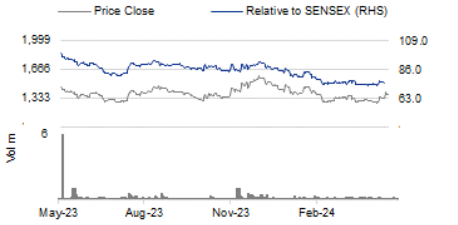
India

REDUCE *(no change)*

Consensus ratings*:	Buy 6	Hold 4	Sell 2

Current price:	Rs1,372
Target price: ▼	Rs665
Previous target:	Rs666
Up/downside:	-51.5%
InCred Research / Consensus:	-50.7%
Reuters:	
Bloomberg:	CLEAN IN
Market cap:	US$1,754m
	Rs145,772m
Average daily turnover:	US$2.8m
	Rs230.0m
Current shares o/s:	106.3m
Free float:	21.5%

Source: Bloomberg



Source: Bloomberg

Price performance	1M	3M	12M
Absolute (%)	4.5	(6.5)	(5.2)
Relative (%)	2.2	(9.4)	(21.4)

Major shareholders	% held
Promoter & Promoter Group	78.5
Axis Mutual Fund Trustee Limited	1.8
Nomura India Investment Fund	1.2

Clean Science and Technology

HALS - much ado about nothing-II

- This is the second report in the series on HALS. Upon receiving feedback from various investors, we have delved deep into the technology of HALS.
- Clean Science makes HALS-770, which was invented in 1970 by Ciba Geigy (now BASF) and can be supplied by more than 400 manufacturers & traders.
- The Indian market is small at ~400-500t. There is a huge pricing gap between Chinese & German exports. As of now, Clean Science competes with China.

Clean Science's Clean Stab 770 is commodity grade HALS

Clean Science and Technology's (Clean Science) Clean Light Stab 770 or Bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate is a commodity grade, low molecular weight hindered amine light stabilizer. Hindered amine light stabilizers or HALS can be of multiple types and leaders like ADEKA make multiple types of HALS. High molecular weight HALS are more desirable than low molecular weight HALS. China is one of the biggest suppliers of Bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate and there are multiple manufacturers of this molecule in the country. One can source this molecule from at least 368 listed suppliers (both traders and manufacturers). Globally, this list has more than 400 suppliers.

HALS are used to protect the polymer surface from UV light

Mostly, HALS are the derivatives of 2,2,6,6-tetramethyl piperidine and are extremely efficient stabilizers against light-induced degradation of most polymers. Please remember that they are applied on the surface of the polymer to protect it from ultraviolet or UV-light induced degradation.

Clean Science is taking baby steps in HALS

While competitors like ADEKA are making multiple HALS for multiple usage, Clean Science is making 770 HALS, which can be supplied by at least 400 different suppliers across the world (suppliers include both manufacturers and traders). Bis(1,2,2,6,6-pentamethyl-4-piperidyl) sebacate was first commercialized in the late 1970s by Swiss chemical company Ciba-Geigy, now a part of BASF. Ciba-Geigy was a pioneer in the development and introduction of HALS in the market during the late 1970s and early 1980s.

Clean Science can be a big HALS player, but it may take a long time

To justify the valuation, Clean Science (trades at 20x sales and 70x P/E) may need to discover a new chemical, as being in the commodity HALS space certainly doesn't fit that bill. We don't argue against the capabilities of the company but just state that it's a long road ahead and, as always, the stock market is well ahead of company fundamentals. Ultimately, P/E is the function of investors' belief in the narrative, earnings growth, cost of capital and the overall enthusiasm level. That's why while we believe this kind of a stock doesn't deserve more than 30x P/E but as is evident, investors disagree. We retain our REDUCE rating on the stock with a target price of Rs665 (Rs666 earlier). Upside risk: A sustained stock market rally.

Financial Summary	Mar-22A	Mar-23A	Mar-24F	Mar-25F	Mar-26F
Revenue (Rsm)	6,849	9,358	7,915	8,602	8,853
Operating EBITDA (Rsm)	2,999	4,021	3,321	3,518	3,428
Net Profit (Rsm)	2,285	2,952	2,440	2,686	2,619
Core EPS (Rs)	21.5	27.8	23.0	25.3	24.6
Core EPS Growth	15.2%	29.2%	(17.3%)	10.1%	(2.5%)
FD Core P/E (x)	63.83	49.41	59.76	54.29	55.69
DPS (Rs)	0.0	0.0	0.0	0.0	0.0
Dividend Yield	0.00%	0.00%	0.00%	0.00%	0.00%
EV/EBITDA (x)	47.75	35.42	40.98	37.99	38.28
P/FCFE (x)	299.50	12.60	62.55	63.26	62.68
Net Gearing	(34.5%)	(33.7%)	(84.8%)	(87.7%)	(90.3%)
P/BV (x)	18.98	14.44	12.65	10.49	9.00
ROE	34.9%	33.2%	22.6%	21.1%	17.4%
% Change In Core EPS Estimates			(0.22%)	(0.25%)	
InCred Research/Consensus EPS (x)					

SOURCE: INCRED RESEARCH, COMPANY REPORTS

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HALS - much ado about nothing-II

What are hindered amine light stabilizers or HALS? ➤

One main category of light stabilizers consists of what are known as hindered amine light stabilizers (abbreviated as HALS). They are derivatives of 2,2,6,6-tetramethyl piperidine and are extremely efficient stabilizers against light-induced degradation of most polymers.

