

Ancamine[®] 2836: A new multi-functional polycyclic Mannich Base for Epoxy Coatings



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Webinar

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Evonik is a technology leader in Epoxy Curing Agents

- Full toolbox of amine-based curing agents, including special diluents, resins and modifiers
- Offerings for ambient- and heat-cure applications
- Tailor-made solutions for various industries and end markets

MARKETS

Marine
Coatings



Protective
Coatings



Construction
and Flooring



Composites &
Adhesives



PRODUCTS

Epodil®

Ancamide®

Imicure®

Amicure®

Ancamine®

Anquamine®

Nourrybond®

Ancarez®

We are close to our customers – around the globe

Your Benefits

- Global presence of customer relevant functions
- Application know how for addressing specific regional needs
- Flexibility in responding to customer needs by leveraging global network
- Proximity to customers allows for fast response times

Our production sites



Evonik solves current challenges in the epoxy industry

Eco-friendly

- Low emissions
- Improved EH&S profile by elimination of harmful raw materials



Improved Productivity

- Reduced downtime
- Wider application window / more robust conditions



Enhanced Performance

- High durability over time
- Long maintenance cycles



The new Ancamine® 2836

Eco-friendly



- Does not contain CMR classed alkyl phenols, formaldehyde or other harmful raw materials
- Good labeling profile



The new Ancamine® 2836

Improved Productivity

- PHR 29
 - 88% cure after 7 d at 23°C
 - Neat viscosity: 5500 mPas
40% in BzOH: 260 mPas
 - Gel time (40% BzOH): 44min
 - Thin film set time (40% BzOH): 5 - 6h
-
- Excellent balance of pot life and cure speed
 - Good property development under adverse conditions down to 5°C



The new Ancamine® 2836

Enhanced Performance

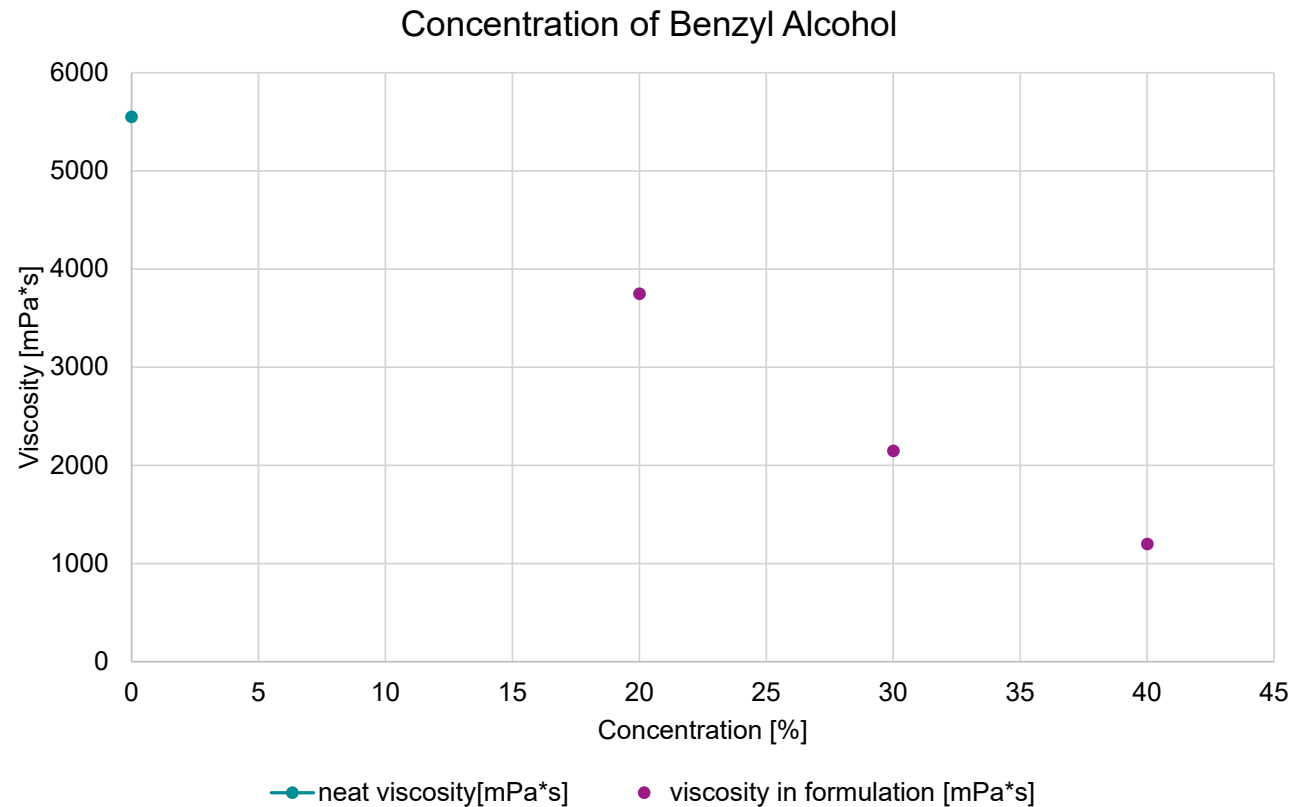
- Glass transition T_g (2nd scan): 133°C
- Barrier properties: R_p pore resistance (EIS) $\sim 10^{10} \Omega$
- Good integrity of test specimens immersed 28 days in various solvents

