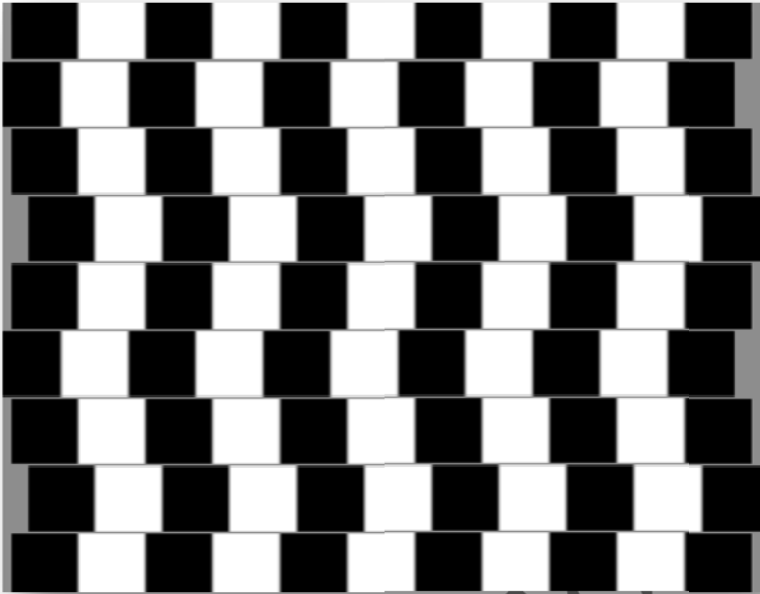
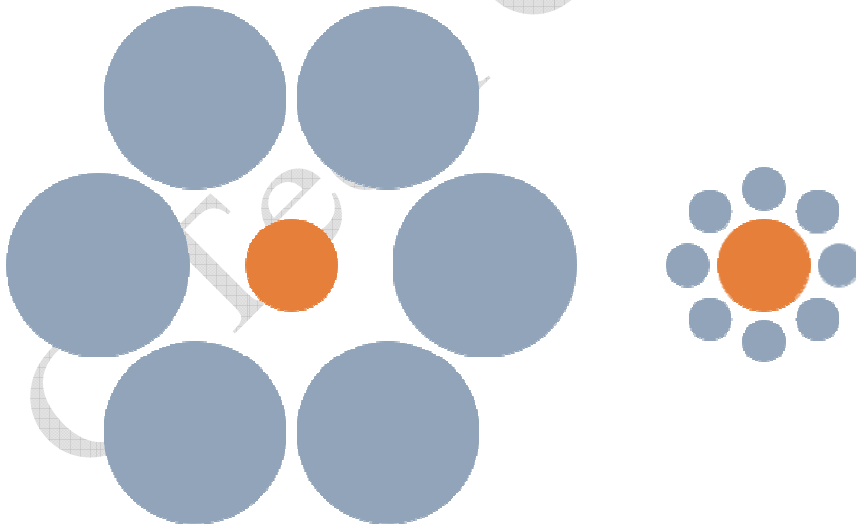




WHEN IGNORANCE IS NOT BLISS!



The lines appear to be slanted. However, it is only an illusion. Lines are parallel.



Don't the two orange circles look of different sizes? However, in actual fact, these two circles are of same size. Why not print and measure?!

Look beyond such illusions. Look closely and vigilantly.



Similarly one should be wary before buying additives for polymer applications. This article will serve as a good guide to buy anti-rodent (AR) or anti-termite (AT) masterbatches for polymer applications.

Before you decide to a particular additive for your application, make sure you know the answers to the following questions:

1. Does this additive contain any heavy metals?

Inorganic pesticides include arsenic, copper sulfates, lead, mercury compounds. The main features of such additives are:

- They do not degrade readily and persist long in the system
- They may be leached out of the system by water, wind and erosion...

Acute health effects of heavy metal based AR and AT additives are as follows¹:

Lead	Abdominal pain, vomiting, anorexia, ataxia, anemia, lethargy, encephalopathy, irritability, wrist drop, arthralgias.
Cadmium	Vomiting, diarrhea, abdominal pain, pulmonary edema, pleuritic chest pain, conjunctivitis, sore throat, cough, fever.
Mercury (Elemental)	Fever, chills, gastrointestinal complaints, pulmonary edema, encephalopathy.
Mercury (Inorganic)	Stomatitis, sore throat, nausea, vomiting, abdominal pain, hematemesis, renal failure, shock.
Mercury (Organic)	Depending on complex, may mimic inorganic poisoning or possibly dysarthria, visual field deficits and encephalopathy.
Arsenic	Vomiting, bloody diarrhea, abdominal pain, light-headedness, weakness, hemolysis, renal failure, CHF, cerebral edema.

