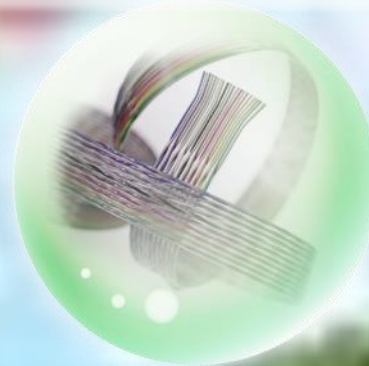




Introduction of ADEKA Corporation and our business partners



OUTLINE

1. Profile of ADEKA Corporation
2. Polymer Additives Division
3. ADEKA's Global Network

1. Profile of ADEKA Corporation

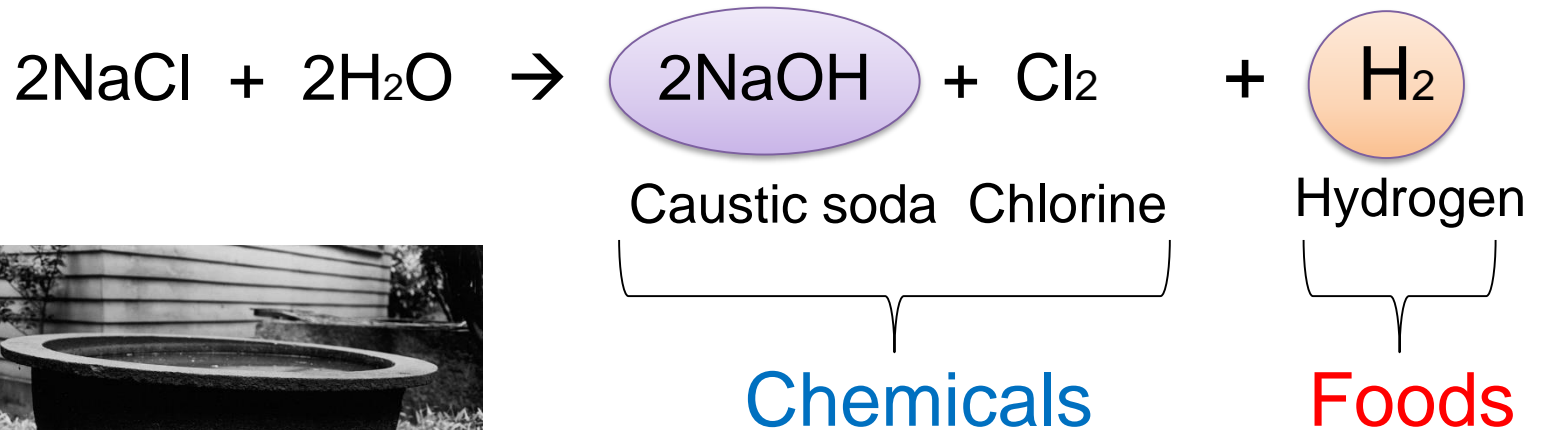


Establishment : **1917** (as Asahi Denka Kogyo)
Business field : **Chemicals & Foods**
Capital : **US\$230 Million (¥22.9 Billion)**
Subsidiary & Group companies : **38 (Domestic 16, Overseas 22)**
Employees : **3,400 (Group total)**
Turnover (FY2015 Apr.-Mar.) : **US\$2.1 Billion**



Corporate History

1917 Asahi Denka Kogyo was established to produce caustic soda as domestic product



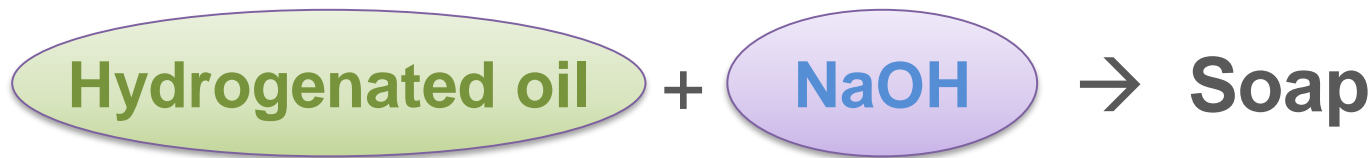
The first reaction pot

Corporate History

1919 Started production of hydrogenated oil



1920 Started production of soap



1929 Started production of margarine



Risu bland artificial butter



Corporate History

1954 Started production of PVC plasticizer

Plasticizer ADK CIZER

1962 Adeka Argus Chemicals was established to produce PVC stabilizers and Additives

Stabilizer

Additives

ADK STAB

1990 Adeka Argus was merged with Asahi Denka Kogyo

2006 Changed the company name to ADEKA

2016 Exhibited to **IRAN OIL Show** with ISC Group



2017

100th
Anniversary 〈Since 1917〉



Core Business : Polymer Additives, Foods



Functional Chemicals
Polymer Additives
Lubricants etc.