HALS, which are efficient scavengers and function by inhibiting degradation of polymers that have already formed free radicals, do not absorb UV radiation but act to inhibit degradation of the polymer .They slow down the photochemically initiated degradation reactions to some extent, in a similar way like antioxidants. The difference in mechanism between antioxidants and HALS is that HALS' reaction is cyclic while that of antioxidants is not.

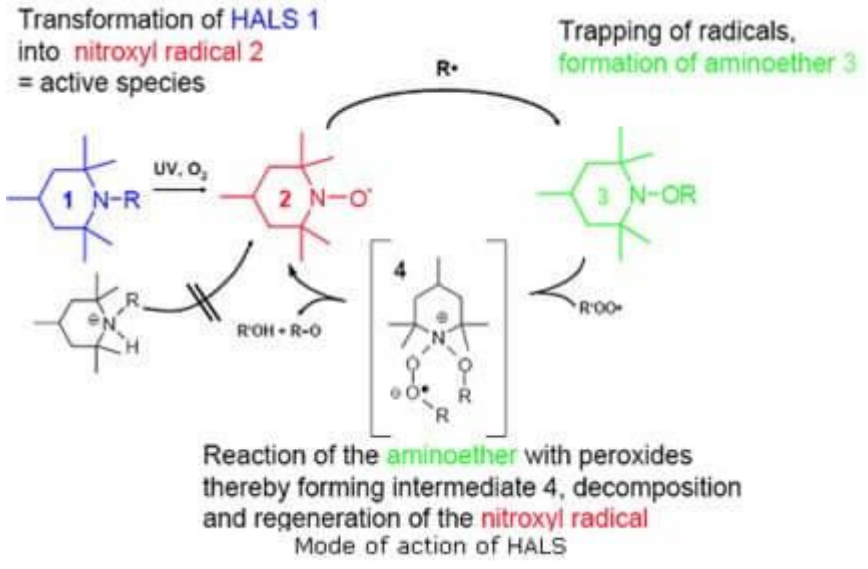
Commercially, HALS are now the single most important light stabilizers, followed by benzophenones and benzotriazoles.

How hindered amine light stabilizers work? ➤

Hindered amine light stabilizers (HALS) do not absorb radiation; instead they protect the coating resin from the harmful effects of photochemically-produced 'free radicals' by neutralizing them, hindering chemical degradation. HALS regenerate themselves during the neutralization process.

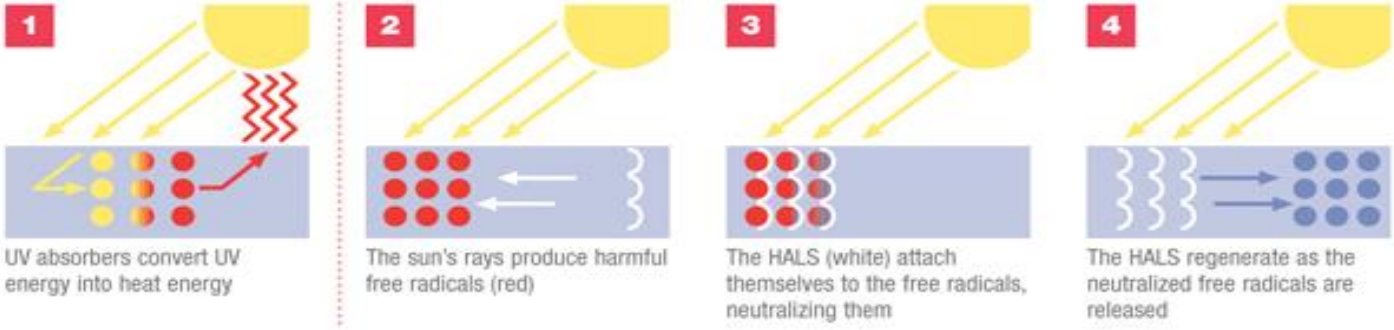
The effectiveness of HALS system does not depend on the thickness of the plastics product and they are therefore particularly useful for protection of surface layers and in thin sections. Agents are of low or high molecular weight. Polymeric HALS offer superior compatibility, low volatility, excellent resistance to extraction, and contribute to heat stability. The combination of two high molecular weight grades gives a good balance of properties in a greenhouse film, which is the main use of HALS in a LDPE film.

