# Vijai Poly Products Pvt. Ltd.

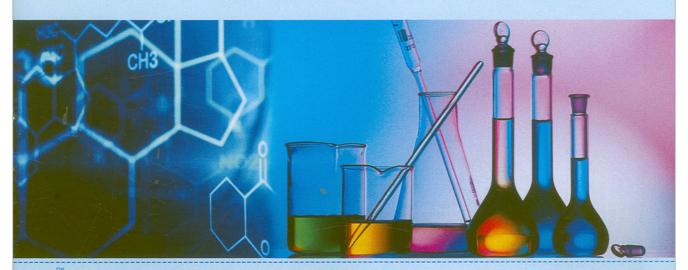


Cardanol Based Technologies

Vijay Poly Products Pvt. Ltd. is a company registered under the provision of Indian Companies Act .The company has its manufacturing facilities located on Savli-Manjusar Road: approx. 20 kms from Vadodara. In our commitment to remain environmentally friendly business entity, we have our products based on agro produce. Phenalkamines are obtained from CASHEW NUT SHELL LIQUID (CNSL) which is a renewable natural resource . CNSL is a monohydroxyl Phenol having a long hydrocarbon Chain in the meta position. The unique properties of CNSL are used to develop Phenalkamines.

Phenalkamines (curing agents) based on cardanol have unique advantages over some traditional chemistries. The different grades vary in the viscosity, molecular weight, amine value, and solid content. These products are manufactured to exacting specifications, are used to diverse applications including coating (Protective, Marine, Floor, Industrial), adhesives and laminates, low temp. Curing agents, low VOC, corrosion protection and high performance in adverse environmental conditions.

Phenalkamines are a class of curing agents that exhibits outstanding performance in epoxy systems. Phenalkamines provide excellent corrosion protection and adhesion, great mechanical and chemical properties and fast cure at low temperatures; excellent thermal shock resistance, construction, transportation, industrial paint manufacturers and electronics adhesive formulators can take advantage of these properties for a better formula.



# Vijai Poly Products Pvt. Ltd.

#### What We Produce

Vijai offeres a broad range of high performance Phenalkamine, Phenalkamine Adduct and Phenalkamide epoxy curing agents.

Phenalkamines are a distinct range of natural epoxy curing agents that provide very fast cure, even at low temperatures (<40 °F or 5 °C), with a good workable pot life. They have excellent resistance to moisture during cure, and offer good chemical resistance, and flexibility. These unique properties make them an excellent choice for marine and offshore coatings, solvent-free industrial floor coatings, railcar and agricultural/construction equipment coatings, portable water coatings, and tank and pipe linings. They are also used for adhesive, automobile, and electrical potting application.

Phenalkamine Adducts are a unique type of epoxy curing agents based on the latest modified phenalkamine technology, these products exhibits extremely rapid cure even at low temperatures with a workable pot life, it allows applications of 2 coats per day at low temperature as low as 5 C. Adducts will also not give blush formation as the primary amines are partially cross linked with epoxy resins. Adducts also gives more chemical resistant property as these products have more molecular weight than precursor.

Phenalkamides are designed to provide coating formulators with the benefits of both polyamides and phenalkamines in one product. Phenalkamides have the excellent fast curing and corrosion protection properties of phenalkamines, but with improved flexibility, overcoat window, and color stability that are typical of polyamides. These balanced properties enable the use of one workhorse curing agent for multiple applications in marine, offshore, protective, and industrial coatings.

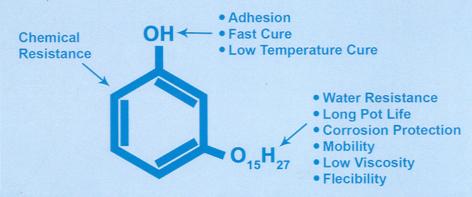
## What We Can Do For You

We will develop a customized product that matches your specifications exactly. We will produce it efficiently so as to offer even small quantities at a fair price and to the highest standards on time.

