Performance Resins for Long Lasting Coatings

Novares LS 500 as NP replacement

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Agenda

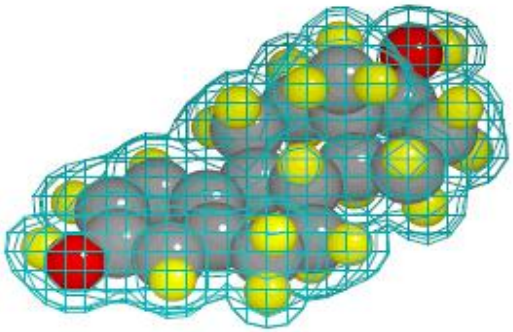
1. Regulatory Background
2. Performance NP replacement for EP curing
    - Curing behavior
    - Mechanical properties
    - Chemical resistance
3. Summary

Performance NP replacement for EP curing

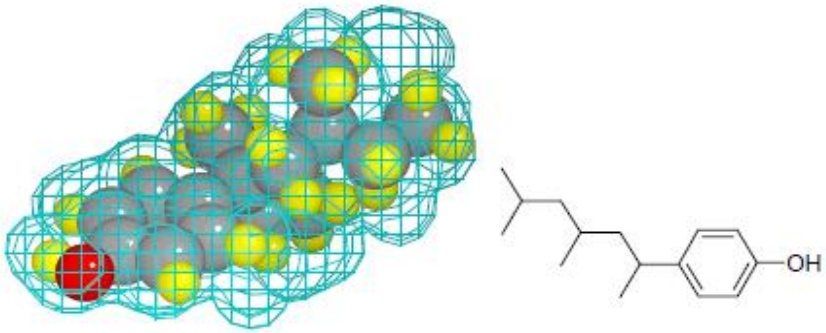
Novares LS 500
as
Replacement for Nonylphenol with technical advantages

Performance NP replacement for EP curing

Why?

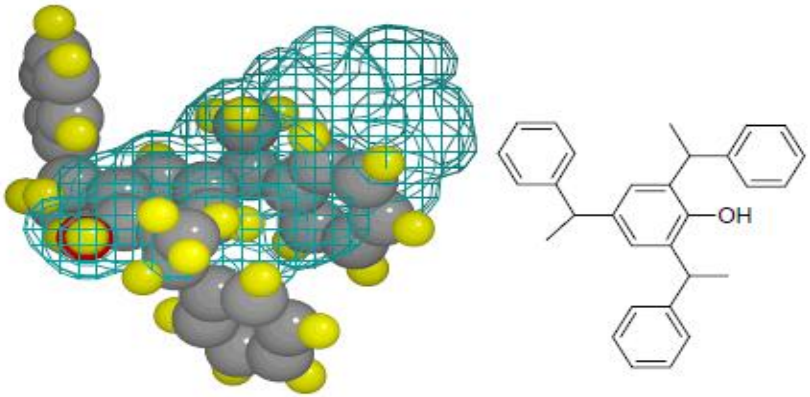


estradiol



p-nonylphenol

Due to the structure similarity NP is stated to have strong binding to human estrogen. Recent measurement of Clariant shows styrenated phenols don‘t have any affinity to estrogen receptor.



tristyrylphenol

Source: Clariant Newsletter on formulation additives April 2004

Performance NP replacement for EP curing

Why?

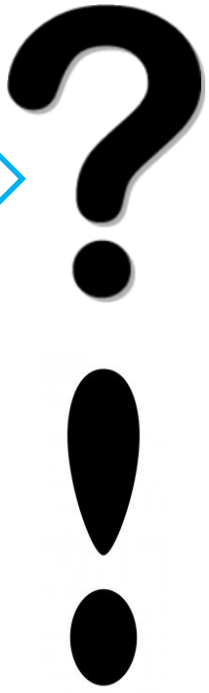
Nonylphenols and nonylphenol ethoxylates are toxic to aquatic organisms, have been found in human biomonitoring studies and appear to have estrogenic and endocrine system effects. In the past 2% of all NP production goes for EP curing

US

August 2010
EPA's action on nonylphenols and nonylphenol ethoxylates has languished, the agency released its "action plan" for the compounds Products law

2011
Maine has designated nonylphenols and nonylphenol ethoxylates as "priority chemicals" under its Safer Chemicals in Children's

Oct. 2014
EPA proposed a Significant New Use Rule (SNUR) for these compounds (excluded the use as epoxy curing catalyst)



