

# Discoloration Resistant LLDPE Rotomolding Resin

## PTT GLOBAL CHEMICAL PLC.



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# Rotational Molding Process

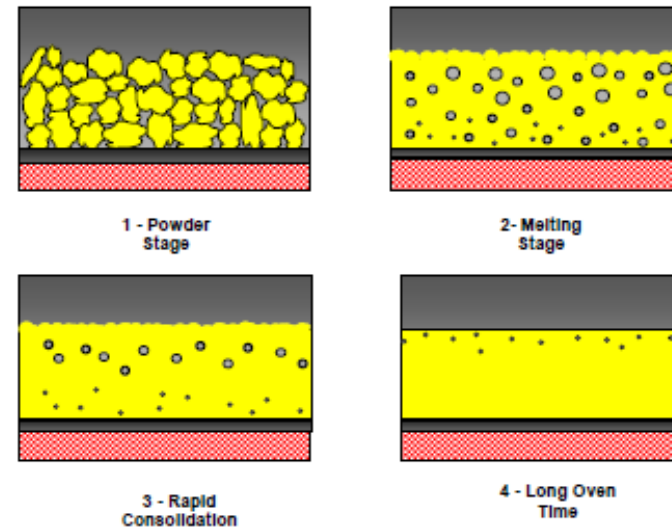
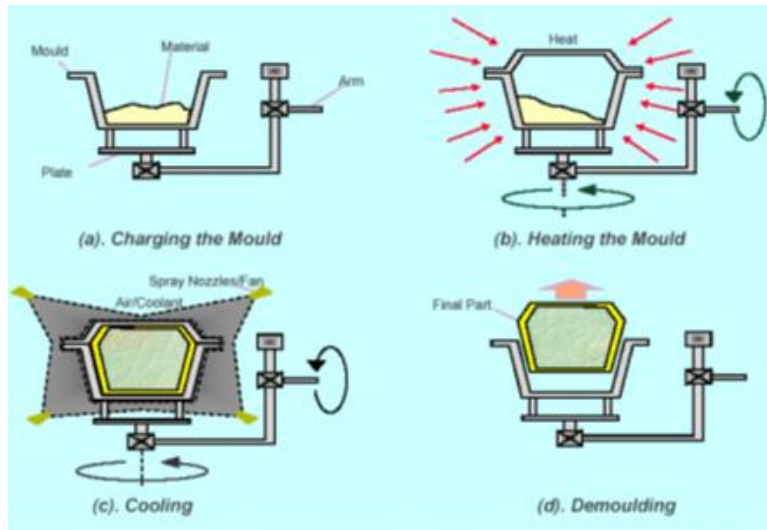
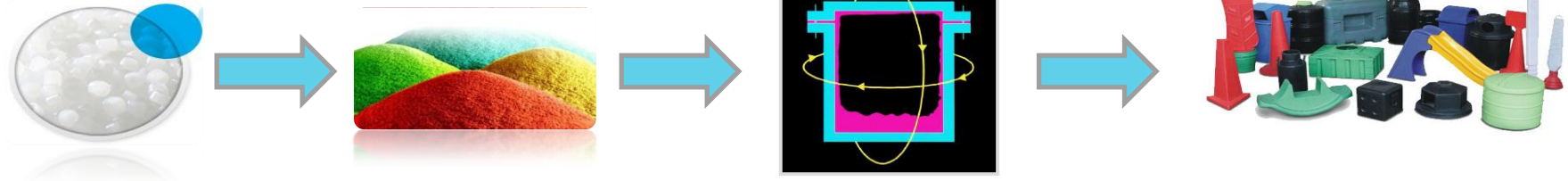