# **Phenalkamine Curing Agent**

It is a Green Technology Product because source of cardanol is Cashew Nutshell Liquid (CNSL) Oil. The Mannich reaction of cardanol, formaldehyde, and certain amines is called a phenalkamine. Phenalkamines and adducts of phenalkamine share some similar advantages to other Mannich base curing agents, such as: extremely fast cure, low temperature cure (even below 0°C), good chemical resistance, good surface appearance, good moisture tolerance, and non-blushing properties. However, due to the long aliphatic side chain of cardanol, phenalkamines also have very good pot life, good flexibility, surface tolerance, and excellent water and salt water resistance. Advantages over polyamide resin in terms of low temperature cure even at high humidity. These curing agents have relatively low viscosity and high solid content (Solvent Free System).

# CARDANOL Chemical Structure



The fast and low temperature cure properties of phenalkamines have a number of benefits for coating formulations. Application productivity can be significantly improved and the ability to apply a coating in low temperatures allows for a longer or even year round painting season. Faster cure also means protected surfaces can be re-coated or returned to service more rapidly, including solvent free formulations that will continue to cure when immersed in water and solvent based coatings that will continue to cure in poorly ventilated conditions. In forced cure industrial coating applications, phenalkamines can help save energy by lowering oven cure temperatures, or improving process efficiency via increased production line speeds. Finally, fast cure can also help protect coating manufacturers from coating failures. By reaching a high level of crosslinking very quickly, coatings develop their stability early and avoid problems when the environmental conditions change after application.

The high hydrophobicity of phenalkamines provided by the long linear side chain also brings many benefits to coating formulations compared with some other technologies. Water sensitivity of the phenolic hydroxyl and other formulation components can be counteracted, which reduces the chance the resin binder barrier will be broken and increases corrosion protection. Adhesion to poorly prepared or tough wet surfaces, such as water saturated concrete is especially good with phenalkamines because this hydrophobic effect ensures surrounding water does not influence the surface resin bond. phenalkamine technology such as innovative solvent-free, low viscosity, and faster curing products.

# **Technical Specification**

Characteristics	VIJ 20540	VIJ 20541	VIJ 20541*90	VIJ 20541LV
	PHENALKAMINE	PHENALKAMINE	PHENALKAMINE	PHENALKAMINE
APPEARANCE	Raddish Brown Viscous Fluid	Raddish Brown Viscous Fluid	Raddish Brown Viscous Fluid	Raddish Brown Viscous Fluid
GARDENER COLOUR SCALE	16 TO 17	16 TO 17	16 TO 17	15 TO 16
SPECIFIC GRAVITY AT 25 Kg/Ltr	0.97 - 0.99	0.98 - 1.00	0.98 - 1.00	0.98 - 100
VISCOSITY AT 25 C IN CPS	2000 - 4000	20,000- 50,000	3000 - 6000	1500 - 3500
AHEW	81	130	144	125
AMINE VALUE	490 - 550	290 -330	260 - 310	320 - 345
PHR LIQUID EPOXY RESIN EEW = 190	35 - 40	68	72 - 85	65 - 80
SOLID CONTENT	SOLVENT FREE	SOLVENT FREE	90%	SOLVENT FREE

Characteristics	VIJ 20558	VIJ 2077 ADDUCT	VIJ 20556*80	VIJ 2024
	PHENALKAMINE	ADDUCT	ADDUCT	PHENALKAMIDE
APPEARANCE	Raddish Brown Viscous Fluid	Raddish Brown Viscous Fluid	Orange Reddish	Orange Reddish
GARDENER COLOUR SCALE	16 TO 17	15 TO 16	15 TO 16	15 TO 16
SPECIFIC GRAVITY AT 25 Kg/Ltr	0.97-0.99	0.96 - 0.98	0.97-0.99	0.99 - 1.01
VISCOSITY AT 25 C IN CPS	500 - 2000	1000 - 2500	2800- 8000	50,000-150000
AHEW	95	162	135	160
AMINE VALUE	320 -360	230 -270	310 -350	230-270
PHR LIQUID EPOXY RESIN EEW = 190	50 - 65	85	80 -90	82 -86
SOLID CONTENT	SOLVENT FREE	68 - 72%	80%	SOLVENT FREE