Figure 1: The chemical reaction by which HALS protects the polymer surface is given below



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 2: The chart below explains in simple terms how HALS attach themselves with the free radicals of UV light and neutralize them and In the process, regenerate



SOURCE: INCRED RESEARCH, HTTPS://WWW.INTERLUX.COM/EN/US/SUPPORT/BOAT-PAINTING-TIPS/UV-PROTECTION#:~:TEXT=HINDERED%20AMINE%20LIGHT%20STABILIZERS%20(HALS,NEUTRALIZING%20THEM%2C%20HINDERING%20CHEMICAL%20DEGRADATION.

There are three broad categories of HALS ➤

- Monomeric HALS:
  - They have a small size and molecular weight (around 500 units).
  - They have a diverse range of applications due to their small size in thin films, etc.
- Oligomeric HALS:
  - They contain 2-7 units of repeating monomeric units.
  - They are more stable than monomeric HALS but less stable than polymeric HALS.
- Polymeric HALS:
  - Homopolymeric HALS: Polymeric HALS are more stable than monomeric HALS as shown in the chart below.
  - Copolymeric HALS: They are more stable thermally than homopolymeric HALS.

Figure 3: The temperature characteristics of monomeric HALS and polymeric HALS are given below; oligomeric HALS, which fall somewhere in between, have worse properties than polymeric HALS

Table 1. Characterization of piperidinyl methacrylate and related polymer

	Monomer MTMP			Homopolymer (MTMP)			Copolymer (III-St)		
							III		St
H-NMR (ppm)	5·6, 6·06 1·98 1·1–1·26 5·3			— — 1–1·26 5·2			— — 1·0–1·2		— — 6·7–7·15
Ir (cm^{-1})	1640 1710 3400			— 1710 3400			— 1710 3400		— 3040
Elemental analysis (%)	C 66·38	H 10·01	N 5·93	C 67·11	H 10·32	N 6·03	C 83·06	H 8·70	N 2·47
MW	225			9000			3000		
mT (°C)	58·5–60			190–195			122–124		

mT, Melting temperature.

SOURCE: COMPANY REPORTS, INCRED RESEARCH

Within the three broad categories, there are multiple varieties of HALS and leaders like ADEKA sell multiple varieties for multiple usage ➤

ADEKA offers a big range of HALS products, including conventional low molecular weight types (LA-72, LA-77Y), unique medium molecular weight types (LA-52MP, LA-57), high molecular weight types (LA-63P, LA-68), non-basic NO-alkyl HALS (LA-81), and a co-polymerizable product (LA-82). Adeka also provides innovative, fully formulated light stabilization systems based on proprietary technology from ADEKA (LA-402AF, LA-502XP).

LA-52MP

Medium molecular weight HALS masterbatch for use in the stabilization of automotive PP and TPO compounds.

LA-57

Medium molecular weight HALS for use in the light stabilization of polyolefins, styrenic polymers, and other plastics.

LA-63P

High molecular weight HALS for the light stabilization of polyolefin films and fibres, styrenic polymers, engineering plastics, and sealants.

LA-68

High molecular weight HALS for the light stabilization of polyolefin films and fibres, styrenic polymers, engineering plastics, and sealants.

LA-72

General purpose liquid HALS for use in the light stabilization of plastics and coatings.

LA-77Y

General purpose HALS for the light stabilization of styrenic polymers, polyolefins, and other plastics.

LA-81

Liquid, non-basic NO-alkyl type HALS for use in the light stabilization of plastics, coatings, and sealants.

LA-82

Unique co-polymerizable HALS for use in the light stabilization of thermoplastic and thermoset systems.

LA-402AF

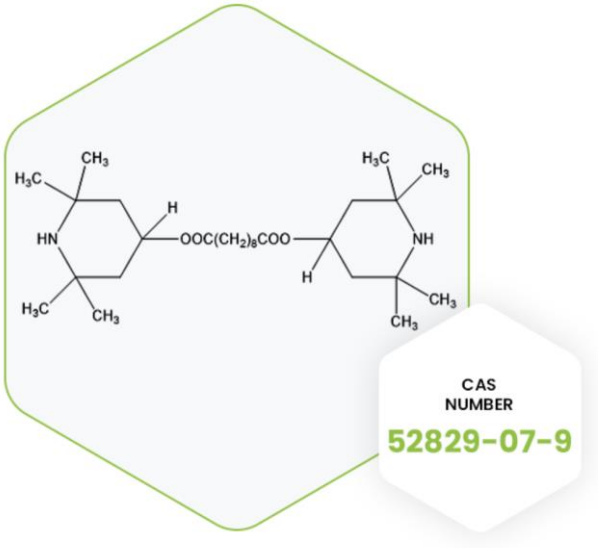
Fully formulated light stabilization system for automotive PP and TPO compounds based on proprietary technology from ADEKA.

LA-502XP

Fully formulated light stabilization system for mineral-filled automotive PP and TPO compounds based on proprietary technology from ADEKA.