Figure 1.21 Stages during oven heating

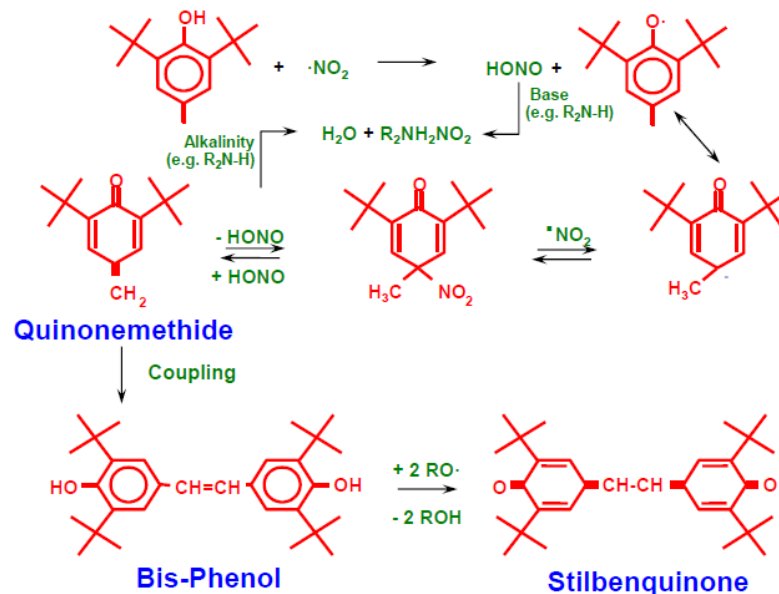
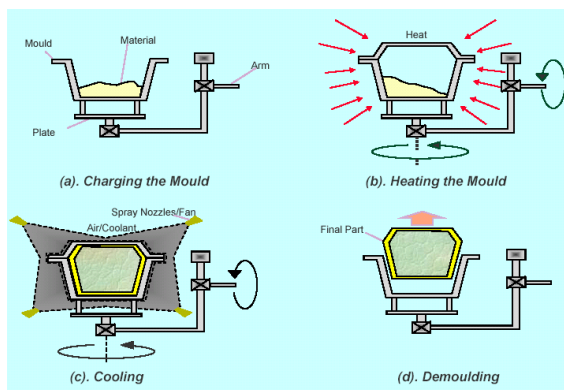
Ref: Practical Guide to Rotational Moulding Roy J. Crawford and Mark P. Kearns 2003

## Polyolefin discoloration pathway

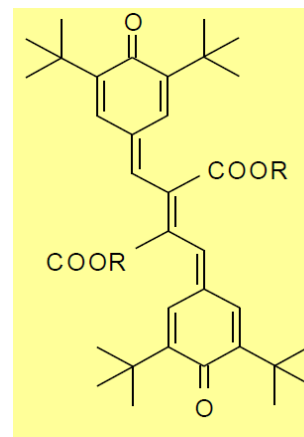
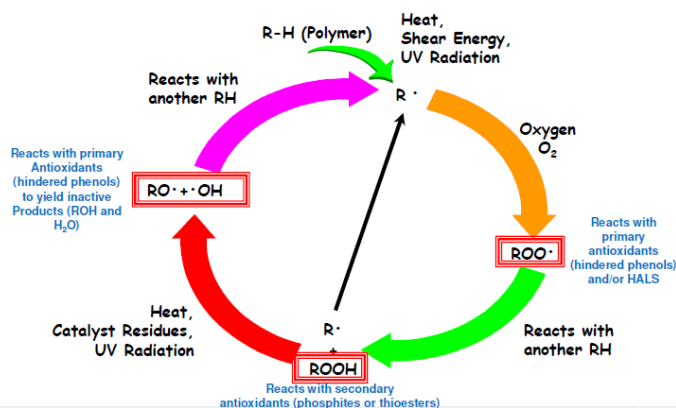
- Phenolic AO/TiO<sub>2</sub> Interaction
- *Phenolic AO/Exhaust Gas Interaction*
  - *Phenolic AO/Oxides of Nitrogen Interaction*
- Cardboard Contaminants
- *Phenolic AO/HALS Interaction*
- Chemical Interaction
- Deposit of Contaminants onto Polymer Part