"In addition to producing death and sickness through direct contact, many highly toxic chemicals and pesticides persist for years in the environment, where they cause long-term damage to human health and to nature", said Klaus Toepfer, executive director of the United Nations Environment Program, which is sponsoring the negotiations.

Do not buy any product which contains heavy metals, these clauses are under statutory regulations of most countries.



2. Is this additive non- toxic?




(What does toxicity actually mean? Look deeper)

Almost all chemicals are accompanied by a Material Safety Data Sheet (MSDS). The MSDS includes the toxicology data of additive/active indicated by **LD50 (oral)**, **LD50 (dermal)** and **LC50 (inhalation)**. Most of us from the non- pharma or non- biology back-ground find it difficult to comprehend what these exactly mean.


What do LD50 and LC50 mean? ⁴

LD stands for "**Lethal Dose**". LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. The LD50 is one way to measure the short-term poisoning potential (acute toxicity) of a material. LC stands for "**Lethal Concentration**". LC values usually refer to the concentration of a chemical in air but in environmental studies it can also mean the concentration of a chemical in water.

The Canadian Center for Occupational Health and Safety has tabulated the labels and precautions corresponding to different acute toxicity range. ⁵

Labels and Toxicity							
Poison Hazard Symbol				[No symbol]			
	Danger Poison	Warning Poison	Caution Poison	Very toxicity	low		
Acute oral LD50	less than 500 mg/kg	500 - 1000 mg/kg	1000-2000 mg/kg	greater than 2500 mg/kg			
Acute dermal LD50	less than 500 mg/kg	500-1000 mg/kg	1000-2000 mg/kg	greater than 2500 mg/kg			
Respirator	required	advisable in confined spaces	advisable in confined spaces	advisable	advisable		
Eye Protection	required	required	advisable	advisable			
Eye effects	corrosive or irreversible	or severe reversible	or irritant	--			
Chronic effects	fatal irreversible	/ non-fatal irreversible	/ non-fatal reversible	/ --			

Next time you read an MSDS, make sure to go through the toxicity section and check the LD50 and LC50 values.



3. Is this additive suitable for polymer processing? What is its thermal stability?

Plastic extrusion is a high volume manufacturing process in which raw plastic material is melted and formed into a continuous profile. Extrusion produces items such as pipe/tubing, weather stripping, window frames, adhesive tape and wire insulation. The processing temperatures usually range from 200 °C (392 °F) to 275 °C (527 °F) depending on the polymer.

However, most of the AR and AT additives have a much lower thermal stability. These are not suitable for polymer processing. For example- refer to following table:

AR/AT additive	Thermal stability
Permethrin	Vaporizes above 200 °C
Bifenthrin	Flash Point above 100 °C
Chlorpyrifos	Vaporization & decomposition above 160°C
Resmethrin	Vaporizes above 180 °C
Copper Naphthenate	Vaporizes above 150-250°C
Cholecalciferol	Not as labile under dry conditions, but decomposed rapidly at high temperature
Bromadiolone	Flash-point temperature is 218°C
Bromethalin	Decomposes before boiling, when heated to decomposition it emits toxic vapors of NO _x , F ⁻ , and Br ⁻

Hence, one should make sure to check that the active ingredient of such products are stable upto 300°C.



4. Is it water soluble? Will the chemicals leach out?

Pesticides leach into ground water, mix with drinking water which then pose a fatal hazard to humans as well as the aquatic flora & fauna. **Persistent organic pollutants (POPs)** comprise of such a category of pollutants. POPs are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic processes.² POPs released in one part of the world can, through a repeated (and often seasonal) process of evaporation, deposit, evaporation, deposit, be transported through the atmosphere to regions far away from the original source.

A growing body of scientific evidence indicates that exposure to very low doses of certain POPs -- which are among the most toxic substances ever created -- can lead to cancer, damage to the central and peripheral nervous systems, diseases of the immune system, reproductive disorders and interference with normal infant and child development.

Another concern behind the treaty negotiations is the growing accumulation of unwanted and obsolete stockpiles of pesticides and toxic chemicals, particularly in developing countries. Dump sites and toxic drums from the 1950s, 1960s and 1970s are now decaying and leaching chemicals into the soil and poisoning water resources, wildlife and people.³

Some of the AR based on aldrin, chlordane, DDT, dieldrin, endrin are POPs.

Always ask their manufacturer of AR and AT additives about the water solubility and leach out index of active.

5. Of course the price? 😊

People compromise their health gaining wealth, and then finally they are compelled to expend all the earned wealth to restore health. In this world, poisons are cheap monetarily but cost heaps in all other facets.

So be wise and fix on!



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