**IT and Electronic
chemicals**
Semiconductor
Circuit materials etc.

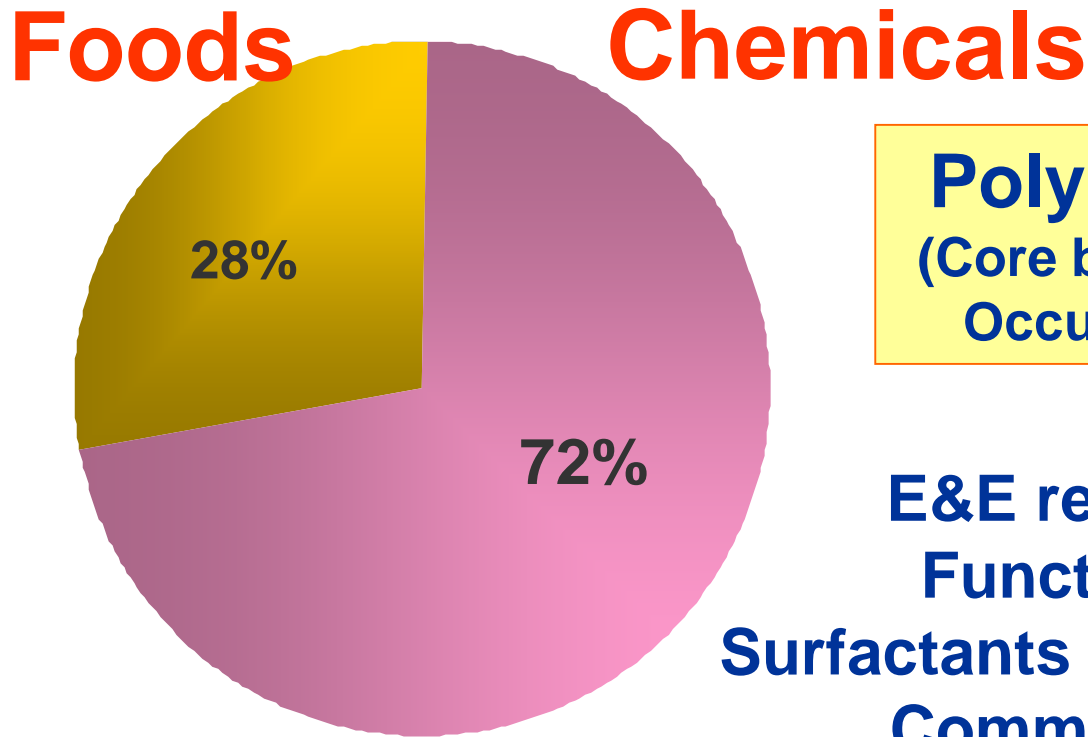


Commodity Chemicals
Polyalcohol etc.



Foods
Bread and oil ingredients etc.

Net Sales: US\$2,105 Million (Apr.'15 ~ Mar.'16)



Polymer Additives
(Core business of ADEKA)
Occupies approx. 30%

and
E&E related Chemicals
Functional Polymers
Surfactants & Lubricant Additives
Commodity Chemicals

2. Polymer Additives Division

1 HYNDERED PHENOLS

2 PHOSPHITES

3 THIOETHERS

4 METAL DEACTIVATORS

5 NUCLEATING AGENTS

6 CLARIFIERS

7 UV ABSORBERS

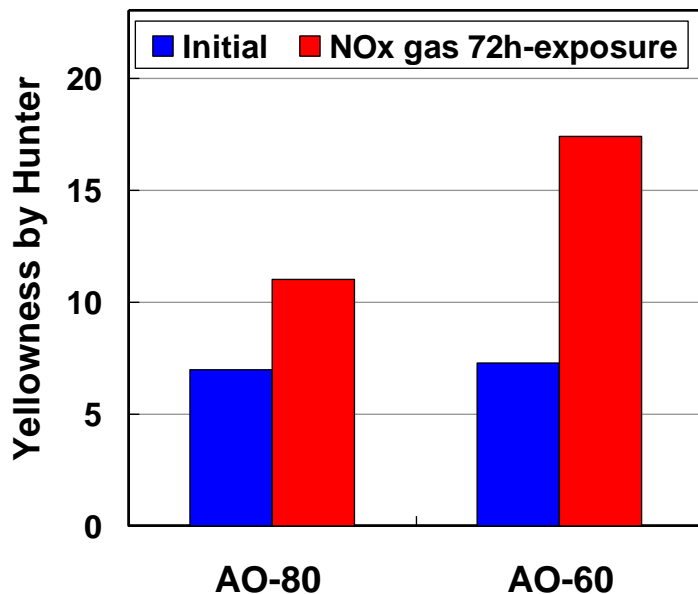
8 HINDERED AMINE
LINGHT STABILIZERS

9 FLAME RETARDANTS

10 OHTERS

1

HYNDERED PHENOLS



NOx gas discoloration of PP

Test: Exposure to 2% NOx gas for 72h
 Formulation: PP-h (100)/ Ca-St (0.05)/ 2112(0.05)/
 Phenolic antioxidant (0.2)
 Process: Extrusion at 230°C, Injection at 250°C
 Test plaque: 1mm-thick plaque