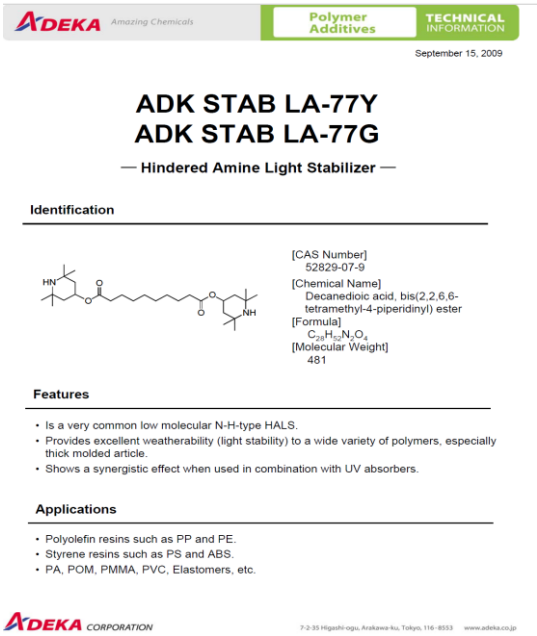
Clean Science makes Clean Slab 770, which is a commodity grade, conventional, low molecular weight HALS, exactly like ADEKA's ADK STAB LA-77Y »

Figure 4: Clean Science makes only one HALS - Clean Stab 770, which is a commodity grade, low molecular weight HALS



SOURCES: INCRED RESEARCH, HTTPS://CLEANSCIENCE.CO.IN/PRODUCTS/PERFORMANCE-CHEMICALS/CLEAN-LIGHT-STAB-770/

Figure 5: ADEKA is marketing this commodity grade HALS since 2009


ADEKA Amazing Chemicals — Polymer Additives — TECHNICAL INFORMATION

September 15, 2009

ADK STAB LA-77Y
ADK STAB LA-77G

— Hindered Amine Light Stabilizer —

Identification

[CAS Number] 52829-07-9
[Chemical Name] Decanedioic acid, bis(2,2,6,6-tetramethyl-4-piperidinyl) ester
[Formula] $C_{28}H_{52}N_2O_4$
[Molecular Weight] 481

Features

- Is a very common low molecular N-H-type HALS.
- Provides excellent weatherability (light stability) to a wide variety of polymers, especially thick molded article.
- Shows a synergistic effect when used in combination with UV absorbers.

Applications

- Polyolefin resins such as PP and PE.
- Styrene resins such as PS and ABS.
- PA, POM, PMMA, PVC, Elastomers, etc.

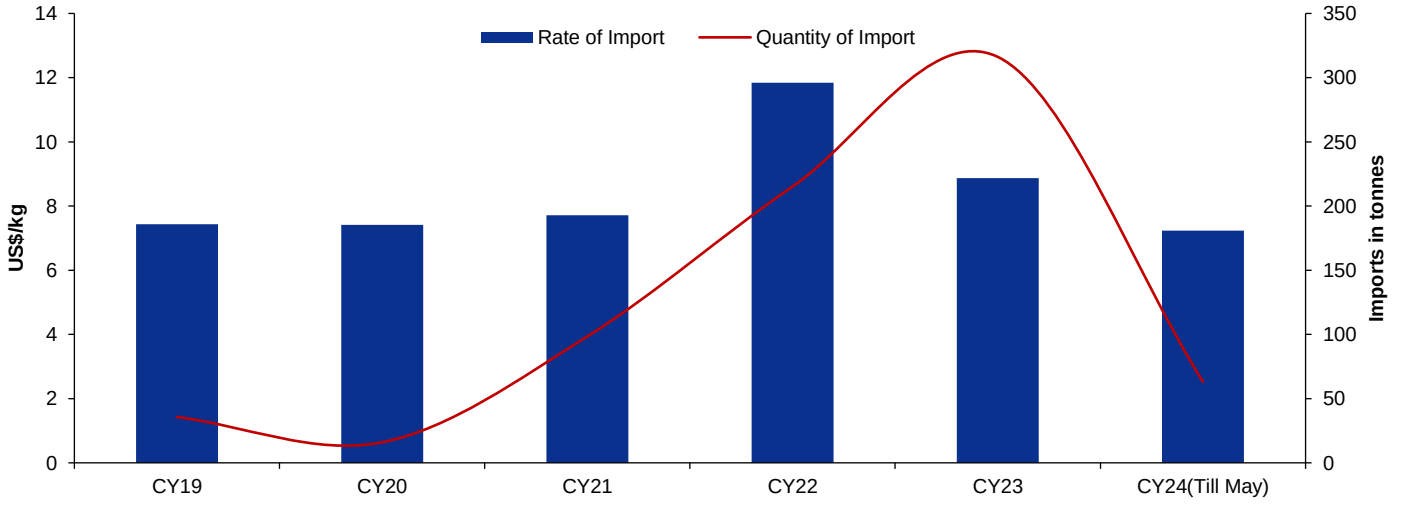
ADEKA CORPORATION

SOURCE: INCRED RESEARCH, HTTPS://CDN.OV2.COM/CONTENT/WWWARONCHEMCOM_OV2_COM/WP-CONTENT_52/UPLOADS/2023/05/LA-77Y-LA-77G_TDSE_ADEKA_090915.PDF

India mainly imports HALS and it's a very small market »

Over the years, India has been importing HALS from the global market, primarily from China and western countries.