- Multifunctional hardener for high cross-linking density
- High chemical and corrosion resistance
- High T_g development



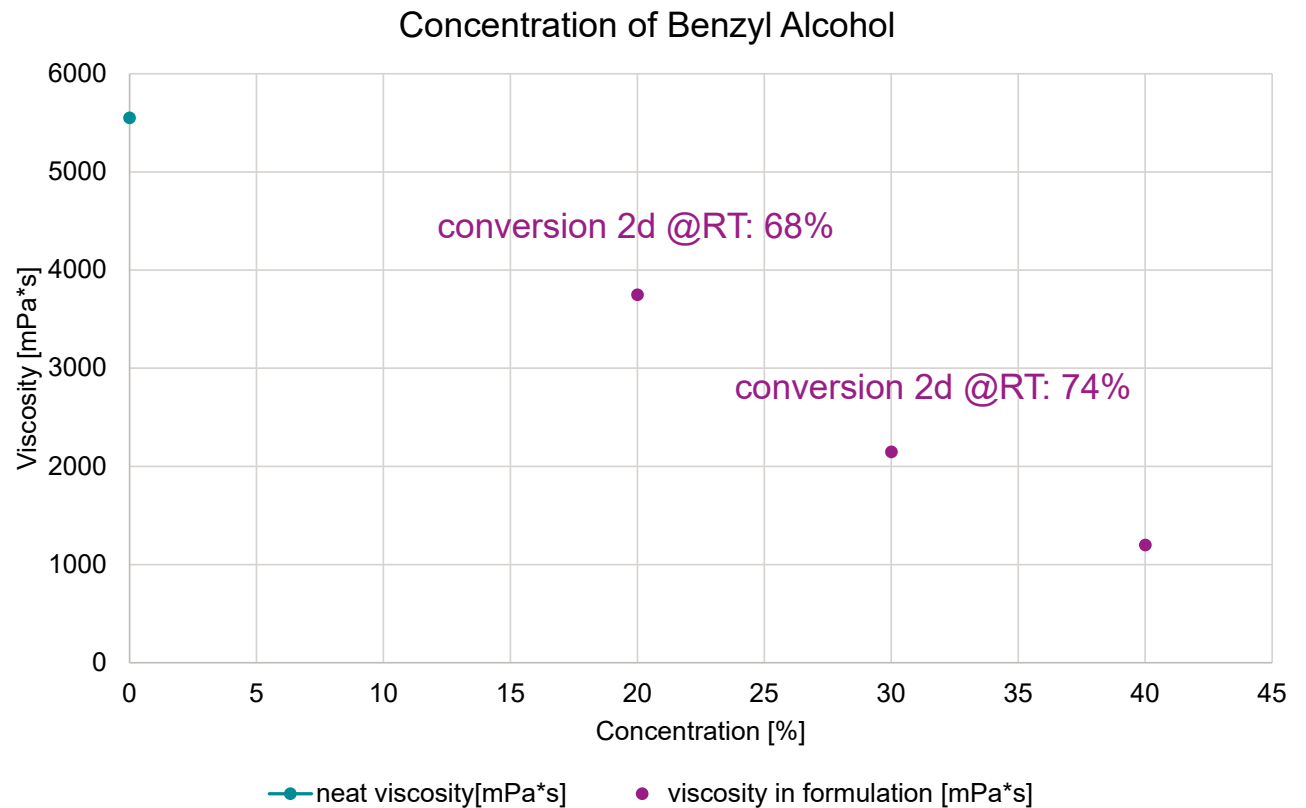
Formulating options for Ancamine® 2836

- Ancamine® 2836 is just a building block, that needs to be further formulated
- Addition of benzyl alcohol to balance viscosity and through-cure
- At low levels of benzyl alcohol risk of too early B-staging