2

PHOSPHITES

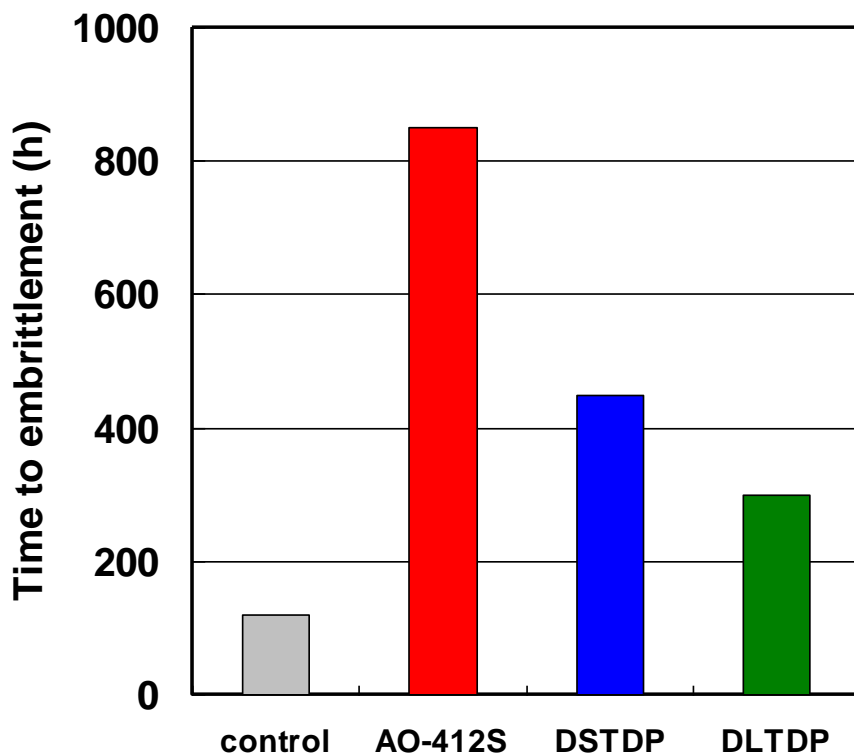


w/o Phosphites

ADKSTAB HP-10
(0.1phr)

3

THIOETHERS AO-412S



Test:

160 °C Oven

Test plaque:

1mm-thick sheet

Formulation:

PP-h(100)

Ca-St(0.2)

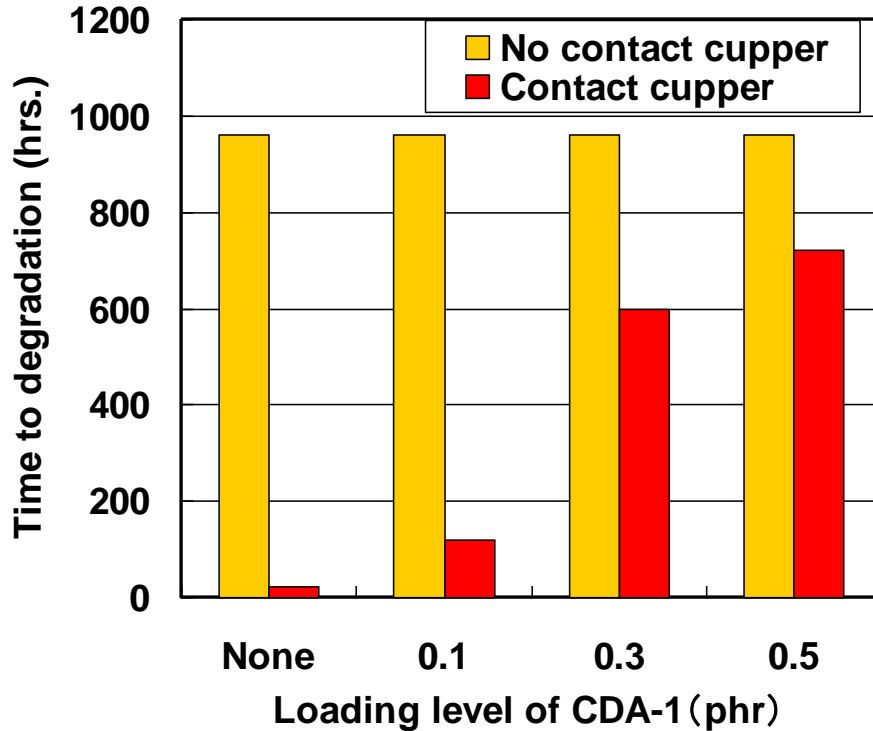
AO-30(0.1)

Thioether antioxidant (0.2)

Long-term heat stability of PP (160 °C)

4

METAL DEACTIVATORS CDA-1



Effect of CDA-1 loading level on long-heat stability of PP which contacts copper at 150°C

Formulation:

Homo PP (100)

AO-60 (0.3)

522A (0.2)

CDA-1 (see graph)

Process:

Roll mixing and Press molding
at 180°C 1mm plaque

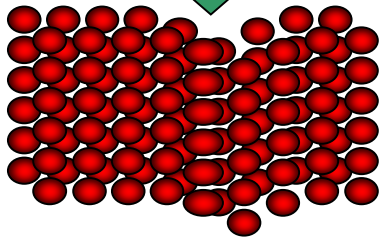
*AO-60: Phenolic antioxidant (CAS No. 6683-19-8)

