CASE STUDY

Biobased and C-14 Analysis: Best Way to start with Sustainability

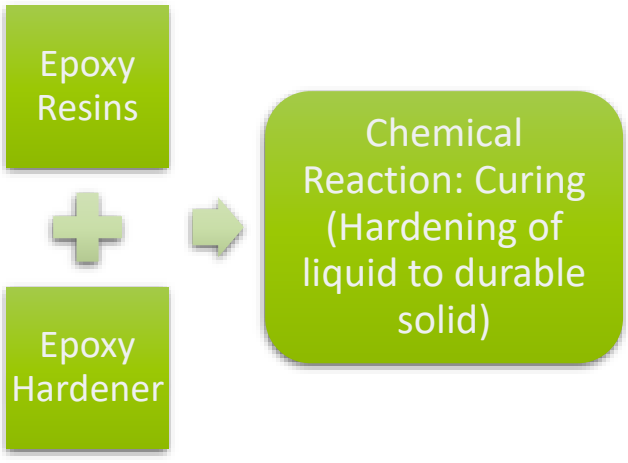
Summary

Product type: Polyamidoamines Curing agents synthesized from biobased fatty-acids
Application: Coating, Flooring, Marine/Anti-Corrosive/Protective, Metal Coating
Key benefits: Sustainability | Circular economy | Lower carbon-footprint | Durability | Hardness| Chemical Resistance

Introduction

'Biobased' is an interesting term used for epoxy hardeners. This case study is all about explaining sustainable processes with the concept of bio-based ingredients and carbon neutrality in the world of coatings. The identification of the best raw material suppliers is required to confirm and certify this point to create a chemistry that you can trust!

Epoxy hardeners are chemicals that are mixed with epoxy resins to initiate a chemical reaction causing curing and hardening of the liquid into a durable solid. There are endless uses for epoxy resins in applications requiring higher strength, durability, and chemical resistance.



The Challenge

When you hear the term biobased, it might come to your mind that it is a substance derived from living matter. There is a contradiction in this aspect: Take an example of gasoline that is derived from petroleum derivatives that were once living matter, but it is NOT a biobased material. There is a difference between LIVE carbon and FOSSIL carbon. C-14 (a radioactive element) is used to differentiate between these two kinds of carbon along with providing information regarding its ratio. The radiation is not an issue as the amount of this element is 1/1000th less than ppb of the total carbon amount.

A simple equation to calculate the percentage of biobased carbon (described by ASTM D6866)

$$biobased\ carbon\ \% = \frac{biobased\ carbon}{total\ carbon} \cdot 100$$

There is concept of using polyamidoamines (PAAs) synthesized from bio-fatty acids as a curing agent for epoxy coatings is a challenge for the coatings segment. These acids are derived from natural sources for synthesizing PAAs which is a bio-based option in comparison to conventional petroleum-based PAAs. Coating formulators expect to obtain the natural PAAs that give similar hardness, adhesion, and chemical resistance, as their non-biobased counterparts.

Solution

ddchem provides the chemistry that you can trust!

The company promotes the insidious way of biobased and carbon neutrality for implementing the data by the C-14 method described in the **American Society for Testing and Materials** ASTM D6866 which certifies the percentage of bio-based content in the products that depicts the efforts put up to create sustainable chemistry.

The experts at ddchem have looked toward the future and implemented bio-based fatty acids in the formation of epoxy hardeners. They are the global producers of **epoxy hardeners** based on **polyamidoamines** and guarantee that the naturally derived **fatty acids** can be used for synthesizing derivatives from plants that are different from the food elements. The use of biobased PAAs is not harmful to the environment as it reduces the dependence on the fossil-fuels to reduce waste/pollution and promotes sustainability in coating chemicals.