#### **Phenalkamine Hardner**

**Technical Data Sheet** 

VIJ 20541 is a solvent-free phenalkamine curing agent designed for epoxy coating applications. It has excellent rapid cure properties, even at low temperatures, and provides good adhesion on wet or otherwise unprepared surfaces. Heavy duty industrial, protective, and marine service coatings can benefit from this product's outstanding water resistance and corrosion protection.

#### **Properties**

Properties	Typical Value
Appearance	Reddish Brown Liquid
Color (Gardner)	17 max.
Viscosity at 25°C	20000 to 50000 cps
Amine Value	290 – 330 mgKOH/g
AHEW	130
Volatile Loss	2% max.
Recommended Use Level (EEW 190)	68
200 micron dry times at 25°C (touch/hard/through)*	2.5/4.5/7.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

- 1. Medium to high solid coatings
- 2. Adhesives
- 3. Flooring and constructions
- 4. Marine and industrial coatings
- 5. Surface tolerant primers for metallic substrates
- 6. Tank lining

#### **Phenalkamine Hardner**

**Technical Data Sheet** 

VIJ 20540 is a low viscosity, solvent-free phenalkamine curing agent designed for epoxy coating applications. It has excellent rapid cure properties, even at low temperatures, offers very good chemical resistance, and provides good adhesion on wet or otherwise unprepared surfaces. Heavy duty industrial, protective, and marine service coatings can benefit from this product's outstanding water resistance and corrosion protection.

#### **Properties**

Properties	Typical Value
Appearance	Reddish Brown Liquid
Color (Gardner)	17 max.
Viscosity at 25°C	2,000 to 4,000 cps
Amine Value	490 - 550 mgKOH/g
AHEW	81
Volatile Loss	4%
Recommended Use Level (EEW 190)	40
200 micron dry times at 25°C (touch/hard/through)*	1.5/3.5/4.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

- 1. This product is usable in high solids or solvent free surface tolerant marine, industrial maintenance, protective, and floor coatings.
- 2. Good chemical resistance and suitability for contact with potable water\* make this curing agent especially acceptable for concrete or metal tank linings and pipe coatings.
- 3. It can be used for coating applications under cold and humid conditions, even over damp and poorly prepared surfaces.
- 4. This product's fast cure and good hardness make it ideal for applications requiring fast return to service. It can be use as adhesives and Surface tolerant primers for metallic substrate.

#### **Phenalkamine Hardner**

**Technical Data Sheet** 

VIJ 20558 is a low viscosity, solvent free phenalkamine curing agent designed for epoxy coating applications protecting metal and concrete substrates. It has excellent rapid cure properties, even at low temperatures, offers very good chemical resistance, and provides excellent adhesion on wet or otherwise unprepared surfaces and green concrete. Heavy duty industrial, marine service, protective, floor, and potable water contact coatings can benefit from this product's outstanding water resistance and corrosion protection.

#### **Properties**

Properties	Typical Value
Appearance	Reddish Brown Liquid
Color (Gardner)	17 max.
Viscosity at 25°C	500 - 2000 cps
Amine Value	320 - 360 mgKOH/g
AHEW	95
Volatile Loss	Solvent free
Recommended Use Level (EEW 190)	50 - 65
200 micron dry times at 25°C (touch/hard/through)*	4.5/10/15.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

- 1. This product is usable in high solids or solvent free surface tolerant marine, industrial maintenance, protective, and floor coatings.
- 2. Good chemical resistance and suitability for contact with potable water\* make this curing agent especially acceptable for concrete or metal tank linings and pipe coatings.
- 3. It can be used for coating applications under cold and humid conditions, even over damp and poorly prepared surfaces.
- 4. This product's fast cure and good hardness make it ideal for applications requiring fast return to service.
- 5. It can be use as adhesives.
- 6. Surface tolerant primers for metallic substrate.