*522A: Phosphite

5

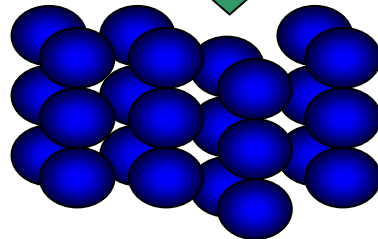
Nucleating Agent ADK STAB NA-27

Stress



With
Nucleating agent

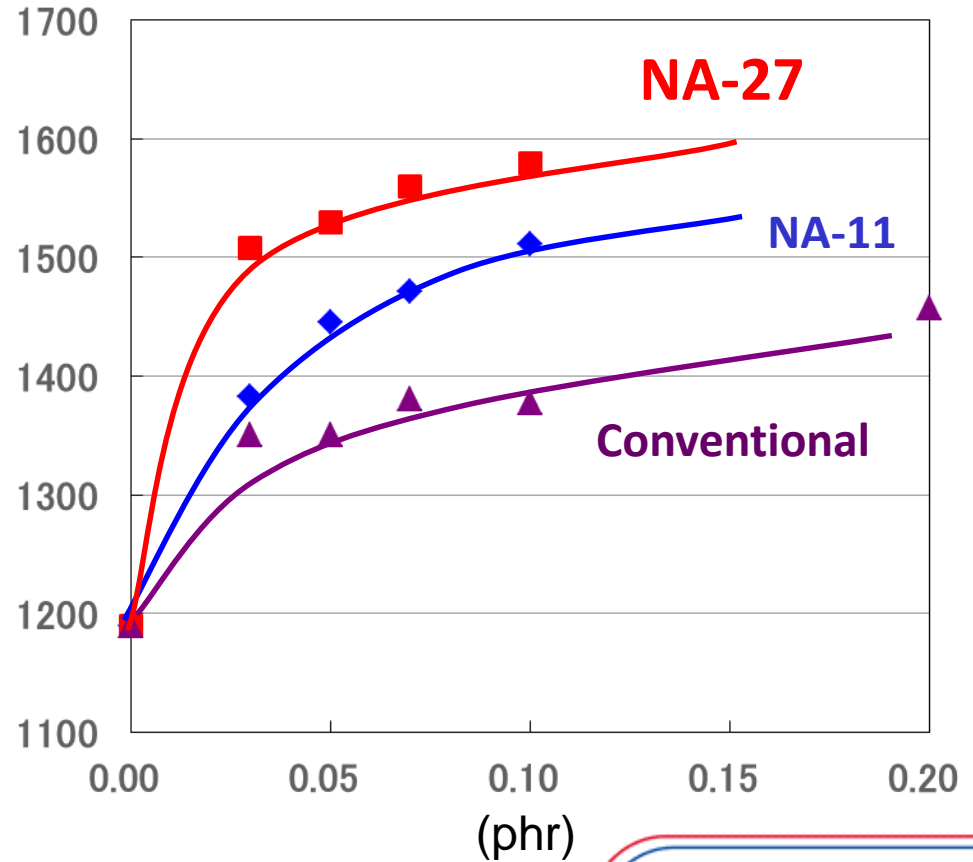
Stress



Without
Nucleating agent

Reduction of stress concentration provides stiffer and tougher materials.

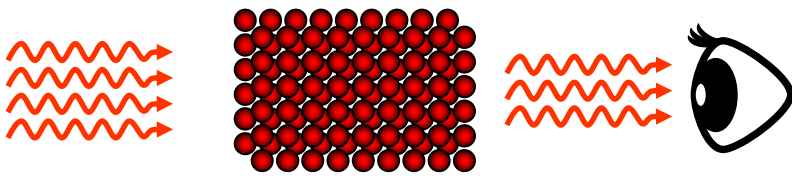
Flexural modulus (MPa)