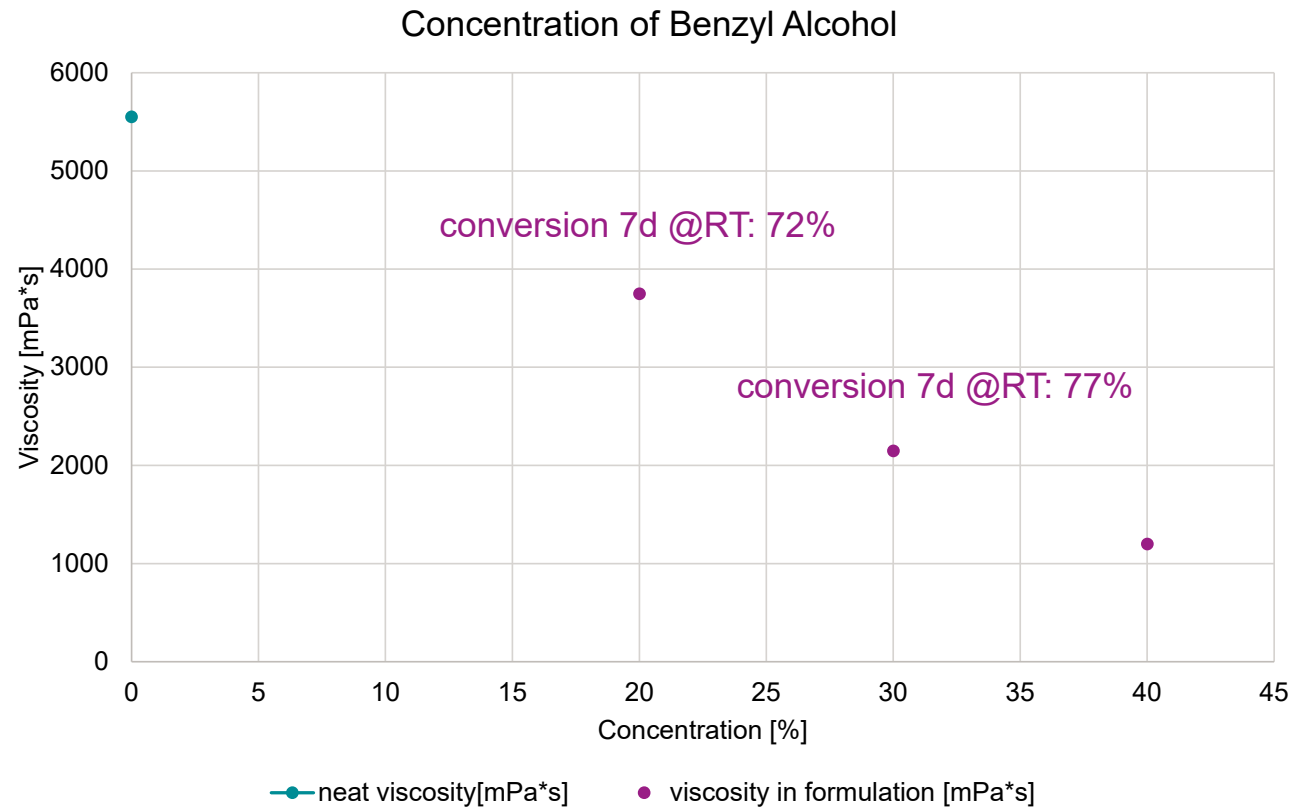
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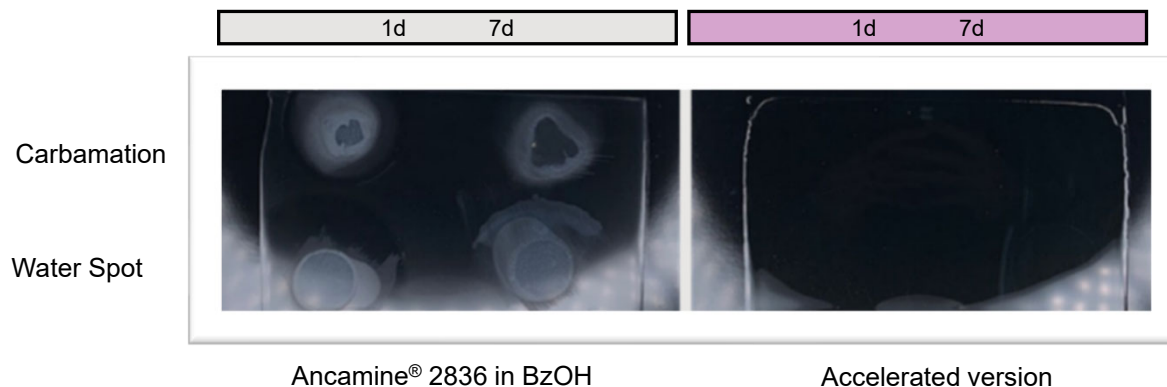