# How plastic discolored from “ROTOMOLDING PROCESS”?

- Exhaust gas environment

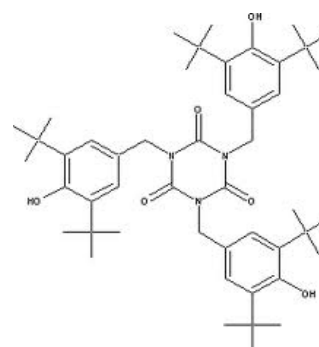
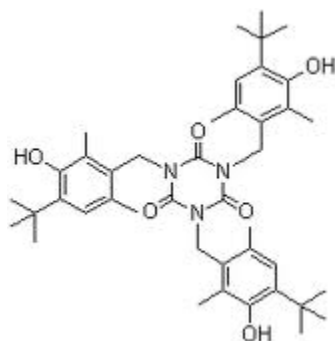
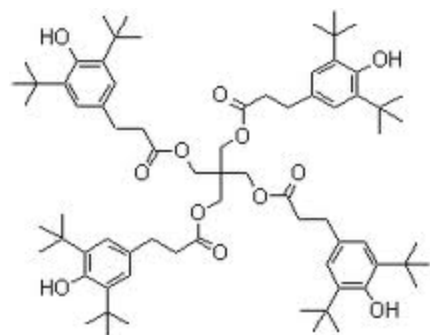
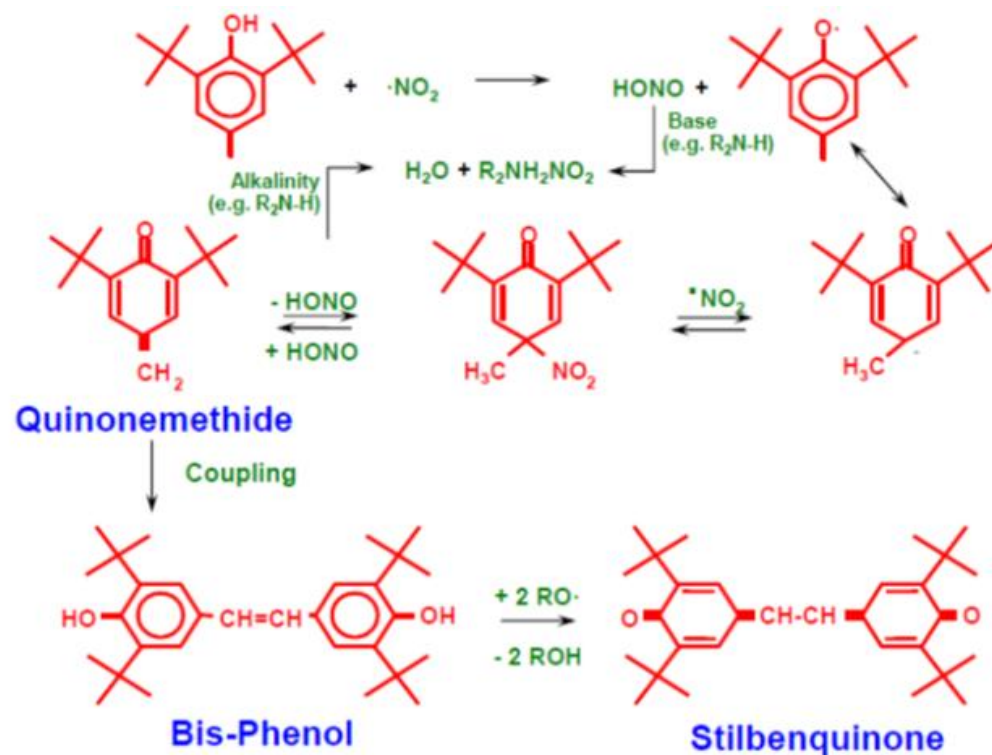