6

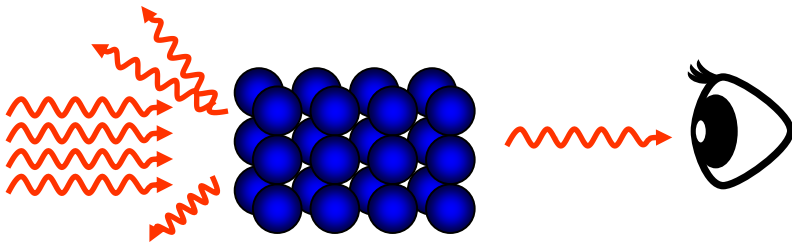
Clarifier ADK STAB NA-71

With Clarifier



Weak reflection of light = clarity

Without Clarifier

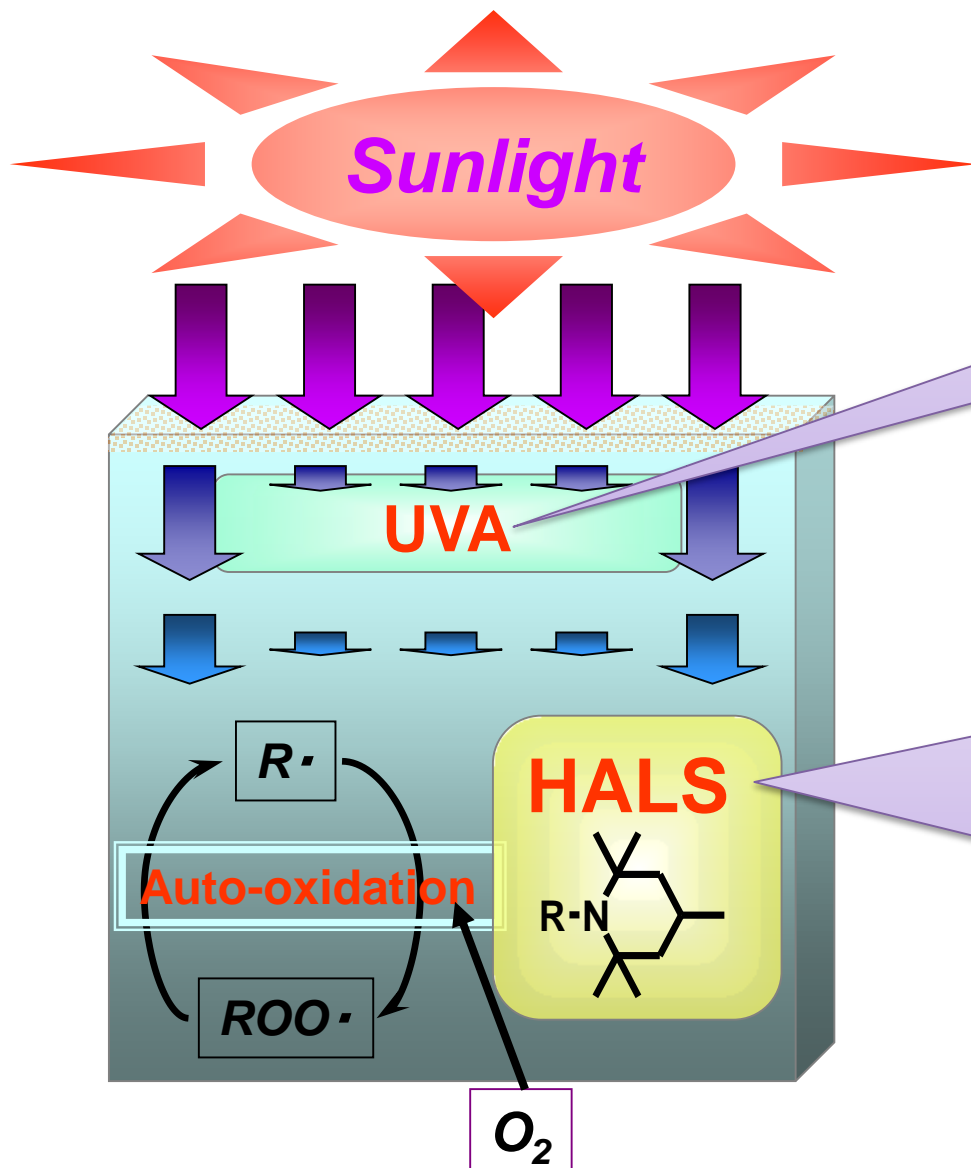


Strong reflection of light = haze

Neat PP

PP with NA-71



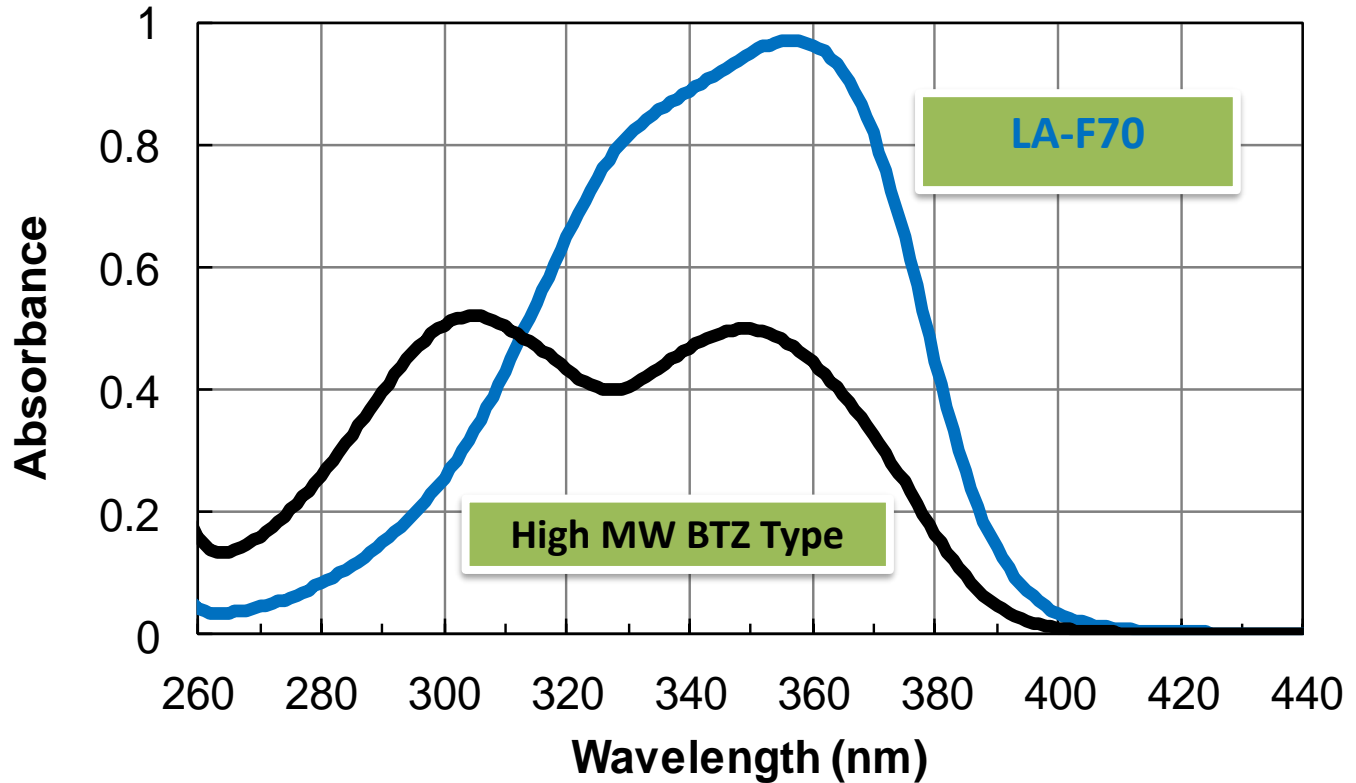


UV Absorbers (UVA) convert photochemical energy of light into harmless heat.

Hindered amine light stabilizers (HALSs) show excellent UV protection by scavenging radicals generated by photo degradation.

