Paint Driers

Patcham | PATcom | PATox

PATCHAM

A SUSTAINABLE APPROACH TO MODERN COATING TECHNOLOGY

A Sustainable Approach to Technology

Patcham FZC is a global manufacturer of specialty additives headquartered in the United Arab Emirates. Since its inception, Patcham has steadily grown to become a leading supplier of metal carboxylates and specialty additives for Paint & Coatings, Inks, PVC, Composites and Polyurethane. We also manufacture a range of tin based and tin free catalysts for various end use industries.

The company's Pat-Add range of coating additives includes driers, wetting & dispersing agents, defoamers, slip & leveling agents, rheology modifiers. All our products are APEO free and many are produced from green raw materials. Several are designed to enable our customers to make products that are low VOC or VOC free.

Patcham has a strong manufacturing and R&D infrastructure that enables rapid transition from concept to products. The company has strategically located technical service laboratories, offices and representatives around the world to provide efficient customer service. In addition, a well-developed robust supply chain network enables us to deliver our products and services to customers around the globe with minimal lead-time.

Paint Driers

Driers for Alkyd Systems

Paints and Coatings based on alkyd or modified alkyd resins are common in today's markets. These air drying systems require catalysts to accelerate the chemical reactions of the drying process. These catalysts are called Driers.

Types of Driers:

Primary Driers: (Also termed as Active Driers; Drying Initiators; Surface or Top Driers.)

Act as primary oxidation catalysts and work mainly on the surface of the wet film.

Cobalt	Most powerful at ambient temperatures. Can lead to discoloration due to its purple color	**Iron**	Weak at ambient temperatures– often used in baking finishes. Efficacy can be enhance by the use of chelating agents.
Manganese	Weaker than cobalt but its efficacy can be enhanced with chelation agents. Can discolor white paints Also gives some through drying.	**Cerium**	Very weak as an initiator at ambient temperatures. Colorless. Provides some through drying

Secondary Driers: (Also termed as Through Driers.)

Used in conjunction with primary driers to ensure a balanced drying process of both the surface and body of the film.

Zirconium	Powerful through drier. Most widely used	**Strontium**	Good through drier
Zinc	Strong through drier. Slows surface dry slightly. Gives harder films	**Bismuth**	Weaker through drier. Not as toxic as lead.
Lead	Good through drier. Has some initiation effects as well.		

Auxiliary Driers: (Also termed polarizing driers.)

Modify the action of primary and secondary driers

Calcium	Assists in the through drying process. Improves the action of primary driers. Most widely used.	**Lithium**	Used to improve the hardness of high solids coatings.
Barium	Good at maintaining drying under humid conditions.	**Potassium**	Used occasionally to improve the action of cobalt driers.

PATcom Drier Combinations

Any single metal is not sufficient to catalyze fast and uniform drying. For this reason, a mixture of driers are used in alkyd paints. Pre-mixing the concentrated driers usually results in gelling. There are a variety of stable combination drier packages available both standard and custom made.

Driers for Water-Based Alkyd Systems

Water-based alkyd resins are often hybrid alkyd/acrylic dispersions. The alkyd part of these binders again dries via an oxidative polymerization process catalyzed by driers.

PATox WB series of driers is specially formulated for water borne alkyd systems providing performance and ease of incorporation.

Cobalt	10% WB & 6% WB	Zirconium	12% WB	Combinations WB 102 WB 103
Manganese	6% WB	Calcium	5% WB	

Loss-of-Dry Inhibitors

Air drying paints tend to lose drying efficiency during storage as the result of undesired interactions between the drier catalyst system and other paint components. Driers are prone to absorption by high surface area pigments and fillers and to hydroylsis issues through the presence of water. The problem is most acute when primary driers are impacted.

Patcham Cobalt 21% is an all-purpose loss of dry inhibitor.

PATcom 78 provides loss of dry protection in systems containing high surface area pigments.

Lead Replacement:

Concerns surrounding the toxicity of lead have caused users to seek replacements such as zirconium driers. However, some of the advantages offered by lead are not always obtained when using substitutes.

PATcom PBF is a specially formulated lead free combination drier that mimics the action of lead when used in combination with cobalt and calcium.

Cobalt Replacement:

Recent concerns regarding the regulatory status of cobalt has led to interest in cobalt replacement driers. **PATcom 2516** is a special metal complex that can be used in place of cobalt driers. This is also recommended for urethane alkyds and in air drying paints where the color of cobalt is an issue.