Understand how C-14 (Radioactive element) is produced in the environment

Carbon-14 is produced in the Earth's atmosphere through the interaction of cosmic rays with nitrogen gas molecules. The free neutron of nitrogen becomes an unstable isotope of nitrogen, called Carbon-14. This isotope is oxidized to form carbon dioxide that gets into the Earth's atmosphere. The radioactive carbon dioxide is absorbed by the plants during photosynthesis and becomes a part of the carbon cycle.

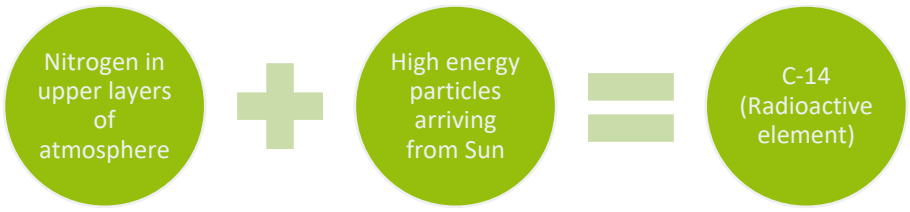


Figure 1: Formation of C-14 (Radioactive element)

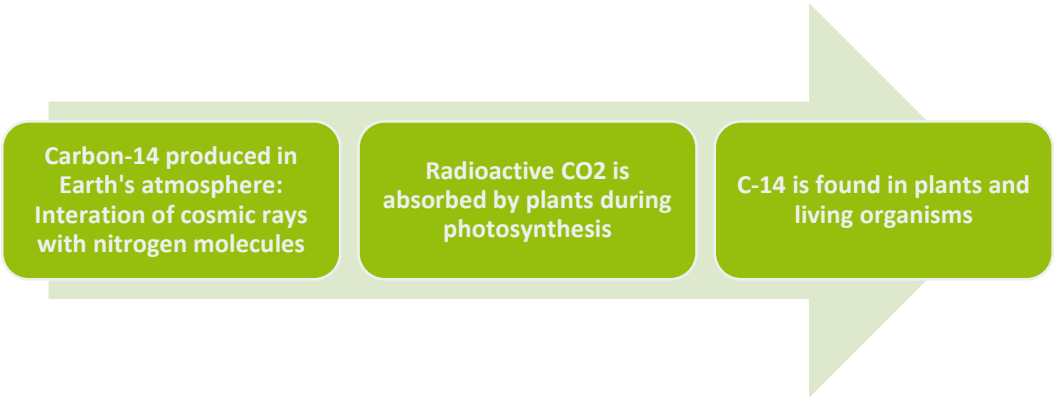


Figure 2: C-14 in environment

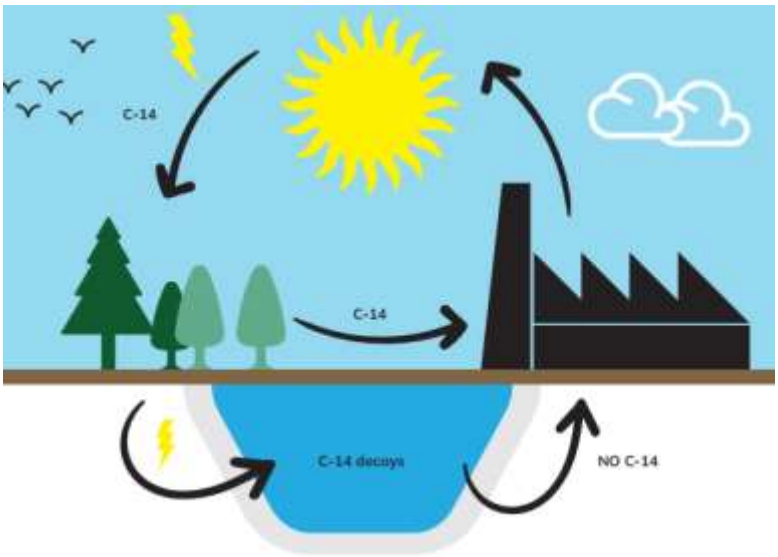


Figure 3: Process of C-14 synthesis in the environment

The chart below shows the **biobased carbon percentage** in different ddchem ingredients synthesized from natural sources (as per ASTM 6866):