Absorption Spectrum of LA-F70

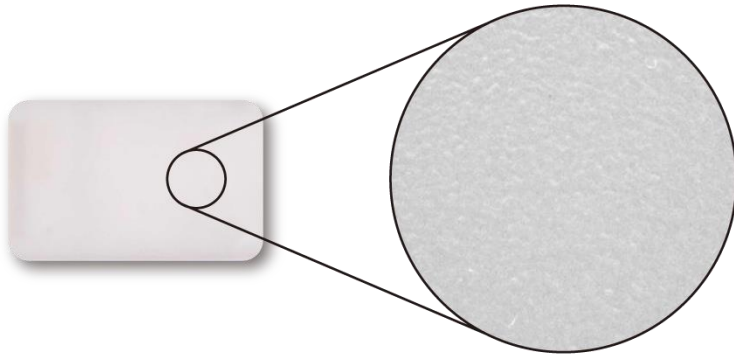
High
↑
UV
absorbability
↓
Low



LA-F70 is a unique triazine type UV absorber which has strong and broad absorption.

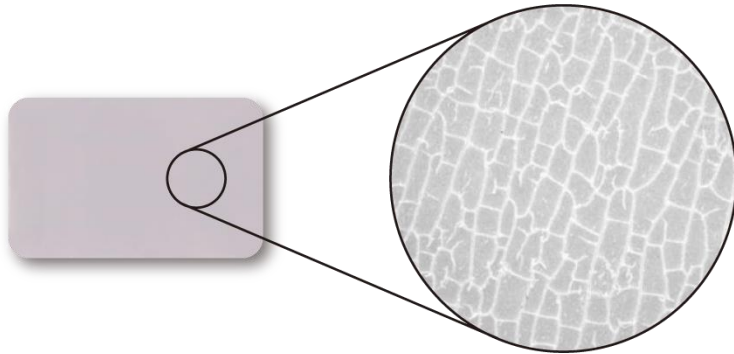
Effect of HALS

Microphotographs of PP surfaces after XWM with spray



LA-402AF (0.3phr)

No crack generation



Without HALS

Crack generation

LA-402AF

provides an excellent surface stability over the very long term.

FP-2000 series : Intumescent-type flame retardant

This product can...

Suppress generation of smoke with acid and CO **almost completely**
Keep the compound's mechanical property



Application

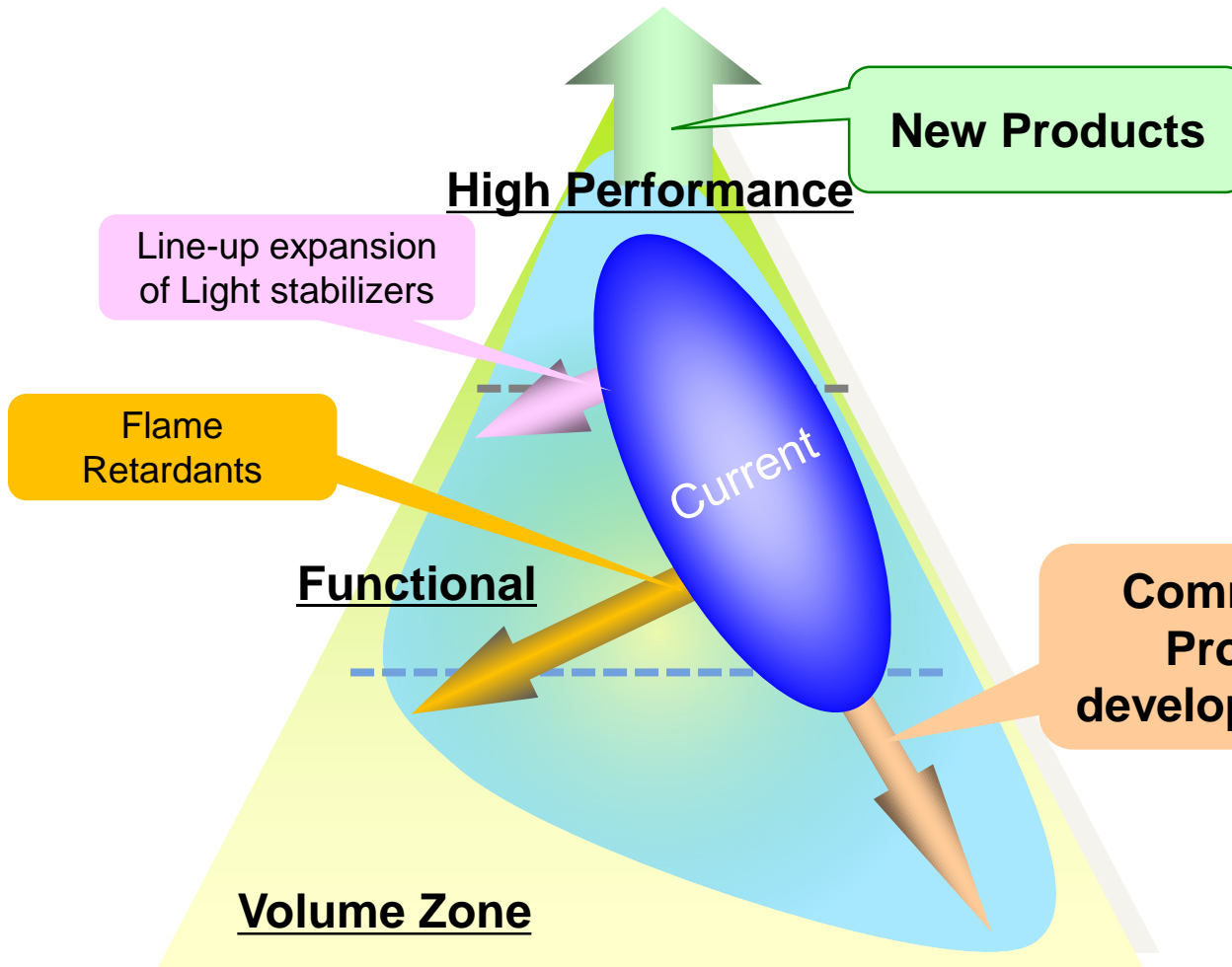
Automotive parts, wire and cable jacket, E&E housing etc.