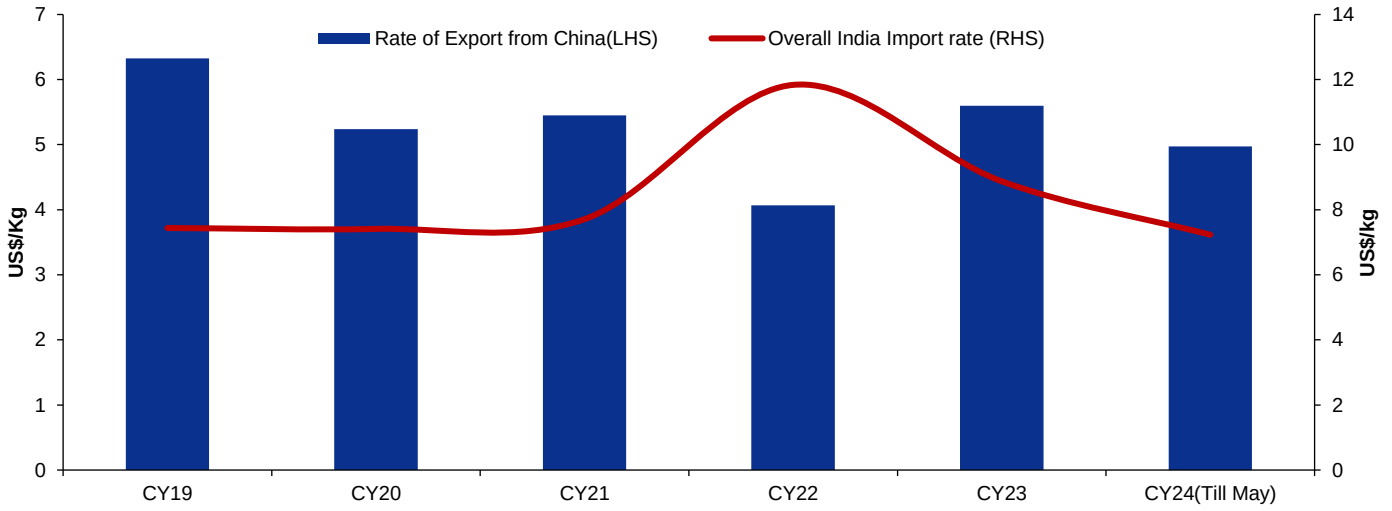
Figure 6: Import prices in India have been coming down. CY22/23 has been an aberration as Chinese production shutdown impacted the overall trade



SOURCE: INCRED RESEARCH, COMPANY REPORTS

As usual, India's import prices depend on China's export prices ➤

Figure 7: Barring CY22, when there was lockdown in China, India's import prices are totally dependent on overall Chinese export prices



SOURCE: INCRED RESEARCH, COMPANY REPORTS

There are multiple alternatives to HALS ➤

Hindered benzoates:

- They are light stabilizers with a slightly different mechanism when compared to HALS. They primarily absorb UV radiation themselves, preventing it from reaching the polymer and initiating free radical formation. HALS scavenges free radicals generated during UV exposure. These free radicals can break down polymer chains, leading to material weakening and loss of properties.
- Often used in combination with other light stabilizers such as HALS. They are more effective than using individually.
- They are less effective than HALS as they degrade over time with high UV-exposure.
- They are less prone to discoloration when compared to HALS.
- They cost less compared to HALS due to low raw material costs.
- The raw materials used in hindered benzoates are benzoic acid, dihydric phenol, butyl chloride and catalysts. They are priced at US$3,000/t compared to US$5,000/t of HALS.

Oxime-based AOs:

- Limited to polymers containing halogens.
- They are antioxidants with a simpler mechanism compared to light stabilizers.
- Lower environmental impact than HALS.
- They are less effective towards most polymers as compared to HALS.
- Due to their limitations, they are less expensive as compared to HALS.
- They have a wide range of applications in a wide range of materials (heat, UV, oxidation, etc.)
- The raw materials used in its manufacture are aldoxime, resorcinol, potassium phosphate, catalysts, and additives.
- They are priced at US$2,000/t, on an average, and individual prices depend on the type of oxime.

Nickel-based light stabilizers:

- While HALS are better for long-term UV resistance, nickel-based light stabilizers are cost-effective.
- It is a newer area of study (compared to HALS) and there are high opportunities to improve and make them as efficient as HALS.
- They could be potentially more environmental-friendly than HALS.
- They are a relatively new area of research, and the market size is not available yet.
- The raw materials used in their manufacture are nickel oxalate, various organic ligands, additives, and catalysts.
- As far as we could ascertain, they don't have a market in India yet.
- Their price is US$2,500/t as compared to US$5,000/t in the case of HALS.