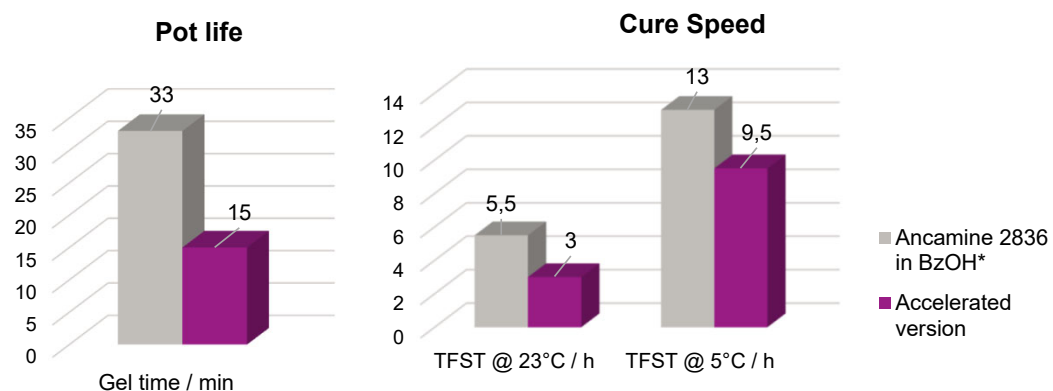
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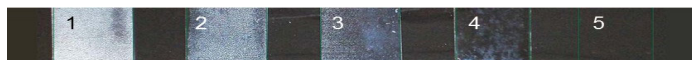