Produce location

AFCS (China)

| Company | HYNDERED PHENOLS | PHOSPHITES | UVA | HALS | MDA | Nucleating Agent | Flame Retardants (Phosphate) |
|--------------|------------------|------------|-----|------|-----|------------------|------------------------------|
| ADEKA | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| BASF | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Songwon | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| Addivant | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| Clariant | | ✓ | | ✓ | | | ✓ |
| Solvay/Cytec | | | ✓ | ✓ | | | |
| SI Group | ✓ | ✓ | | | | | |
| Milliken | | | | | | ✓ | |

ADEKA can provide total solution in combination with all kinds of additives.



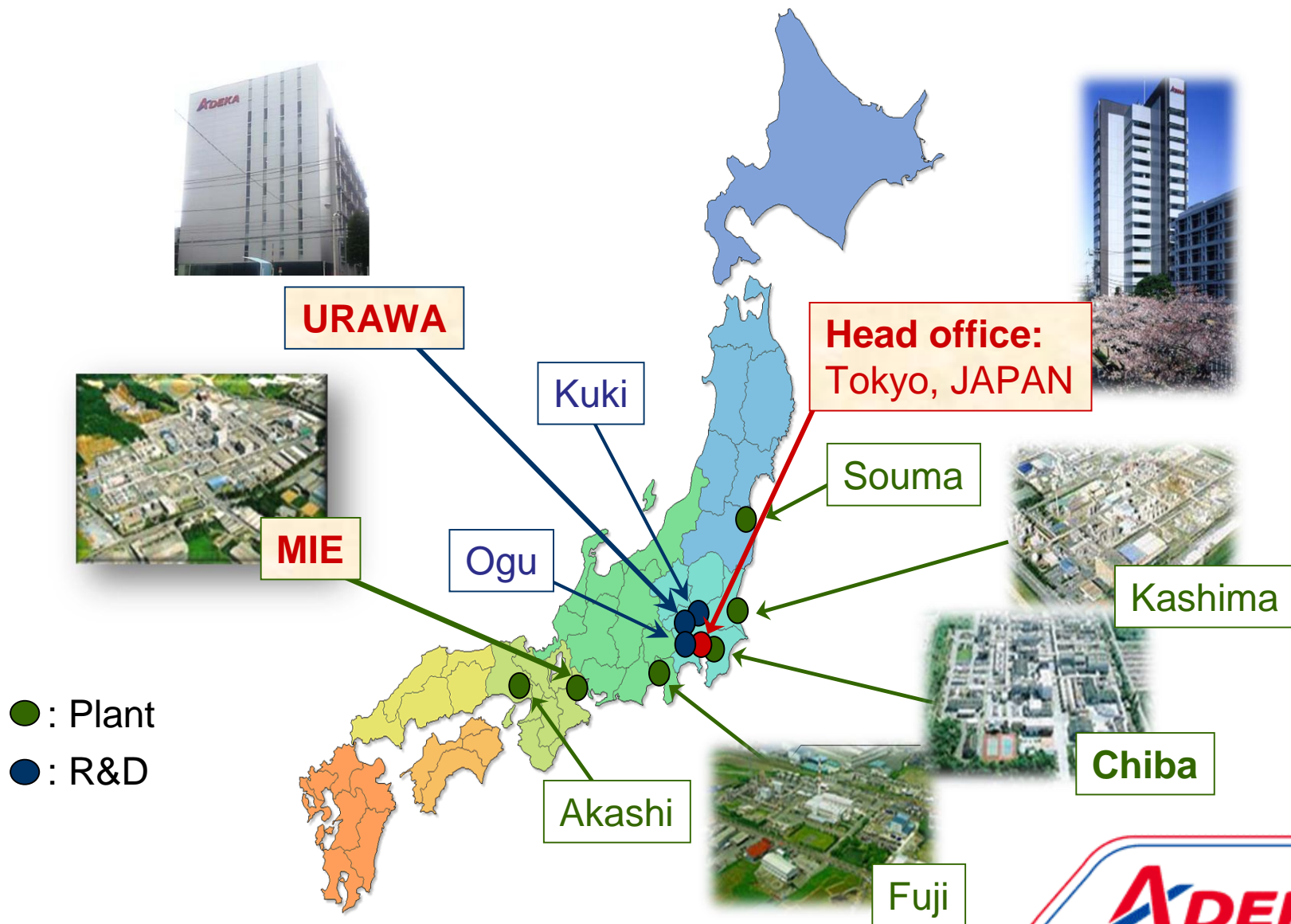
ADEKA Group is going to expand product coverage with;

- New products
- Light Stabilizers
- Flame Retardants
- Commodity AOs
- Customized products for development markets

**Commodity AOs
Products for
development market**

3. ADEKA's Global Network







Chang Chun Petrochemical (CCP) is ADEKA's production partner in TAIWAN. Our partnership have **35years** history.