EU

July 2003
Directive 2003/53/EC restricts products containing NPE or NP in Europe

2005
Sale and use of products containing more than 0.1% NPE or NP is not allowed.

2012
ECHA classified NP as SVHC

Performance NP replacement for EP curing

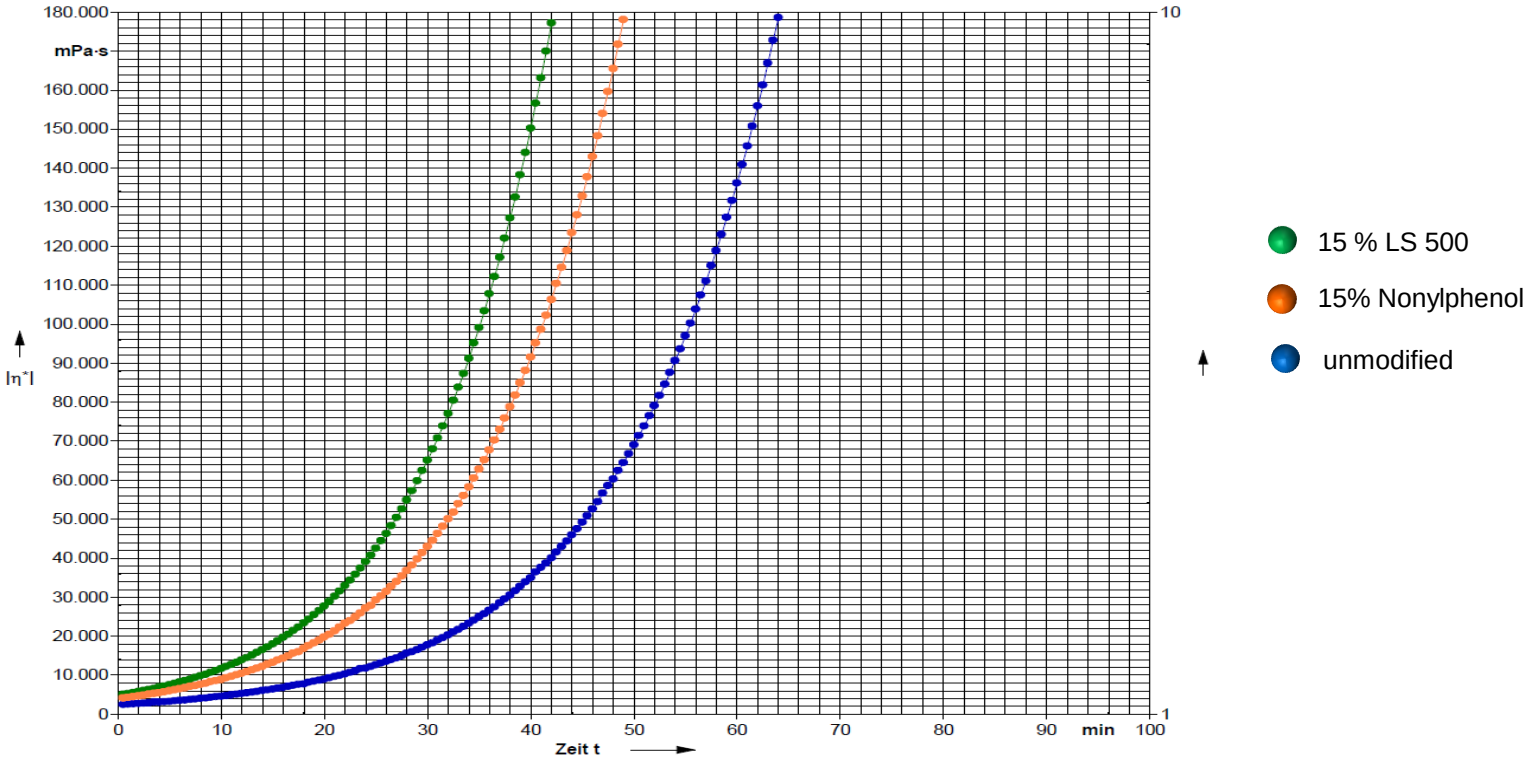
Novares LS 500

Chemicals like Novares LS 500 not only give a more harmless alternative to Nonylphenol, but also a technically excellent solution as NP-replacement