First Prototype – Accelerated version

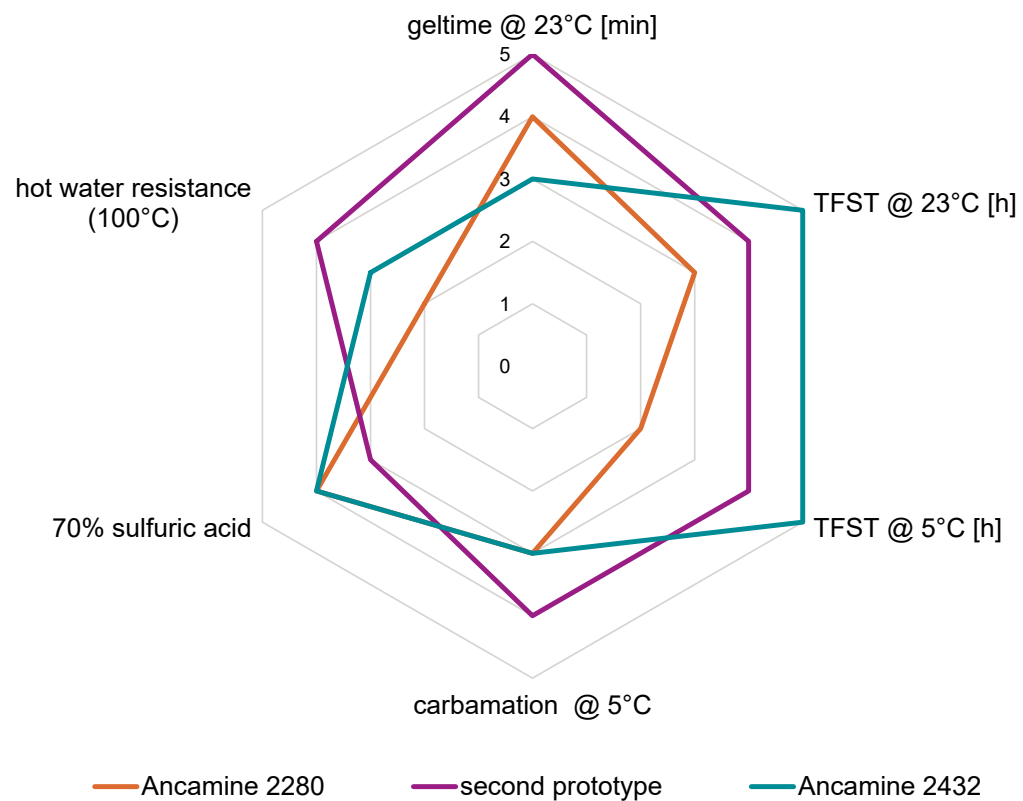
- Formulated version in benzyl alcohol using accelerator
- Improved low temperature cure performance down to 5°C
- Acceptable working life maintained
- Outstanding early water spot and carbamation resistance at 5°C
- Excellent chemical and corrosion resistance maintained



Carbamation resistance following wet patch method (ISO 2812), Scale 1-5 (5=best)



Second Prototype – High chemical resistance and good low temperature cure profile



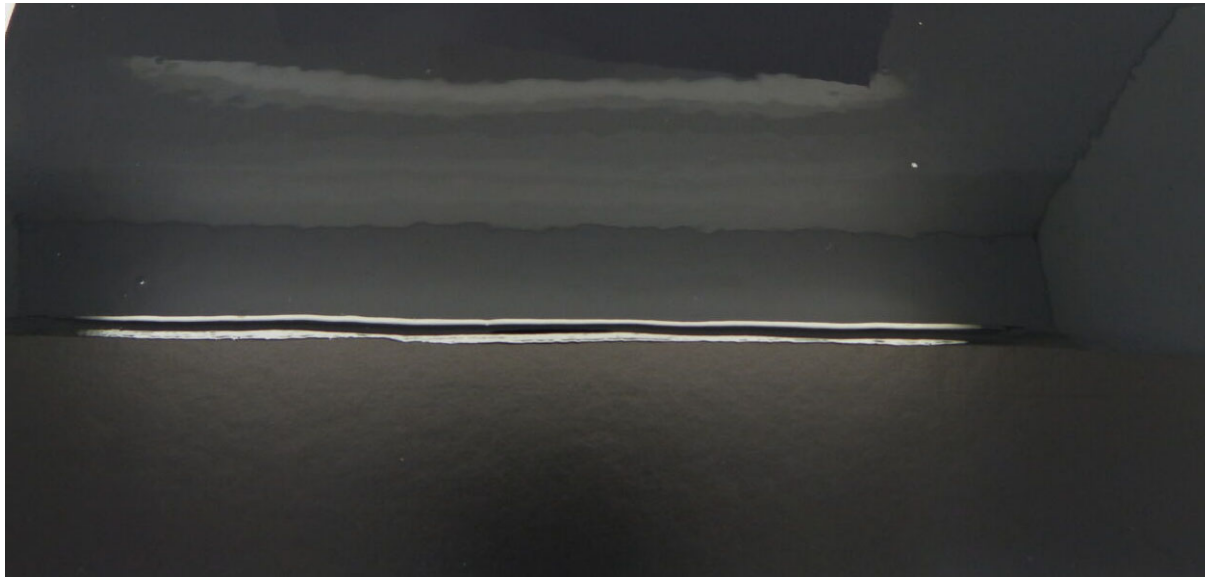
- Maintains overall good chemical resistance of Ancamine® 2280 with improved resistance against mineral acids and boiling water
- Improved low temperature surface appearance and carbamation resistance, especially vs. other Mannich bases