- Additive formulations

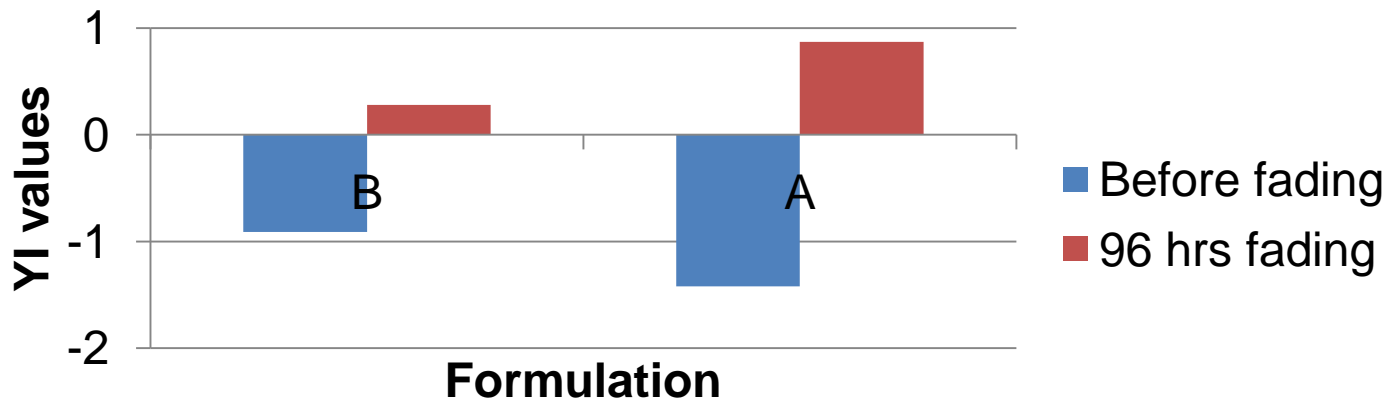


Ref: <http://www.ampacet.com/faqs/yellowing-and-pinking-white-pe-pp/>

# Exhaust gas environment

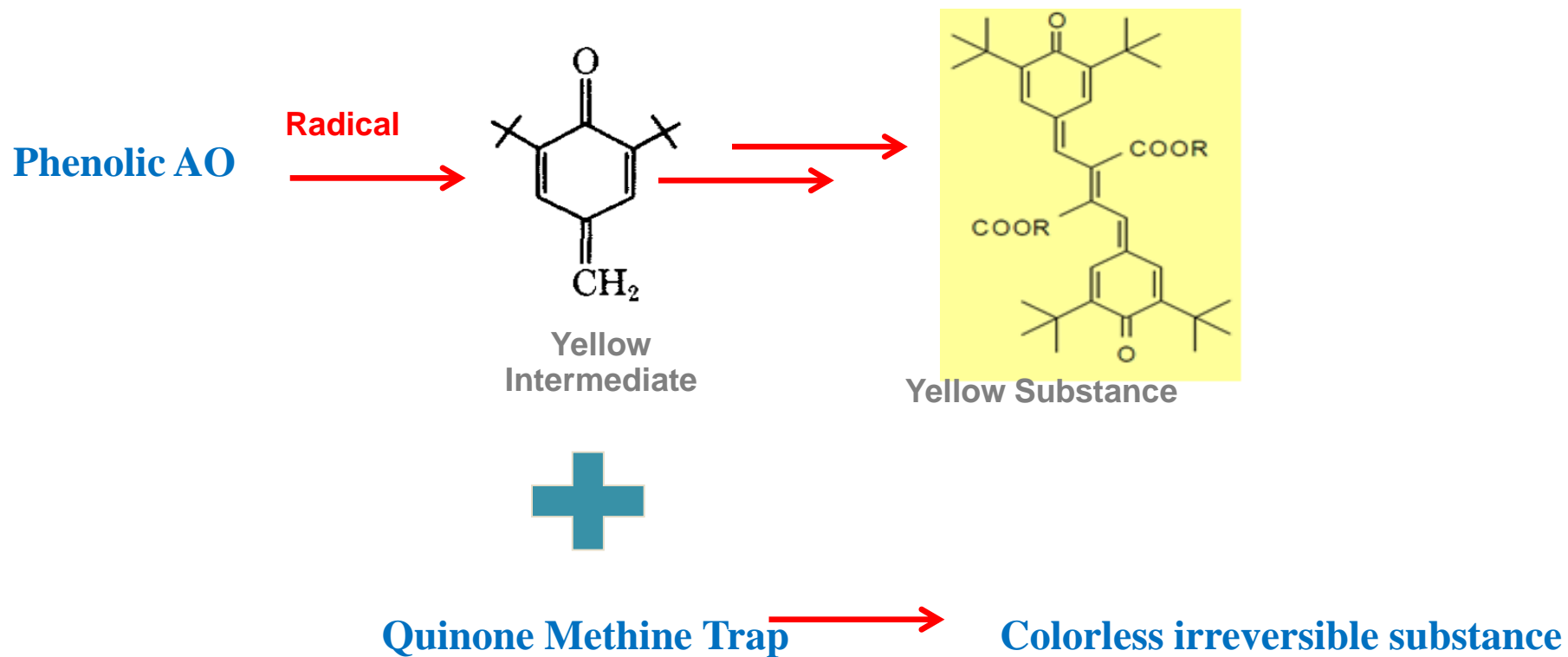


# Gas Fading Experiment

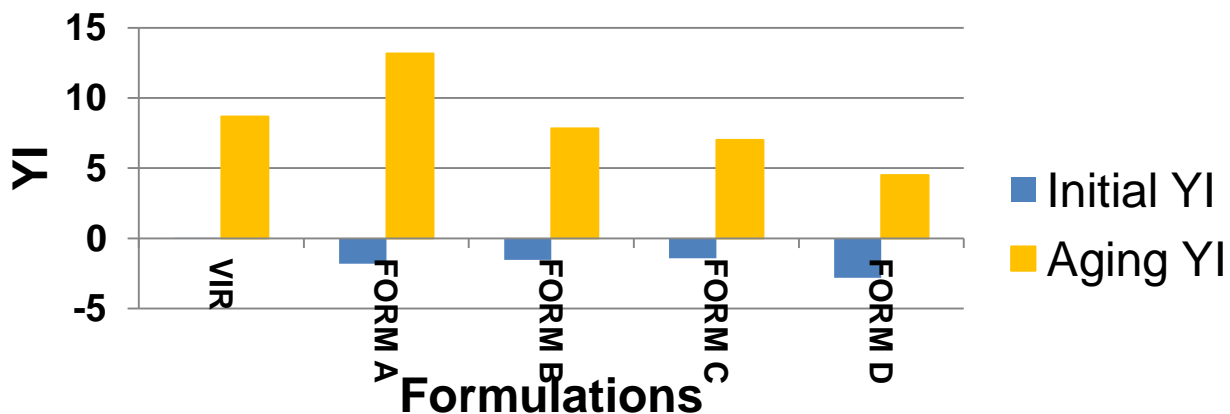


Samples	Before fading	After 96 hs fading
B + phosphite	-0.91	0.28
A + phosphite	-1,42	0.87

# Discoloration Mechanism from Additives



# Effect of Quinone Methine Trap amount



formulation	Initial YI	After aging (210 C 30 min)
<b>VIR</b>	0.04	8.68
<b>FORM A</b>	-1.81	13.16
<b>FORM B</b>	-1.54	7.83
<b>FORM C</b>	-1.41	7.01
<b>FORM D</b>	-2.81	4.51