Performance NP replacement for EP curing

Curing behavior

Curing behavior of modified epoxy systems at 25 ° C



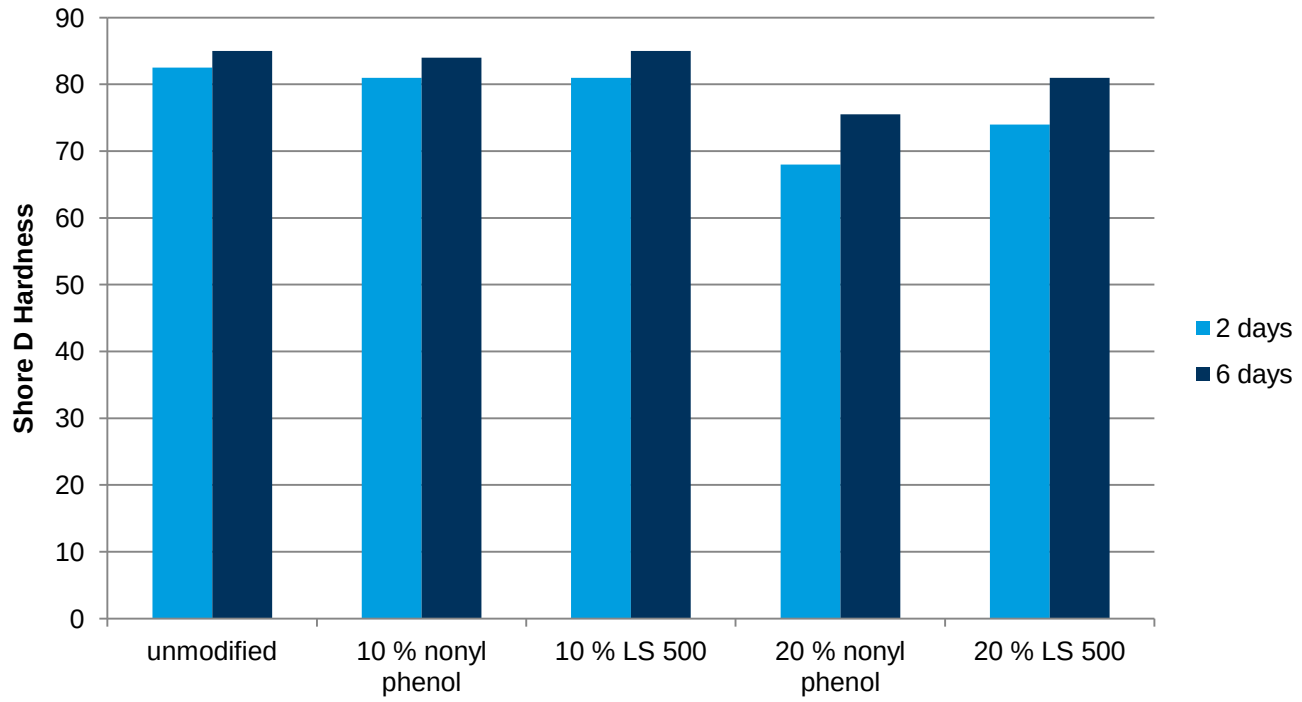
Reference: Epikote 828/Epikure 550

→ The fast reaction reduces dust drying and touch drying time and allows shorter working period for further application steps. LS 500 is more catalytically reactive than NP

Performance NP replacement for EP curing

mechanical properties

Hardness development of epoxy systems after 2 and 6 days



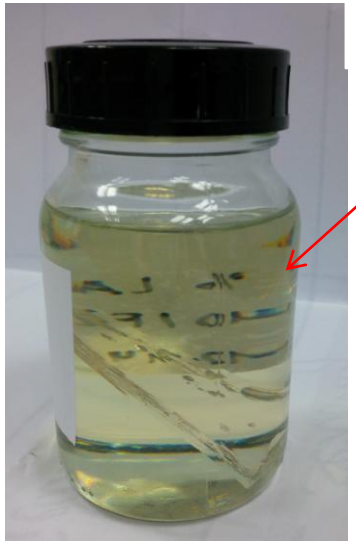
Reference: Epikote 828/Epikure 550

→ LS 500 has less side effect on hardness of EP coatings.

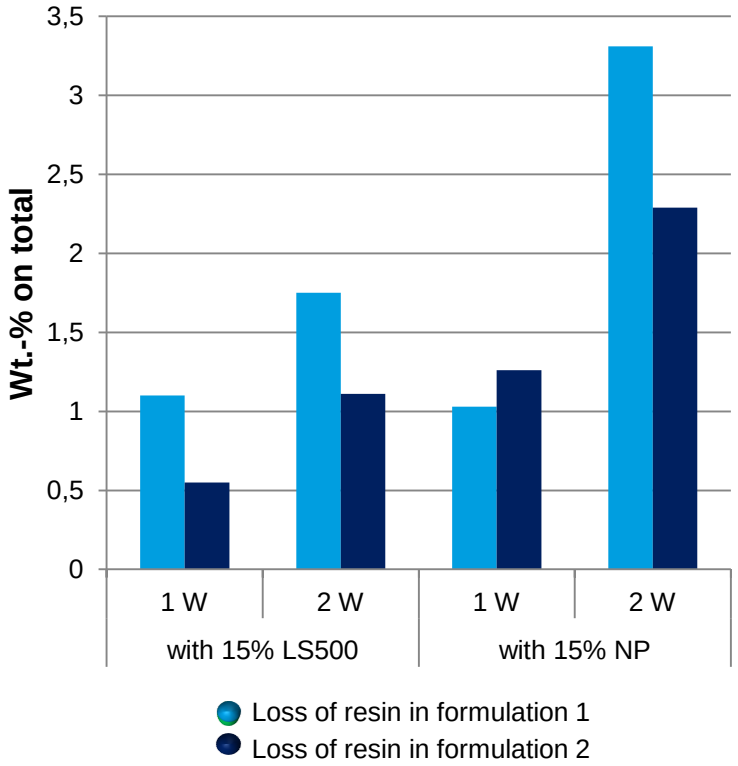
Performance NP replacement for EP curing