Second Prototype – High chemical resistance and good low temperature cure profile

	Ancamine® 2280	second prototype	with conventional Mannich base	Ancamine® 2432
Gel time @ 23°C [min]	40	60	35	25
TFST @ 23°C 3rd phase [h]	9	5	4,5	2
TFST @ 5°C 3rd phase [h]	21	13	15	9,5
carbamation (waterspot) @ 5°C 1d	2-3	4-5	1-2	2-3
chemical resistances [weight increase in % after 28d of immersion]				
70% sulfuric acid	1.9	2.7	0.6	1.9
50% NaOH	-2.4	-0.2	-0.1	-0.1
xylene	0.2	1.1	0.3	0.3
methanol	destroyed	14,7	10	destroyed
hot water resistance (100°C)	-5,8	1,2	-0,5	-4

- Excellent balance of pot life and cure speed
- Good property development under adverse conditions down to 5°C

Second Prototype – High chemical resistance and good low temperature cure profile



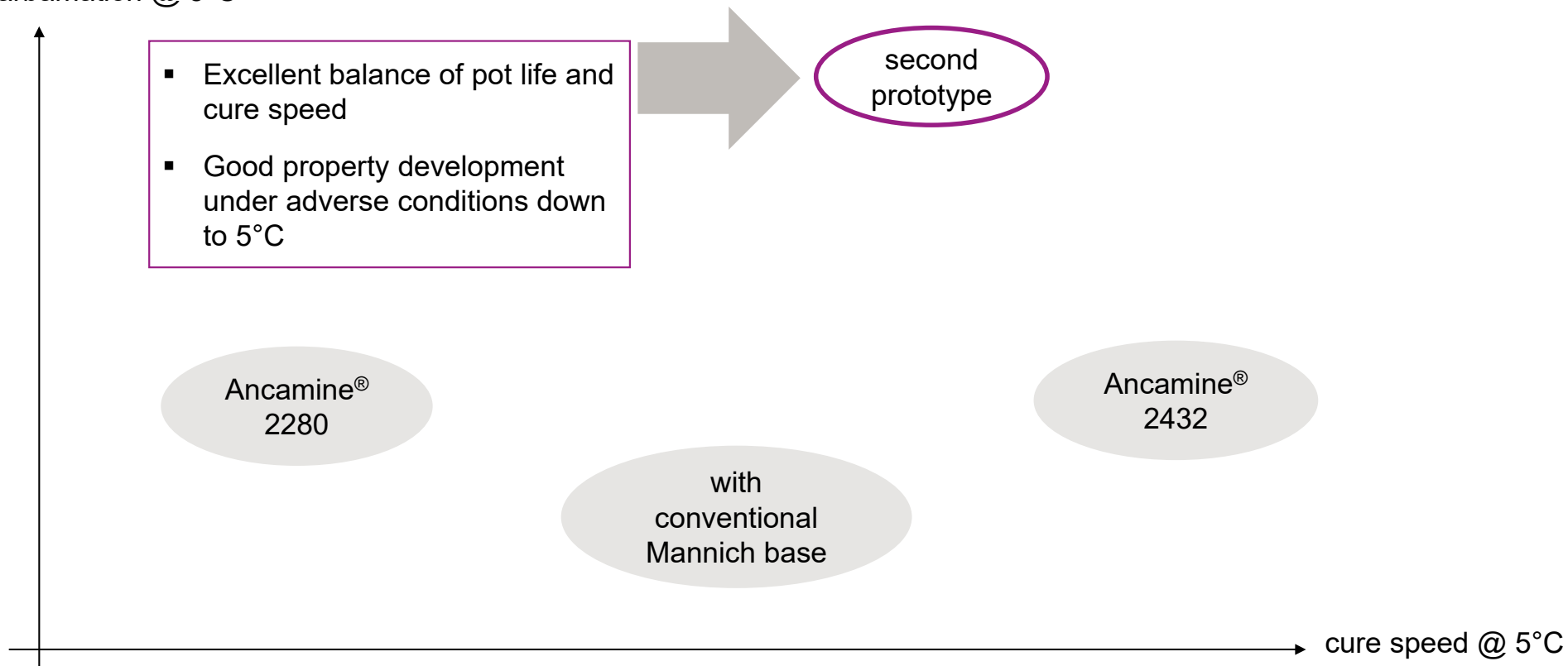
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Carbamation resistance following wet patch method (ISO 2812), Scale 1-5 (5=best)