UV absorbers

- They have a different mechanism as they are UV absorbers and not stabilizers. They act as shields, directly absorbing UV radiation before it interacts with the polymer.
- They are generally less expensive than light stabilizers and there are a variety of products based on the wavelength of UV radiation needed.
- They degrade faster than light stabilizers, not as effective as HALS and are more harmful to the environment.
- There are a few of these available in India and they are generally less expensive than HALS. Light stabilizers and absorbers as a category is new in India, but both have the potential.
- The raw materials used in their manufacture depend on the chemical class of the UV absorber. For example:
    - Benzotriazoles require diamino benzene, formic acid, butyl chloride and catalysts.
    - Triazines require melamine, anhydrides, and a catalyst. These are the best UV absorbers available in the market.
- They are priced around US$650/t, depending on the type of UV absorbers. Triazines were priced at US$1,300/t in Dec 2023.

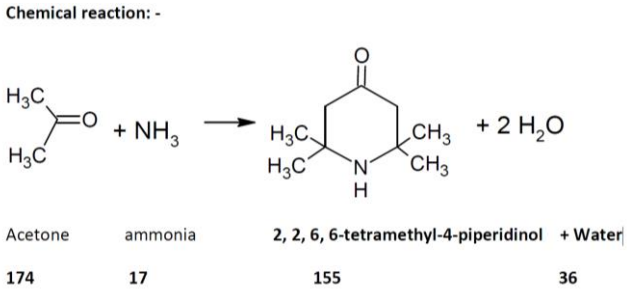
There are alternatives like UV absorbers and polymer additives available and choosing them, depending on the need and application, will make more sense. India mostly imports HALS through Prakash Chemicals, and the share of the above three in India is negligible. There are a few oximes that are present in India, but they could be used for medicinal purposes as well.

HALS work well with other stabilizers like hindered phenolics or antioxidants, and they are the most effective light stabilizers in the market.

The process to make Clean Slab 770 of ADEKA ADK Stab LA-77Y HALS is as follows: ➤

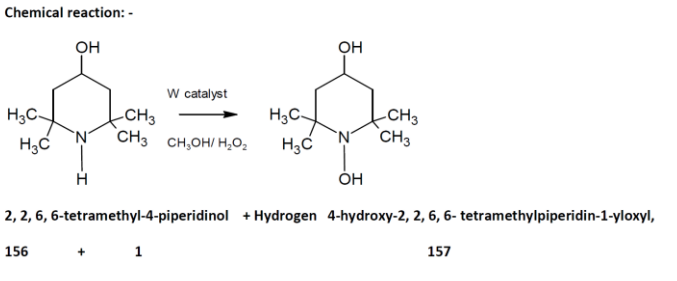
Acetone and ammonia react to make 2, 2, 6, 6-tetramethyl-4-piperidinol. 2, 2, 6, 6-tetramethyl-4-piperidinol react with hydrogen to manufacture 4-hydroxy-2, 2, 6, 6- tetramethylpiperidin-1-yloxyl, (TEMPO-OH) or HALS.

Figure 8: Acetone and ammonia react to make 2, 2, 6, 6-tetramethyl-4-piperidinol



SOURCE: INCRED RESEARCH, COMPANY REPORTS

Figure 9: 2, 2, 6, 6-tetramethyl-4-piperidinol and hydrogen react to make 4-hydroxy-2, 2, 6, 6- tetramethylpiperidin-1-yloxyl, (TEMPO-OH)



SOURCE: INCRED RESEARCH, COMPANY REPORTS

The raw material balance for HALS is shown in the table below:

Figure 10: 1kg of TA OH needs the inputs given below

Raw Materials			
Sr. No	Input	Purity (%)	Qty (kg)
1	Acetone	100	3.8
2	Ammonia gas	100	0.15
3	hydrogen gas	100	0.02
4	Zeolite Catalyst - 1	100	0.02
5	Pt/C Catalyst - 2	100	0.02
Total			**4.01**