Chemical resistance

Network stability using LS 500 and NP as accelerator in Ethanol



Loss of resin:
amount of LS 500 or NP found in medium after immersion



Formulation 1: EP 828/Epikure 505, Formulation 2: EP 828/Epikure 05418

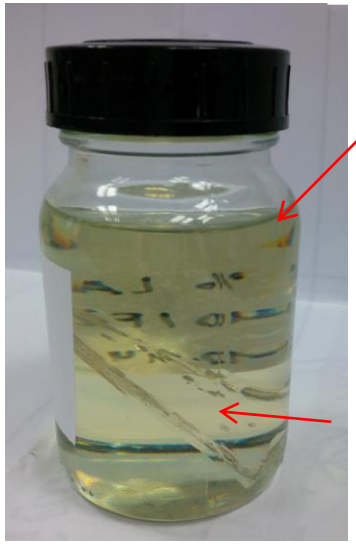
→ LS 500 is more stable bonded into EP polymer matrix. The stable network is higher resistant against solvents penetration and swelling

Performance NP replacement for EP curing

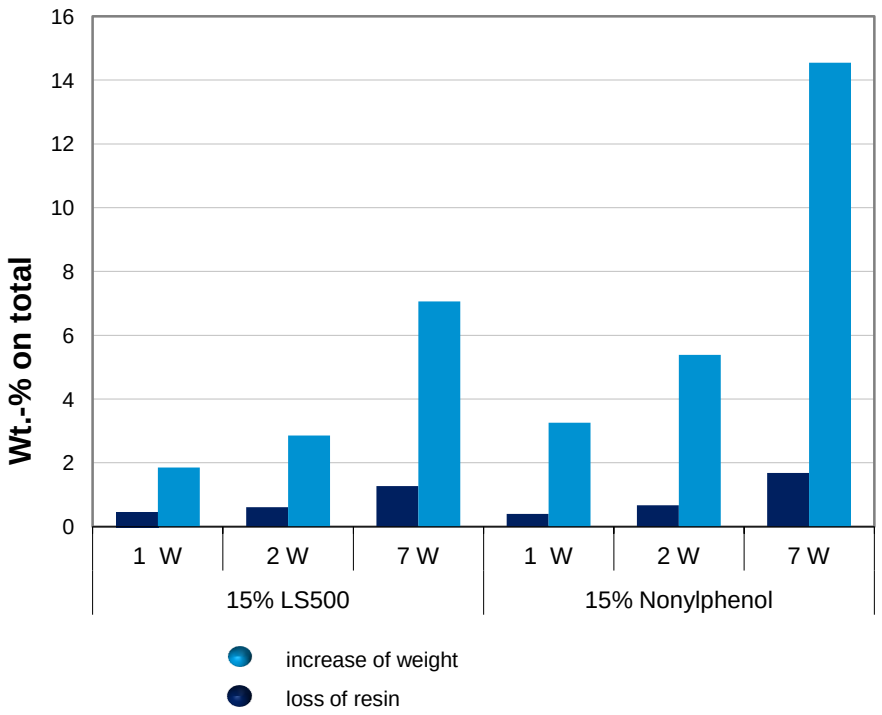
Chemical resistance

Network stability using LS 500 and NP as accelerator in Xylene

Loss of resin:
amount of LS 500 or NP found in medium after immersion



Weight increase is the weight change of specimen after immersion



Reference: Epikote 828/Epikure 550

→ LS 500 is more stable bonded into EP polymer matrix. The stable network is higher resistant against solvents penetration and swelling

Performance NP replacement for EP curing

Conclusion

Nonylphenol is known as a substance of very high concern. With Novares LS 500 we have got a product which has not only a better legal status, but also provides technical advantages:

- Higher acceleration effect than NP
- less influence on mechanical properties
- better chemical stabillity in epoxy network

Thank you very much for your attention.

Your contact:

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