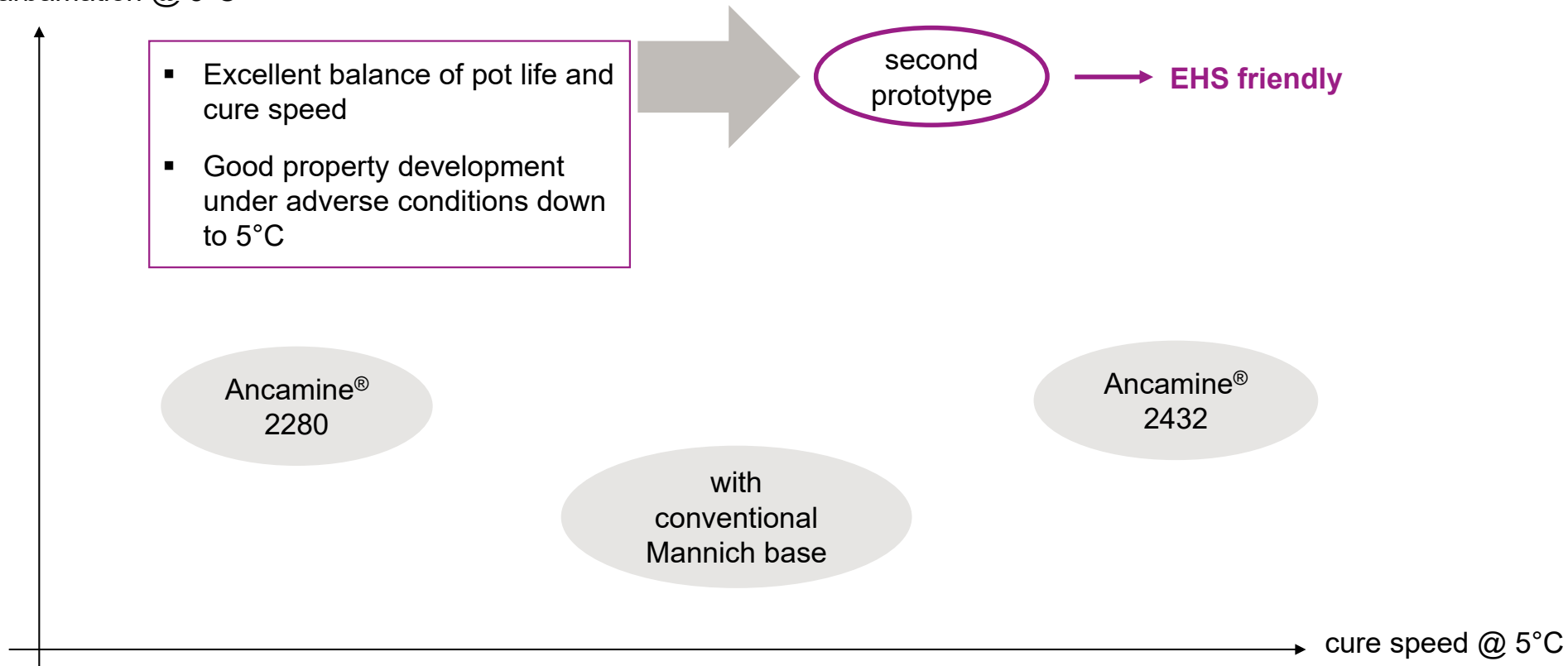
Second Prototype – Enhanced performance at low temperatures