# VIJ 20556X80

#### Phenalkamine Adduct

**Technical Data Sheet** 

VIJ 20556X80 is 75 to 80% solids, low viscosity, adducted phenalkamine curing agent designed for high solids epoxy coating applications. This curing agent has extremely fast cure, even at very low temperatures, allowing application of 2 coats per day at temperatures down to 5°C, while still maintaining a workable pot life.

Coatings based on VIJ 20556X80 develop hardness rapidly for applications requiring quick dry to handle, This curing agent has good adhesion on wet or otherwise unprepared surfaces, and can provide outstanding water resistance and corrosion protection.

# **Properties**

Typical Value
Reddish Brown Liquid
16 max.
2800 - 8000 cps
310 - 350 mgKOH/g
75 – 80 %
80 - 90
2/3.5/4.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

# **Applications**

- VIJ 20556X80 is usable for all season cure, fast setting, heavy duty industrial, marine, and protective coatings. It is used for high solid primers.
- 2. Its fast cure brings early return to service for applications like potable water pipe linings, and can help lower oven cure temperatures in forced cure applications.
- 3. This curing agent is usable for transportation primers and fleet refinish coating applications requiring fast dry .as this curing agent develops hardness quickly.

# **Advantages**

- 1. Excellent combination of rapid cure and long pot-life at both ambient and low (<40°F) Temperatures.
- 2. No induction times and nomcritical ratio.
- 3. Exceptional corrosion resistance and it cures below 5°C
- 4. Outstanding chemical resistance
- 5. Moisture tolerant during cure

# Vijai Poly Products Pvt. Ltd.

#### VIJ 20541 LV

#### Phenalkamine Hardner

**Technical Data Sheet** 

VIJ 20541 LV is a solvent-free low viscosity phenalkamine curing agent designed for epoxy coating applications. It has excellent rapid cure properties, even at low temperatures, and provides good adhesion on wet or otherwise unprepared surfaces. Heavy duty industrial, protective, and marine service coatings can benefit from this product's outstanding water resistance and corrosion protection.

#### **Properties**

Properties	Typical Value
Appearance	Reddish Brown Liquid
Color (Gardner)	15 - 16
Viscosity at 25°C	1500 - 3500 cps
Amine Value	320 – 345 mgKOH/g
AHEW	125
Volatile Loss	4.5 to 5%
Recommended Use Level (EEW 190)	65 - 80
200 micron dry times at 25°C (touch/hard/through)*	2.5/7/9.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

## **Applications**

- Excellent combination of rapid cure and long pot-life at both ambient and low temperatures.
- 2. Continues to chemically crosslink at very low Temperatures.
- 3. Low viscosity for excellent workability.
- 4. Good adhesion to poorly prepared surfaces.
- 5. Moisture tolerant during cure.
- 6. Excellent early water resistance.
- 7. Good chemical resistance. Good flexibility.
- 8. Compatible with most epoxy resins, solvents and their blends.
- 9. Superior corrosion resistance mitigating the need for anticorrosion pigments.
- 10. Good dilution efficiency with solvents.
- 11. Non-critical mix ratio.
- 12. No induction time required.



#### Phenalkamide

**Technical Data Sheet** 

VIJ 2024 is a Phenalkamide Epoxy curing agent. This product is designed to give coatings a combination of the benefits of both polyamide and phenalkamine systems. This curing agent offeres advanced performance such as fast cure even at low temperature, good dry colour stability, excellent water resistance, chemical and corrosion resistance and flexibility of the film.

