.0%	≥99.0%	≥99.0%	≥99.0%
	dNDP	≤0.5%	-	≤0.9%	≤0.5%
	Other impurities	≤0.1%	-	-	≤0.3%
Functional	DNases, RNases	Not detectable	Not detectable	Not detectable	Not detectable
	Nicking activity	Not detectable	Not detectable	Not detectable	Not detectable

HPLC data



Optimal performance for conventional PCR (Pharmicell vs Others)



The outcome of this test unequivocally verifies that Pharmicell's dNTPs meet the standards required for commercial products. It has also been confirmed that Pharmicell's dNTPs do not contain any impurities that may affect PCR amplification.

Agarose gel electrophoresis



## Industrial Chemicals

A wide variety of chemicals for industrial use is manufactured and supplied by us to other businesses.

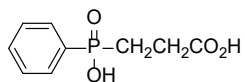
Our products range from fine industrial chemicals for highly specialized applications to bulk raw materials, which are supplied to international and regional markets.

### Phosphorus Flame Retardants

Pharmicell has developed eco-friendly phosphorus-based flame retardants and supplied to various industries such as printed circuit boards in mobile devices, textiles and engineering plastics.

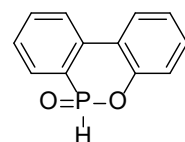
#### Phoretar 101 (Reactive)

- **Chemical Name** : 3-(Hydroxyphenylphosphinyl) propanoic acid (3-HPP)
- **CAS No.** : 14657-64-8
- **Application** : polyester



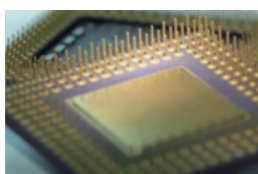
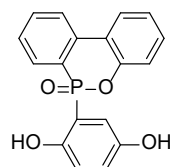
#### DPP (Reactive)

- **Chemical Name** : 9,10-Dihydro-9-oxa-10-phosphaphenanthrene-10-oxide (DPP)
- **CAS No.** : 35948-25-5
- **Application** : epoxy, PET, PU resin and especially for printed circuit board



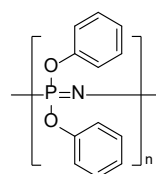
#### DPP-HQ (Reactive)

- **Chemical Name** : 10-(2,5-Dihydroxyphenyl)-10H-9-oxa-10-phosphaphenanthrene-10-oxide(DPP-HQ)
- **CAS No.** : 99208-50-1
- **Application** : epoxy, PET, PU resin and especially for printed circuit board



#### Phoretar 201 (Additive)

- **Chemical Name** : Poly(bis(phenoxy)phosphazene)
- **CAS No.** : 28212-48-8
- **Application** : epoxy, PET, PU resins and engineering plastics such as PC, PC/ABS, PBT etc.



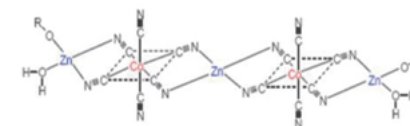
### Other Industrial Chemicals

We manufacture and supply the best chemicals for industrial customers in various applications. Our products include the following:

#### 1 Fine chemicals for 5G

#### 2 Catalyst for polyol synthesis

- **Chemical Name** : PH-DMC (Cobaltate(3-), hexakis(cyano- κC)-, zinc (2:3), (OC-6-11)-)
- **CAS No.** : 14049-79-7
- **Application** : Polymerization of PPG or PPG-PEG copolymer



#### 3 Polyurethane monomer for optical lens



## Custom Synthesis

We provide integrated chemical synthesis services for small molecules, from initial route scouting to commercial-scale process intensification.

### Full range services for custom synthesis

We have years of experience in custom synthesis, driven by our research capabilities, which has enabled us to become a leading supplier of pharmaceutical intermediates and other fine chemicals. Our products have consistent quality due to continuous refinement of manufacturing process and strict quality management, which are offered at competitive prices. We operate various types (stainless steel , glass-lined) and sizes of reactors so that we can meet various needs of our customers.

#### Plant #1

134(M<sup>3</sup>)

8K × 5  
6K × 14  
3K × 3  
1K × 1

#### Plant #2

109(M<sup>3</sup>)

8K × 6  
6K × 10  
1K × 1

#### Plant #3

134(M<sup>3</sup>)

8K × 5  
6K × 14  
3K × 3  
1K × 1

- To be established

### Major Production Facilities

Facilities	Properties	Quantity
Reactor(SUS, -4~130°C)	8m <sup>3</sup> (4 sets), 6m <sup>3</sup> (4sets), 6m <sup>3</sup> (300°C, 2MPa), 3m <sup>3</sup> (-60°C)	10 sets
Reactor(G/L, -4~130°C)	8m <sup>3</sup> (7 sets), 6m <sup>3</sup> (19 sets), 3m <sup>3</sup> (2 sets), 1m <sup>3</sup> ((2 sets)	30 sets
Centrifugal filter	140kg	6 sets
Vacuum filter	300L(8 sets), 400L	9 sets
Filter press	5.26m <sup>3</sup> /cycle(3hr), 750/750 = 17 plates(260L)	3 set
Cabinet dryer(vacuum)	2.52m <sup>3</sup>	18 sets
Vacuum pump(Dry screw type)	800L/min(15kw, 440V, 2sets), 1 ~ 0.1 torr 400L/min(11kw, 440V, 11sets), 1 ~ 0.1 torr	13 sets
Refrigerating machine(Chiller)	100RT(3 sets), 50RT(3sets)	6 sets
Crusher	100kg/hr	1 set
Warehouse	4°C (91m <sup>2</sup> ), -15°C (69m <sup>2</sup> )	2 sets

*We are PHARMICELL,*  
your trusted partner in chemical solutions.



#### Research & Development

We never cease R&D efforts to improve the quality of our products.



#### Innovation

We always seek for areas where we can bring in innovation to enhance productivity.



#### Expert Team

We maintain a team of highly skilled researchers and workers through continuous training.



#### Qualified Facility

Our facilities are ISO 9001:2015 certified and satisfy the highest quality standards.



#### High Purity Product

We provide products with the highest purity available in the market.



#### Flexibility in Scales

We are ready to provide our products at any scale in response to our customers' specific needs.





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