carbamation @ 5°C

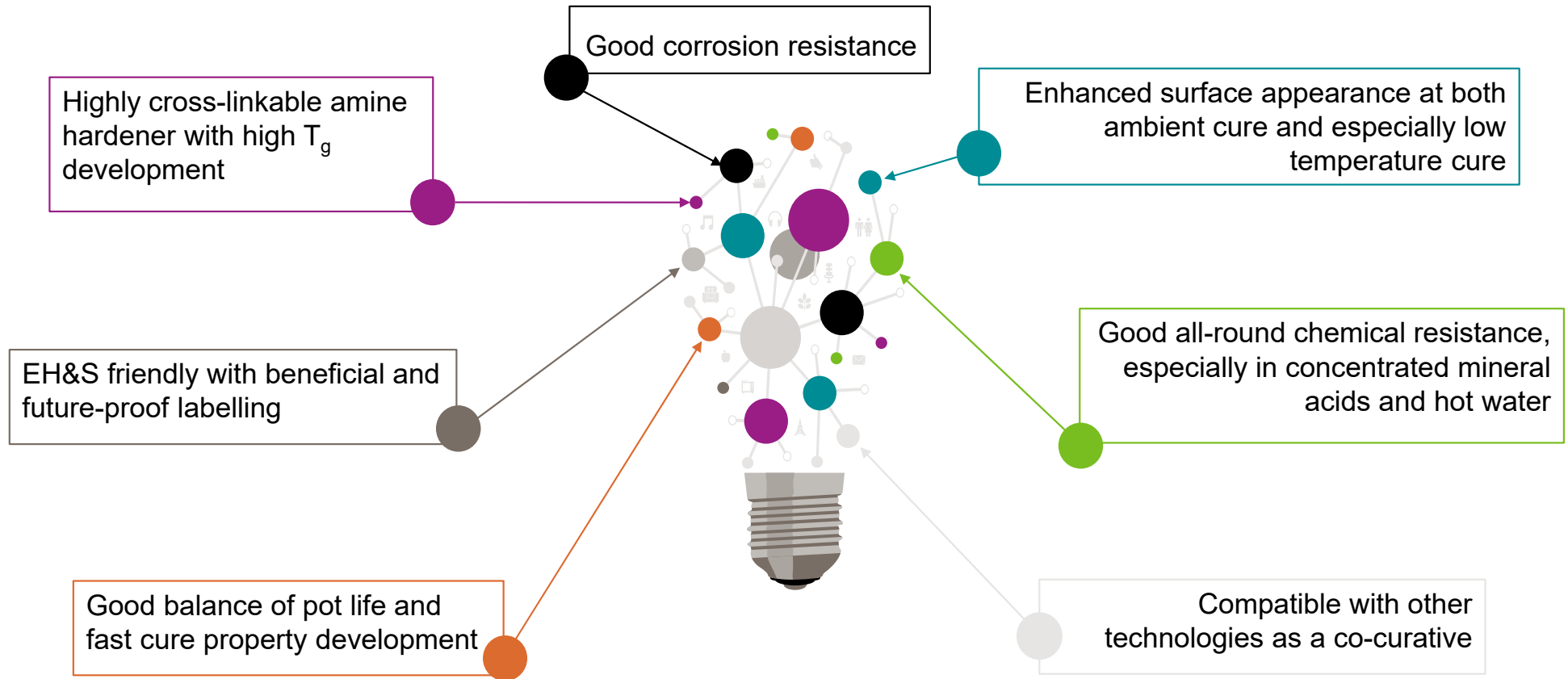


Second Prototype – Enhanced performance at low temperatures

carbamation @ 5°C



Ancamine® 2836 benefits



Contact us

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www.evonik.com/crosslinkers



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**Less
Energy**



**More
Durability**



**More
Protection**

Questions?



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