#### **Properties**

Properties	Typical Value
Appearance	Orange color
Color (Gardner)	16 Max.
Viscosity at 25°C	50000 to 150000 cps
Amine value	230 to 270 mgKOH/g
AHEW	160
Volatile Loss	Solvent free
Recommended Use Level (EEW 190)	84
200 micron dry times at 25°C (touch/hard/through)*	1.5/3.5/4.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

# **Applications**

- 1. Solvent free high solid coatings.
- 2. Fast curing property makes ideal for applications requiring multiple coats over short period of time in marine, industrial, floor, protective coatings.
- 3. For the application which requiring the speed, corrosion protection, better dry color stability and extended recoat interval.
- 4. Adhesives.

# VIJ 2009 AD

#### Phenalkamine Adduct

**Technical Data Sheet** 

VIJ 2009 AD is a modified phenalkamine curing agent designed for epoxy coating applications. It has excellent rapid cure properties, even at low temperatures, and provides good adhesion on wet or otherwise unprepared surfaces.

#### **Properties**

Orange Red
15
500 TO 1000 cps
150 TO 180 mgKOH/g
190
59% TO 62%
100

# **Applications**

1. VIJ 2009 AD is usable for all season cure, fast setting, heavy duty industrial, marine, and protective coatings.

#### **Advantages**

- 1. Excellent combination of rapid cure and long pot-life at both ambient and low (<40°F) Temperatures.
- 2. No induction times and noncritical ratio.
- 3. Exceptional corrosion resistance and it cures below 5°C.
- 4. Outstanding chemical resistance.
- 5. Moisture tolerant during cure.



#### **Phenalkamine Adduct**

**Technical Data Sheet** 

VIJ 2077 is a low viscosity, solvent free phenalkamine curing agent designed for epoxy coating applications protecting metal and concrete substrates. It has excellent rapid cure properties, even at low temperatures, offers very good chemical resistance, and provides excellent adhesion on wet or otherwise unprepared surfaces and green concrete. Heavy duty industrial, marine service, protective, floor, and potable water contact coatings can benefit from this product's outstanding water resistance and corrosion protection.

#### **Properties**

Typical Value
Reddish brown liquid
17 Max.
1000 – 2500 cps
162
68 to 72 % solid
85

- 1. This product is usable in high solids or solvent free surface tolerant marine, industrial maintenance, protective, and floor coatings.
- 2. Good chemical resistance and suitability for contact with potable water\* make this curing agent especially acceptable for concrete or metal tank linings and pipe coatings.
- 3. It can be used for coating applications under cold and humid conditions, even over damp and poorly prepared surfaces.
- 4. This product's fast cure and good hardness make it ideal for applications requiring fast return to service.
- 5. It can be use as adhesives.
- 6. Surface tolerant primers for metallic substrate.

#### **Phenalkamine Curing Agent**

**Technical Data Sheet** 

VIJ 2777 is a 68 to 70 % solids, adducted phenalkamine curing agent. This curing agent has very fast cure even at low temperatures, and can provide excellent adhesion on difficult substrates. Film coating property is excellent not showing blush formation at low temperature and high humid condition. Good adhesion property even on wet or unprepared surface. Outstanding corrosion resistant property.

#### **Properties**

Properties	Typical Value
Appearance	Yellow Brown Liquid
Color (Gardner)	15 to 16
Viscosity at 25°C	3000 to 6000 cps
AHEW	164
Solids	68 to 70%
Recommended Use Level (EEW 190)	64
200 micron dry times at 25°C (touch/hard/through)*	4/5.5 hours

<sup>\*</sup> Tested at recommended phr with liquid epoxy resin EEW equal to 190

#### **Applications**

1. VIJ 2777 is suitable for fast curing medium and high solids surface tolerant marine, industrial, and protective coatings. This product's fast cure and good hardness make it ideal for applications requiring fast return to service or multiple coats over a short period of time. It can be used for coating applications under cold and humid conditions, even over damp and poorly prepared surfaces. Good flexibility and adhesion on various metal/primed substrates make this curing agent especially suitable for primers of marine, transportation, and general industrial equipment. Its ability to cure quickly over a wide temperature range, including below 0°C, combined with a good pot life at room temperature brings coatings based on this curing agent broad application latitude and good workability.