Patcham Paint Driers

Commodity Driers

Primary Driers / Drying initiators

Patcham Cobalt Octoate	12%
	10%
	8%
	6%
Patcham Cobalt Neodecanoate	12%
	10%
Patcham Manganese Octoate	12%
	10%
	9%
	6%
	4%
Patcham Iron Octoate	8%
Patcham Iron Naphthenate	6%
Patcham Cerium Octoate	12%

Secondary Driers / Through Driers

Patcham Zirconium Octoate	24%
	18%
	12%
	10%
	6%
Patcham Zinc Octoate	18%
	16%
	12%
	10%
	8%
	6%
Patcham Lead Octoate	36%
	30%
	24%
Patcham Strontium Octoate	10%
Patcham Bismuth Octoate	28%
	24%

Secondary Driers / Auxiliary Driers

Patcham Calcium Octoate	10%
	8%
	6%
	5%
Patcham Calcium Neutral	6%
Neutral	5%
Neutral	4%
Patcham Barium Octoate	12.5%
Patcham Lithium Octoate	2%
Patcham Lithium Neodecanoate	2%
Patcham Potassium Octoate	15%

Non Flammable

High flash point
No aromatics

Primary Driers / Drying initiators

Patcham Cobalt Octoate	12% D80
	10% D80
	8% D80
	6% D80
Patcham Manganese Octoate	12% D80
	10% D80
	6% D80

Secondary Driers / Through Driers

Patcham Zirconium Octoate	18% D80
	12% D80
Patcham Zinc Octoate	16% D80

Secondary Driers / Auxiliary Driers

Patcham Calcium Octoate	10% D60

Green Driers

2 Ethyl Hexanoic Acid - free
Low VOC | No aromatics
Non Flammable

Primary Driers / Drying initiators

Patcham Cobalt Neodecanoate	10% BD
Patcham Manganese Neodecanoate	8% BD

Secondary Driers / Through Driers

Patcham Zirconium Neo	18% BD
Patcham Zinc Neodecanoate	16% BD
Patcham Bismuth Neodecanoate	20% BD

Secondary Driers / Auxiliary Driers

Patcham Calcium	10% BD

Non-Metallic Drying Enhancer :

Patox 41 when used in conjunction with traditional primary metallic driers:

Accelerates drying times

Reduces the tendency for these primary metallic driers to deactivate

Helps to prevent loss of dry typically associated with pigmented oleo-resinous, high-solids, water-reducible, and urethane coatings

Patox 41 is typically used at levels ranging from 0.04% to 0.40% based on resin solids.

Anti-skinning agents

Anti-skinning agents endeavor to inhibit paint drying in the can, thus preventing skin formation, without hindering drying on the substrate. The use of Anti-skinning agents usually cause a slight increase in the drying time.

PATox 1 is MEKO (methyl ethyl ketoxime)

Dispersing agent for enamels

Pat-Add DA 707: Standard pigment dispersant for polar pigments in air-drying paints and most industrial systems. Amphoteric polyester, offering best wetting and dry film toughness.

Additive for water incorporation in solvent based systems

Pat-Add DA 787: Can be used to add 20% water to long oil alkyd and styrentated alkyd systems, including long oil alkyd co grinds. Unique technology, not polysaccharide based. There is no syneresis, no reduction in gloss, no in can corrosion, no flash corrosion and no adverse effects on drying or gloss after storage.

Drier dosage requirement:

$$\text{Weight of drier required} = \frac{\text{Weight of resin solids x \% metal required}}{\text{\% Metal in drier}}$$

Drier metal	Typical wt metal / resin solids %	Normal max. Conc.
Co	0.06	0.20
Mn	0.02	0.10
Fe	0.04	0.08
Ce	0.20	0.60

Drier metal	Typical wt metal / resin solids %	Normal max. Conc.
Zr	0.3	0.4
Pb	0.5	1.0
Sr	0.4	0.6
Bi	0.3	0.5
Zn	0.2	0.4

Drier metal	Typical wt metal / resin solids %	Normal max. Conc.
Ca	0.20	0.40
Ba	0.20	0.40
Li	0.03	0.05
K	0.03	0.08

Drier Related Troubleshooting

Dries too slowly	Increase all driers
Slow drying at low-temperature	Replace Ca with Ba or Sr or Li Replace Co with Mn
Poor drying in high humidity	Replace Ca with Ba
Slow surface dry	Increase Co / Add K or Ca
Poor through dry	Increase Zr / Add Bi or Zn
Film is too brittle	Reduce Co / Replace Co with Mn / Increase Zr
Film too tacky	Increase Primary driers
After Tack	Increase Zr
Dust entrapment	Increase Primary driers
Coating is too soft	Add Zn, Bi or Li
Wrinkling	Increase Ca / Decrease Co / Add Zn / Replace Co with Mn
Coating has poor water resistance	Replace Ca with Ba or Sr
Low gloss	Add Zn
Yellowing	Replace Mn with Co
Blooming	Increase Ca
Poor color retention	Add Zn
In can skinning	Decrease Primary Driers / Increase Anti-skinning agent
Sulphide staining	Replace Pb with Zr
Poor pigment dispersion	Incorporate Zn or neutral Calcium Octoate in the grind stage
Loss of Dry:	
Coatings with high surface area pigments	Increase neutral Ca / Add Zn Add PATcom PBF
Coatings containing water	Add Patcham Cobalt 21%

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