SOURCE: INCRED RESEARCH, ENVIRONMENTAL CLEARENCE DOCUMENT FILED BY CLEAN SCIENCE

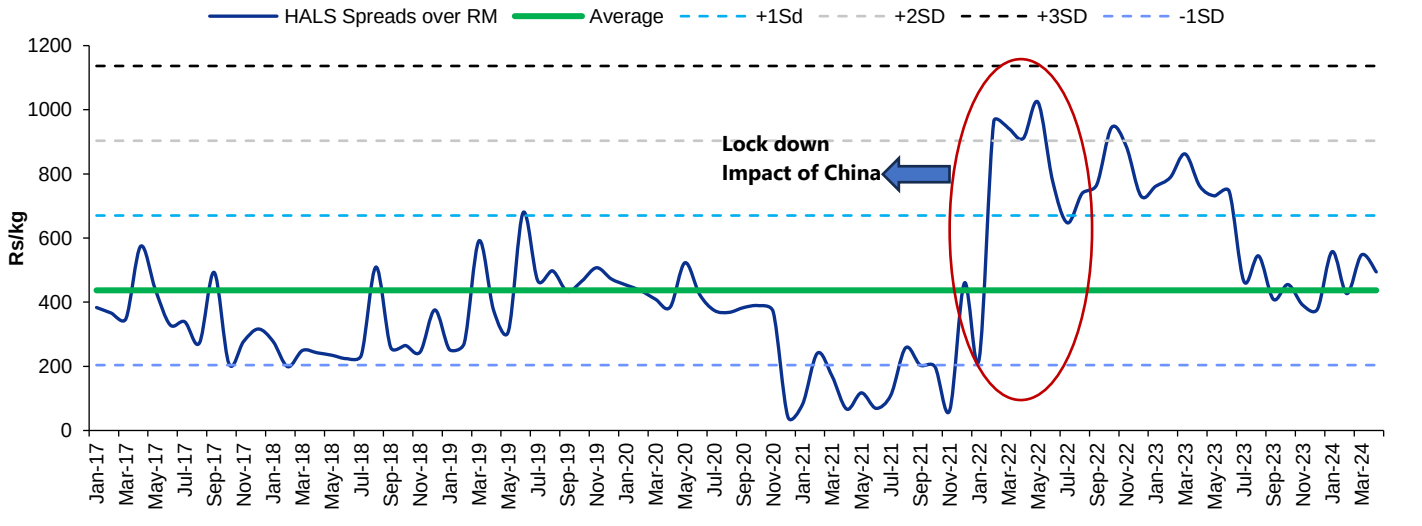
Figure 11: 1kg of HALS or TEMPO-OH needs the inputs given below

Raw Materials			
Sr. No	Input	Purity (%)	Qty (kg)
1	TA-OH	100	0.94
2	Hydrogen peroxide in water (60%)	60	0.51
3	Catalyst	100	0.01
4	Methylene chloride	100	1
5	Methanol	100	1
Total			**3.46**

SOURCE: INCRED RESEARCH, ENVIRONMENTAL CLEARENCE DOCUMENT FILED BY CLEAN SCIENCE

HALS' spreads over raw material show a typical commodity behaviour ➤

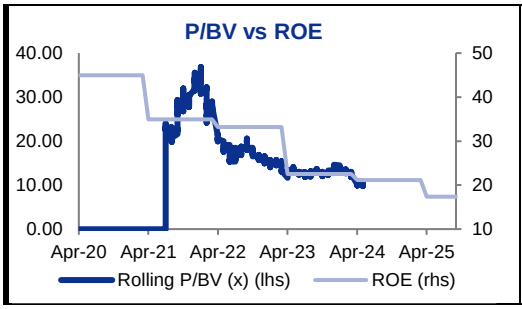
Figure 12: HALS' spreads over raw material are around the historical average and oversupply of this commodity means they will remain under pressure; please remember, the average is also distorted by China's lockdown-driven supply chain uncertainty

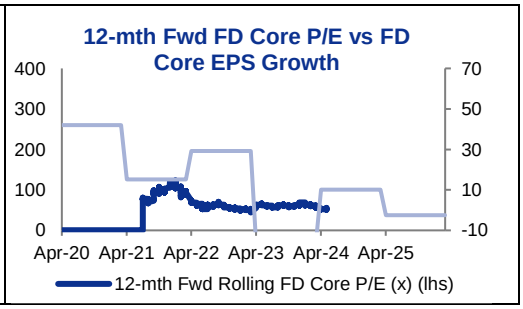


SOURCE: INCRED RESEARCH, COMPANY REPORTS

We acknowledge the contribution of Shakthi Sharvani Karanam (Intern) in the writing of this note.

BY THE NUMBERS





Profit & Loss

(Rs mn)	Mar-22A	Mar-23A	Mar-24F	Mar-25F	Mar-26F
Total Net Revenues	**6,849**	**9,358**	**7,915**	**8,602**	**8,853**
Gross Profit	**4,602**	**6,098**	**5,144**	**5,590**	**5,754**
Operating EBITDA	**2,999**	**4,021**	**3,321**	**3,518**	**3,428**
Depreciation And Amortisation	(249)	(361)	(459)	(459)	(459)
Operating EBIT	**2,750**	**3,660**	**2,861**	**3,059**	**2,969**
Financial Income/(Expense)	(1)	(2)	(9)	(1)	(1)
Pretax Income/(Loss) from Assoc.					
Non-Operating Income/(Expense)	300	298	413	533	533
Profit Before Tax (pre-EI)	**3,048**	**3,956**	**3,265**	**3,591**	**3,501**
Exceptional Items					
Pre-tax Profit	**3,048**	**3,956**	**3,265**	**3,591**	**3,501**
Taxation	(763)	(1,005)	(825)	(905)	(882)
Exceptional Income - post-tax					
Profit After Tax	**2,285**	**2,952**	**2,440**	**2,686**	**2,619**
Minority Interests					
Preferred Dividends					
FX Gain/(Loss) - post tax					
Other Adjustments - post-tax					
Net Profit	**2,285**	**2,952**	**2,440**	**2,686**	**2,619**
Recurring Net Profit	2,285	2,952	2,440	2,686	2,619
Fully Diluted Recurring Net Profit	**2,285**	**2,952**	**2,440**	**2,686**	**2,619**