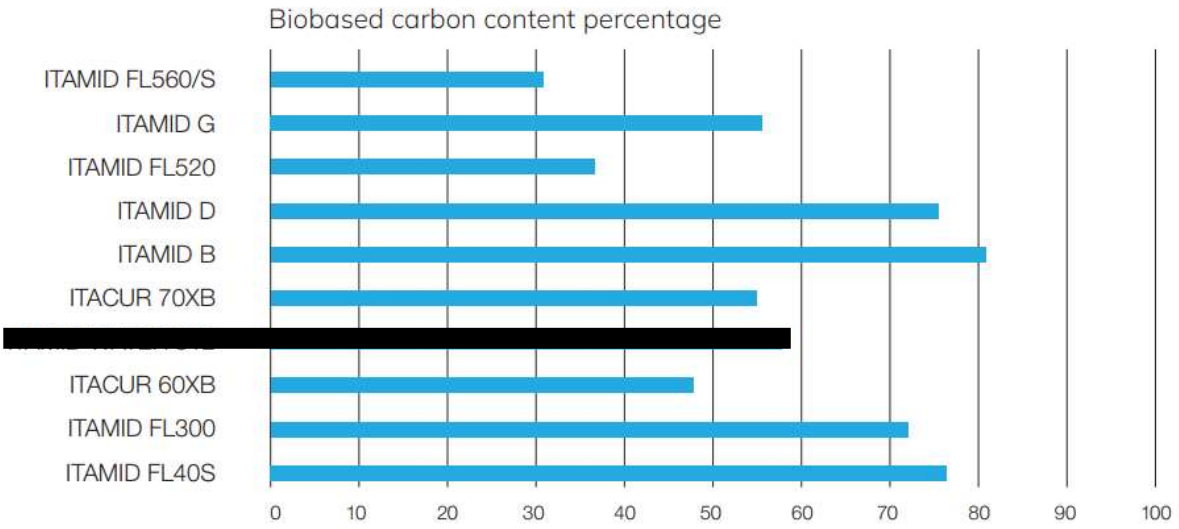


Table 1: Biobased carbon content according to ASTM 6866

Bio-based polyamidoamines (PAAs) by ddchem

Some bio-based polyamidoamines by ddchem are given below with a briefing about the products:

ITAMID FL40/S

ITAMID FL40/S is made up of low-viscosity **polyaminoamide-imidazoline resin** that is used in the formulation of epoxy mortars used in laying tiles, concrete repair, and construction purposes.

In comparison to traditional hardeners, ITAMID FL40/S exhibits lower sensitivity to carbonatation and lower reactivity and gives longer utilization and hardening times.

ITAMID D

ITAMID D is based on polyaminoamide resin that is used with liquid epoxy resins and is used as a hardener. It offers high resistance to chemical agents along with providing excellent flexibility, toughness, and adhesion to different surfaces. ITAMID D is used for solvent-free coatings.

Getting ahead with Biobased Epoxy Hardeners

The use of **polyamidoamines synthesized from biobased fatty acids** has a promising future in comparison to the conventional petroleum-based curing agents in the production of epoxy coatings and other applications. It extends the same properties as the traditional curing agents in terms of strength, durability, hardness, adhesion, and chemical resistance.

ddchem has done extensive research and development for expanding its portfolio with biobased epoxy Polyamidoamines Curing agents synthesized from biobased fatty acids. The concept of sustainability is very important for us and our surroundings. The researchers at ddchem believe that starting production with raw materials with a negative footprint would be the best way to move ahead toward a bio-based approach with curing agents that are formulted with bio-based fatty acids, assure safety for the environment and the human beings.

Request a Sample

ITAMID FL40/S

ITAMID D

ITAMID WATER 512