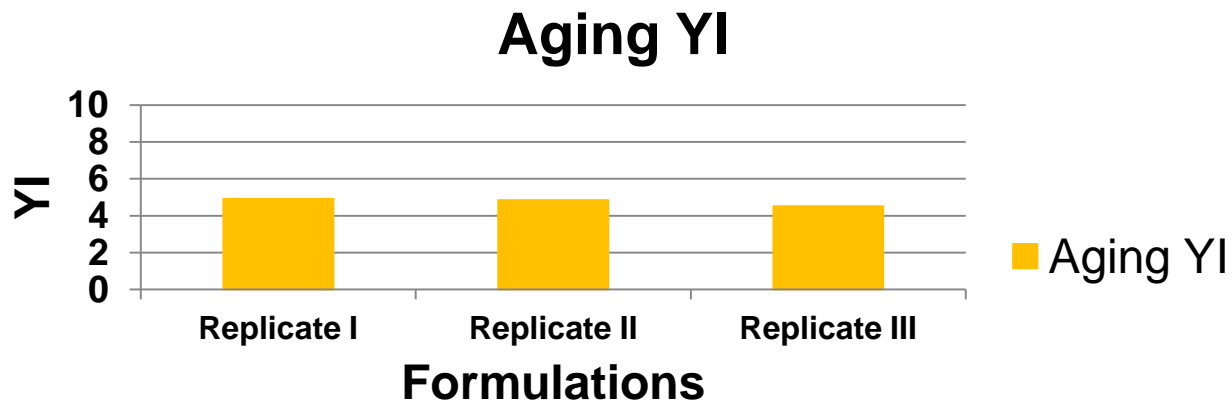
**VIR** : LL9641 base resin

**Formulation**: phenolic, phosphite, UV8 Light stabilizer, Lubricating agent

**FORM A, B, C, D** (amount of Quinone Methine Trap  $A < B < C < D$ )

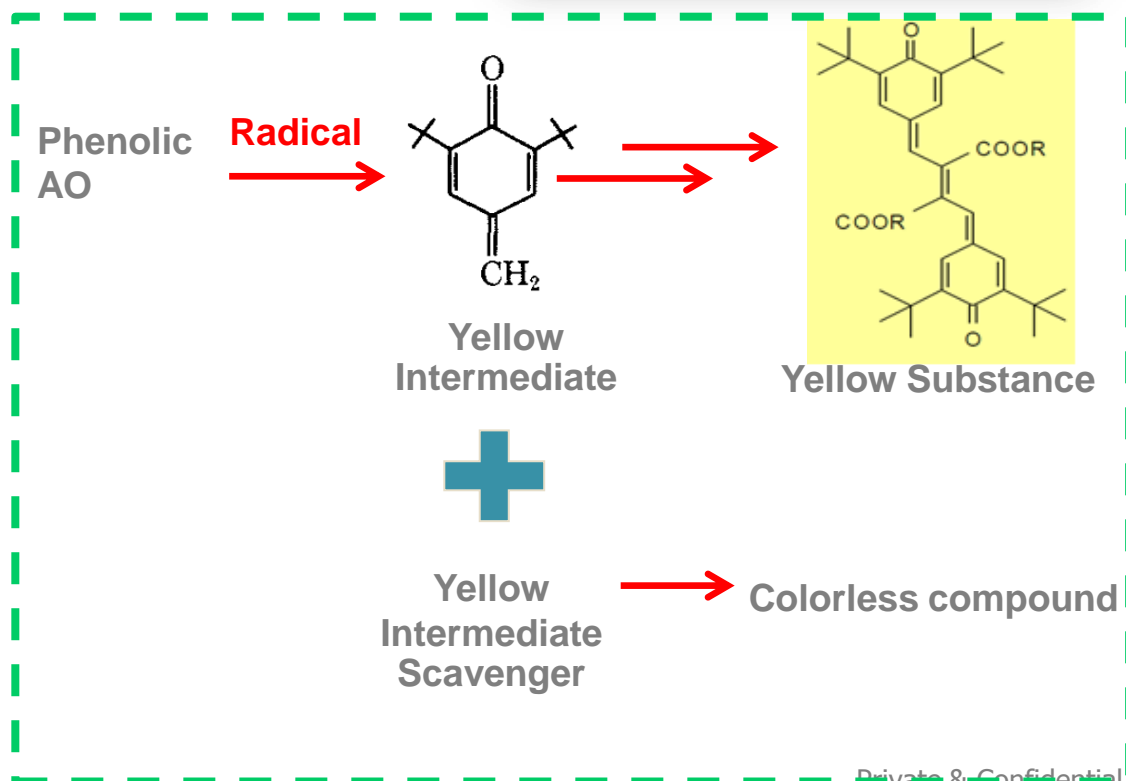
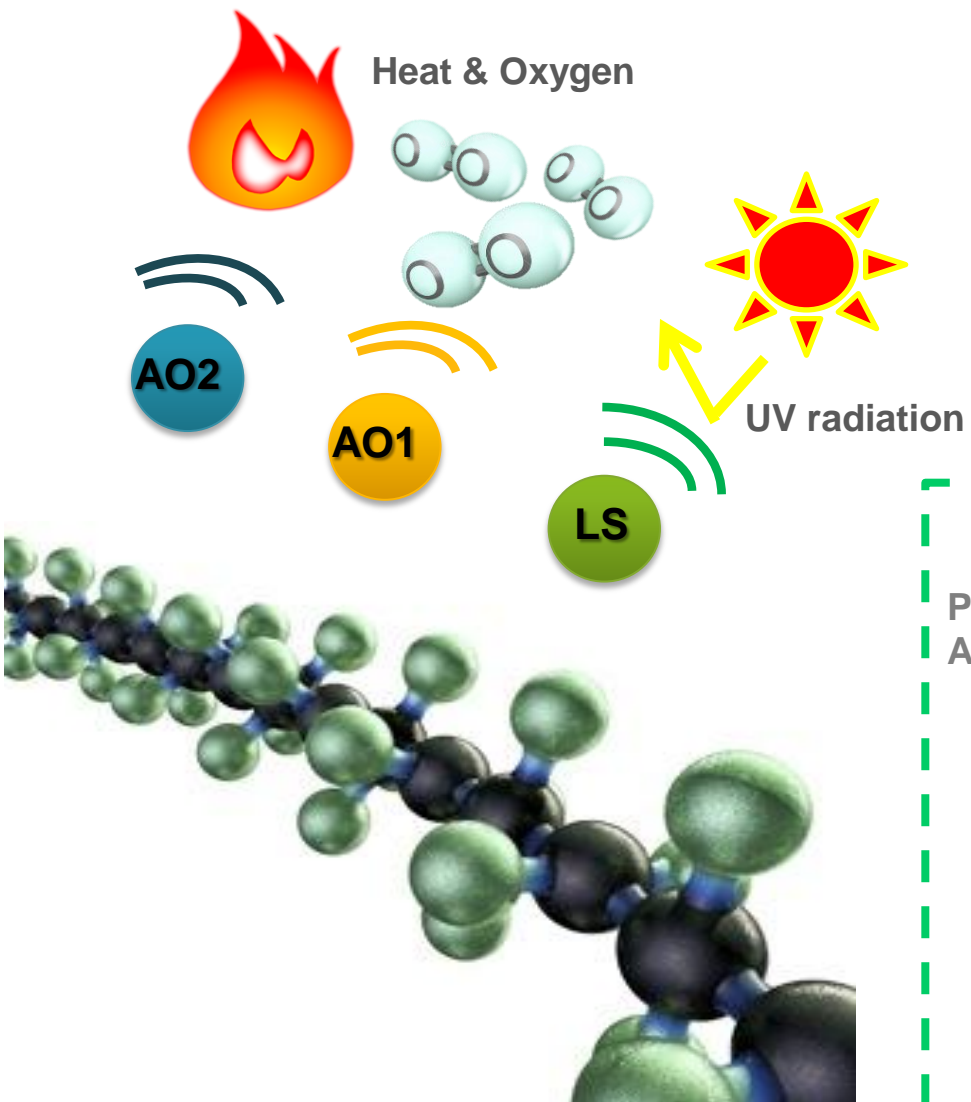


# Consistency of Compounding



formulation	After aging (210 C 30 min)
<b>Replicate I</b>	4.92
<b>Replicate II</b>	4.85
<b>Replicate III</b>	4.51

**Sample:** phenolic, phosphite, Light stabilizer, Lubricating agent (FORM D)





# Acknowledgement

- PTT Global Chemical PLC.
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- Project team (Mr. Wiraphing K, Ms. Patima W. and Ms. Chonticha C.)