Cash Flow

(Rs mn)	Mar-22A	Mar-23A	Mar-24F	Mar-25F	Mar-26F
EBITDA	2,999	4,021	3,321	3,518	3,428
Cash Flow from Invt. & Assoc.					
Change In Working Capital	(1,210)	(51)	132	(140)	(51)
(Incr)/Decr in Total Provisions					
Other Non-Cash (Income)/Expense	(125)				
Other Operating Cashflow	301	298	413	533	533
Net Interest (Paid)/Received	(1)	(2)	(9)	(1)	(1)
Tax Paid	(691)	(1,005)	(825)	(905)	(882)
Cashflow From Operations	**1,272**	**3,262**	**3,032**	**3,006**	**3,027**
Capex	(1,397)	4,155	(350)	(350)	(350)
Disposals Of FAs/subsidiaries	1				
Acq. Of Subsidiaries/investments					
Other Investing Cashflow	611	4,155	(350)	(350)	(350)
Cash Flow From Investing	**(786)**	**8,310**	**(700)**	**(700)**	**(700)**
Debt Raised/(repaid)					
Proceeds From Issue Of Shares					
Shares Repurchased					
Dividends Paid		(738)	(610)		
Preferred Dividends					
Other Financing Cashflow	(1)				
Cash Flow From Financing	**(1)**	**(738)**	**(610)**		
Total Cash Generated	485	10,834	1,722	2,306	2,327
Free Cashflow To Equity	**487**	**11,572**	**2,332**	**2,306**	**2,327**
Free Cashflow To Firm	**488**	**11,574**	**2,341**	**2,306**	**2,328**

SOURCE: INCRED RESEARCH, COMPANY REPORTS

BY THE NUMBERS…cont'd

Balance Sheet

(Rs mn)	Mar-22A	Mar-23A	Mar-24F	Mar-25F	Mar-26F
Total Cash And Equivalents	2,658	3,401	9,774	12,190	14,628
Total Debtors	1,535	1,462	1,774	1,928	1,985
Inventories	881	1,088	1,018	1,107	1,139
Total Other Current Assets	628	352	352	352	352
Total Current Assets	**5,703**	**6,303**	**12,919**	**15,578**	**18,104**
Fixed Assets	3,399	577	142	(41)	(224)
Total Investments		255			
Intangible Assets					
Total Other Non-Current Assets	145	160	160	160	160
Total Non-current Assets	**3,544**	**992**	**302**	**119**	**(64)**
Short-term Debt	1	1	1	1	1
Current Portion of Long-Term Debt					
Total Creditors	1,021	805	1,180	1,282	1,320
Other Current Liabilities	327	349	349	349	349
Total Current Liabilities	**1,349**	**1,155**	**1,531**	**1,633**	**1,671**
Total Long-term Debt	3		3	3	3
Hybrid Debt - Debt Component					
Total Other Non-Current Liabilities		23			
Total Non-current Liabilities	**3**	**23**	**3**	**3**	**3**
Total Provisions	211	240	163	163	163
Total Liabilities	**1,562**	**1,418**	**1,697**	**1,799**	**1,837**
Shareholders Equity	7,684	10,100	11,524	13,898	16,203
Minority Interests					
Total Equity	**7,684**	**10,100**	**11,524**	**13,898**	**16,203**

Key Ratios

	Mar-22A	Mar-23A	Mar-24F	Mar-25F	Mar-26F
Revenue Growth	33.7%	36.6%	(15.4%)	8.7%	2.9%
Operating EBITDA Growth	15.8%	34.1%	(17.4%)	6.0%	(2.6%)
Operating EBITDA Margin	43.8%	43.0%	42.0%	40.9%	38.7%
Net Cash Per Share (Rs)	24.97	31.99	91.90	114.64	137.57
BVPS (Rs)	72.29	95.01	108.41	130.74	152.43
Gross Interest Cover	1,870.54	1,876.95	309.01	3,437.29	3,335.79
Effective Tax Rate	25.0%	25.4%	25.3%	25.2%	25.2%
Net Dividend Payout Ratio					
Accounts Receivables Days	60.69	58.46	74.62	78.56	80.67
Inventory Days	114.56	110.26	138.75	128.81	132.26
Accounts Payables Days	132.49	102.25	130.76	149.24	153.25
ROIC (%)	66.5%	52.1%	86.1%	119.3%	118.5%
ROCE (%)	40.8%	40.2%	26.0%	23.8%	19.5%
Return On Average Assets	28.9%	35.7%	23.9%	18.6%	15.5%

SOURCE: INCRED RESEARCH, COMPANY REPORTS

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