- Antioxidants: AO-60, AO-50, #2112, Liquid Phosphites (TNPP & Others)
- Flame Retardants: FP-600 (BDP type)
- Plasticizers & ESBO

Strength of CCP Group :

Long relationship history with ADEKA Group

- Licensed ADEKA's technology;

- 1982, ESBO
- 1987, Plasticizer
- 1989, Stabilizer for PVC
- 1993, Antioxidant
- 2001, Flame retardant

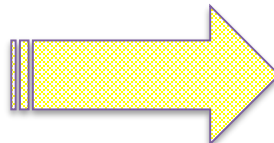
- Quality Assurance System;

- ISO-9001 Originally Registered: March 16th 1994
- ISO-14001 Originally Registered: August 21th 1998
- ISO-18001 Originally Registered: March 24th 2008

***ADEKA and CCP holding Technical(QA, QC and Others) exchange meeting regularly.**

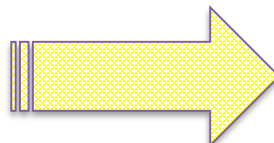
Strength of **CCP Group** : Manufacturing capacity

Commodity Antioxidant*
(Taiwan Plant)



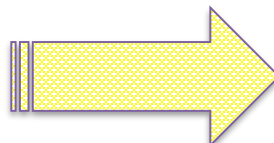
Capacity to double
in 2015

Liquid Phosphites
(Taiwan and China)



Worlds No.1 capacity

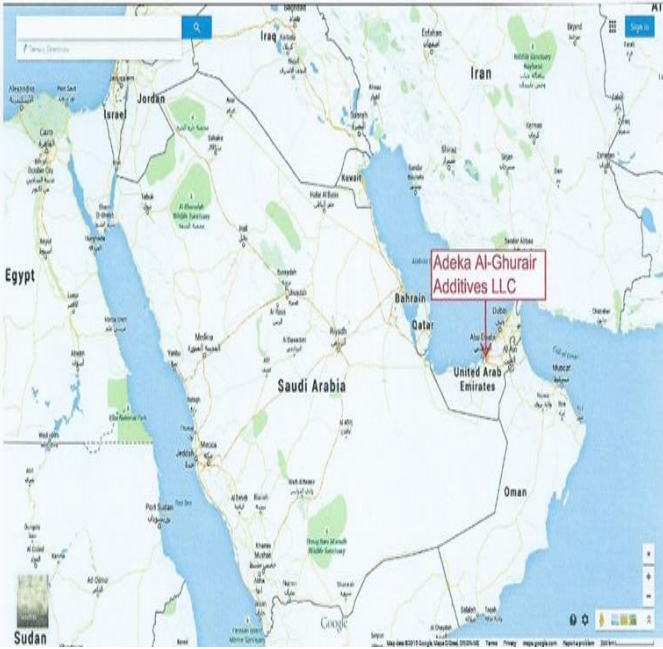
**Flame Retardants
(Phosphate)**
(Taiwan and China)



Worlds No.1 capacity
(BDP type
organophosphate)

*Commodity Antioxidant: Phenolic AO- ADK STAB AO-50(CAS-No.:2082-79-3)
Phenolic AO- ADK STAB AO-60(CAS-No.:6683-19-8)
Phosphites AO- ADK STAB 2112(CAS-No.:31570-04-4)

Introduction of



ADEKA AL GHURAIR ADDITIVES LLC (AAA)

Corporate profile

Location Abu Dhabi, United Arab Emirates

Establish 24th April 2011

Stockholders **AL GHURAIR PETROCHEMICALS LLC (Dubai)**
ADEKA CORPORATION (Japan)

Capital 45,466K AED

Business Sales & Production for **one pack** granule additives

Turnover 67,000K AED (US\$18,300K) : 2015 result

Director **Mr. Maeno (GM)**

Mr. Yukino (CEO) : President of Polymer Additives business in **ADEKA**

Dr. Fukushima : GM of Global Business Development of Polymer Additives Div. in **ADEKA**

Dr. Schuhmann : CEO of Taghleef Industries in **Al Ghurair** Group

Mr. Ghatak (CFO) : CFO of Taghleef Industries in **Al Ghurair** Group

Apr. 2016 : Start to cover **Iranian** market

Dec 2014: Plant expansion (+ 3,500t)

Oct 2013:
EHSMS certified

Sep 2012: ISO9001



Jan 2012: Trading start
Industrial license

Autumn 2011: Production start (3,500t)

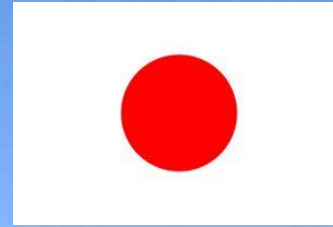
Apr 2011: Foundation

What is our advantage

1. ADEKA is one of the biggest Additives producer in the world
 - Most of raw materials can be supplied by ADEKA Group
 - Supply stability
 - Price competitiveness
2. ADEKA has the widest range of polymer additives
 - Big capacity of commodity polymer additives in the world
 - Having many patented polymer additives
3. Advanced technical support to customers
 - Solve technical problem in customers
 - Develop new grade with customers
 - Having technical service person in Abu Dhabi

Visit our site at Abu Dhabi, UAE



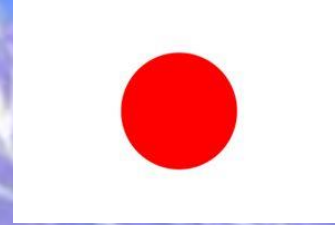


Thank you for your attention!

خَبِيلِي مَمْنُون

100th
Anniversary <Since 1917>

DEKA



Thank you for your attention!

خیلی مَمَنون

100th
Anniversary <Since 1917>

DEKA