# **Marine Coating**

Marine coatings based on phenalkamine technology have become the standard for environments that demand the highest level of corrosion protection while providing application benefits such as fast cure, low temperature cure, surface tolerance, and low solvent emission. From critical immersion duty ballast tank coatings to general use atmospheric exposure and universal primers, Vijai offers an innovative toolbox of products for formulators to solve even the most demanding marine coatings problems.

Formulators can choose the most appropriate epoxy curing agent from a broad line of modified and unmodified phenalkamines and phenalkamides that can be used in all seasons. Selection will depend on desired marine coating properties such as target volume solids, cure speed, film properties at certain conditions, color, application method, and overall performance.

The table below is a summary of products suitable for marine coatings to aid in product selection.

#### **Epoxy Curing Agents**

Product Type General Properties		
Product	Туре	General Froperties
VIJ 20541	Phenalkamine	High viscosity, dark color for use in medium solids,
		moderately fast cure systems, requires good formula-
		tion work to get speed and workability.
VIJ 20541*90	Phenalkamine	VIJ 20541 solvent cut for good handling.
VIJ 20558	Phenalkamine	Low viscosity, excellent adhesion, for use in solvent
		free systems.
VIJ 20556*80	Modified Phenalkamine	Fast cure, for use in high solids systems.

# Phenalkamine vs Polyamide Hardener

The Epoxy Hardeners, i.e. Phenalkamines Developed from Cardenol (Mannich Base) Hardeners and their Epoxy Adducts have Great Advantage over Polyamide resins in terms of Low Temperature Cure, even at High Humidity, Superior Water and Corrosion Resistance. Also, they offer Better Acid, Alkali, Solvent and Chemical Resistance. They show good Adhesion to Damp Surfaces. Also, these Products have Relatively low Viscosity. So, they can be Formulated at Very High Solids, even 100%. This Translates into High Solids/Low VOC Products. Worldwide Shipbuilding Activities are concentrated in Korea, Japan & China where Average Temperatures are very low, even Minus in winter. Rapid Cure at Very High Humidity make these Phenalkamine Epoxy Hardeners more Suitable and Practical. These Hardeners, with Low Viscosity, are very useful in Formulating High Solids Epoxy Primers, Mid Coats, Floor Coatings, Marine coatings etc. Phenalkamines are cost effective hardeners.

Characteristics	Phenalkamine VIJ 20541	Polyamide 125
Appearance	Raddish brown	Yellowish brown
Gardener colour	16 to 17	12 to 13
Viscosoty at 25 C in Cps	30 000 to 50 000	50 ooo to 70 000
Amine value	290 to 330	280 to 320
AHEW	130	130
PHR Liquid epoxy resin EEW = 190	68	68

Characteristics	Phenalkamine VIJ 2062	Polyamide 115 (30%xylene)
Appearance	Raddish brown	Yellowish brown
Gardener colour	16 to 17	12 to 13
Viscosoty at 25 C in Cps	1000 to 2500	800 to 1500
Amine value	160 to 200	140 to 180
% Solid Content	68 to 70	68 to 72
PHR Liquid epoxy resin EEW = 190	100	95 to140

# **Quality Policy**

We at Vijai Poly Prod. Pvt. Ltd. stand committed to maintain high standard of quality in products we manufacture. We are always keen to understand customers' need and expectations to serve them better. Quality products and timely execution of orders are the hallmark of our services.

Mamta Kantharia CEO Vijai Poly Products Pvt. Ltd.

