



## **PD Series**

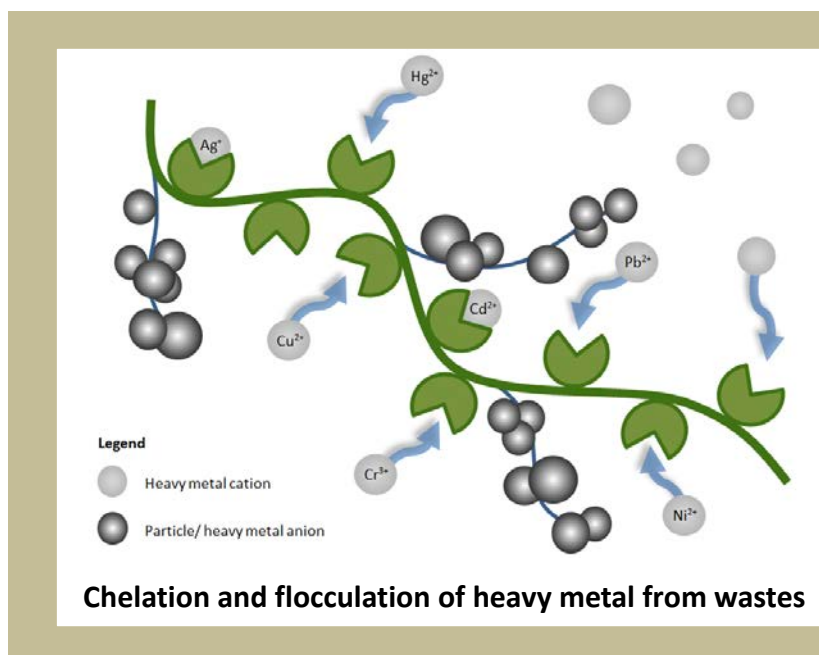
**Multifunctional heavy metal treatment reagents**

# About Linovus PD Series

Linovus PD series products are new-generation multifunctional heavy metal treatment reagents which are developed through integration of chelation and flocculation functionality into advanced polymer materials. They are effective and environmentally friendly solutions for treating heavy metals in wastes. Applications areas include incineration fly ash, contaminated soil and sediment, industrial hazardous wastes, wastewater, surface water, and groundwater.

PD products effectively capture both heavy metal cations (Cr, Ni, Cu, Zn, Pb, Hg, Mn, Cd, Ag, As, etc.) and anions ( $\text{Cr}_2\text{O}_7^{2-}$ ,  $\text{AsO}_4^{3-}$ ,  $\text{AsO}_2^-$ ,  $\text{MnO}_4^{2-}$ , etc.) under ambient temperature in solid wastes and wastewater by forming stable, insoluble heavy metal-polymer complex which is safe to human or the environment. These products remain highly effective even in the presence of complexing agents. PD reagents also produce excellent results in flocculation where heavy metal treatment using reagents with low molecular weight usually exhibit little effect. PD reagents are capable of simultaneous removal of heavy metal cations, anions, and waste particles in highly complex wastewater matrix.

Applications of PD series products are simple and versatile. There is virtually no change to existing manufacturing processes nor is there any special equipment required to incorporate with our products. They enable optimal results to meet the most stringent environmental regulation and beyond.



# The Advantages

What matters most, we considered first.

## Effectiveness

1. Engineered molecular structure to incorporate higher chelating group density so as to improve effectiveness on all kinds of municipal and industrial wastes contaminated with heavy metals
2. Maintain high effectiveness even in the presence of complexing agents with wide range of concentrations
3. Effective over wide pH-range, in both alkaline and acidic environments
4. Produce large flocs with heavy metals without addition of any other inorganic or organic flocculant in wastewaters
5. Capable of simultaneous removal of heavy metal cations, anions, and waste particles in an extremely complex wastewater matrix
6. Effectively capture heavy metals without being affected by other elements

## Safety

7. Superior long-term stability of treated heavy metals under acidic conditions and at a temperature up to 300°C, thus safe to dump in landfills
8. Easy and inexpensive to integrate into existing waste treatment plants, avoids complex and costly processes or equipment
9. Ready-to-use, non-flammable and environment-friendly, no hazard to human and the ecosystem



# Application Areas

## 1. Industrial Wastewater

- Wastewater from refinery, mining, metallurgy, plating, pharmaceutical, coating, leather treatment, battery industry, etc.
- Leachate from landfill or incineration plant
- Wastewater from flue gas scrubber

## 2. Industrial/ Hazardous Wastes

- Incinerator bottom ash and fly ash
- Industrial ash, slag, catalyst, byproducts, etc.
- Industrial and municipal wastewater sludge

## 3. Contaminated Soils/ Sediments

- Contaminated sediments of river, lake and ocean
- Contaminated soils and marine clays

# Typical Properties

	PD3	PD5	PD5F	PD7	PD7F
Appearance <sup>1</sup>	liquid	liquid	liquid	liquid	liquid
pH(as supplied)	>11	>11	>11	>11	>11
Effective pH range	3-14	3-14	3-14	3-14	3-14
Molecular Weight(MW)	500-1000	65k	65k	>1000k	>1000k
Concentration in Water <sup>2</sup>	20%	10%	10%	10%	10%
Water content (approx.)	<80%	<90%	<90%	<90%	<90%
Theoretical chelating capacity <sup>3</sup> (mmol/g)	1.42	0.60	0.36	0.67	0.40
Decomposition temperature [Onset](°C)	250	>350	>350	>350	>350
Flocculation capability	●	●●●	●●●	●●●●●	●●●●●
Heavy metal cations	✓	✓	✓	✓	✓
Anions and particles	✘	✓	✓	✓	✓
Affinity order	$Hg^{2+} > Ag^+ > Cd^{2+} > Cu^{2+} > Pb^{2+} > Zn^{2+} > Ni^{2+} > Cr^{3+} > Fe^{2+} > Mn^{2+} > Fe^{3+}$				

1. All products are clear to slightly turbid, red to yellowish liquids.
2. All products are miscible with water in all proportions.
3. Theoretical chelating capacity is for reference. Actual quantity required should be determined experimentally.

## Storage

All products should be stored in the original sealed container. We recommend storage under an inert atmosphere.

## Shelf Life

About 1 year in sealed containers.

Please refer to the Material Safety Data Sheet (MSDS) for each product for instructions on safe and proper handling and disposal.





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**Innovation for Green Solutions**