

LEAD PAINT REFORMULATION TECHNICAL GUIDELINES

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CONTENT

1. Technical Guidelines Content;
2. Colours and Paint Function;
3. Paint Raw Materials;
4. Lead Compounds in Paints;
5. Substitution Process;
6. Assessment of Alternative Pigments and Additives;
7. Reformulation Processes.

1. Technical Guidelines Content

- Information on hazardous properties of lead compounds;
- Substitution process;
- Colour theory and colour index;
- Dispersion process;
- Alternative pigments and additives;
- Assessment of alternative pigments and additives;
- General information on reformulation processes;

- The Technical Guidelines are developed to help address both capacity constraints and technical barriers to the substitution of lead compounds in paints
- Focus is on SMEs needs for the effective and efficient reformulation of paint.

2. COLOURS AND FUNCTIONS OF PAINT

COLOURS



Paint Functions - Protection



Paint Functions – Protection (1)



Paint – Signal/Camouflage Function (2)



Paint Functions (3)

- Decorative,
- Insulation,
- Conductivity,
- Antibacterial,
- Fire retardant



Paint Functions (4)

- Paint is also formulated to adapt to a variety of substrates and methods of application.



- Since there are many different initial lead-containing formulations for colour and other paint properties, Technical Guidelines may provide only general information about reformulation processes.
- In-depth analyses and more specific data will be provided through the pilot demonstrations in the GEF Lead Paint Project to participating companies according to their specific needs.

3. Paint Raw Materials

- Resins (vehicle)
- Pigments
- Extenders
- Additives
- Solvents (can be water)



Flammable



Environmentally
Damaging



Irritant



Health hazard

4. LEAD COMPOUNDS IN PAINTS



Paint Raw Materials that may Contain Lead Compounds (1)

Type of paint	Pigments	Extenders	Driers
Air-drying primers and topcoats	X	X	X
Primers, other bases	X	X	
Primer surfacers, other bases		X	
Top coats, other bases	X		

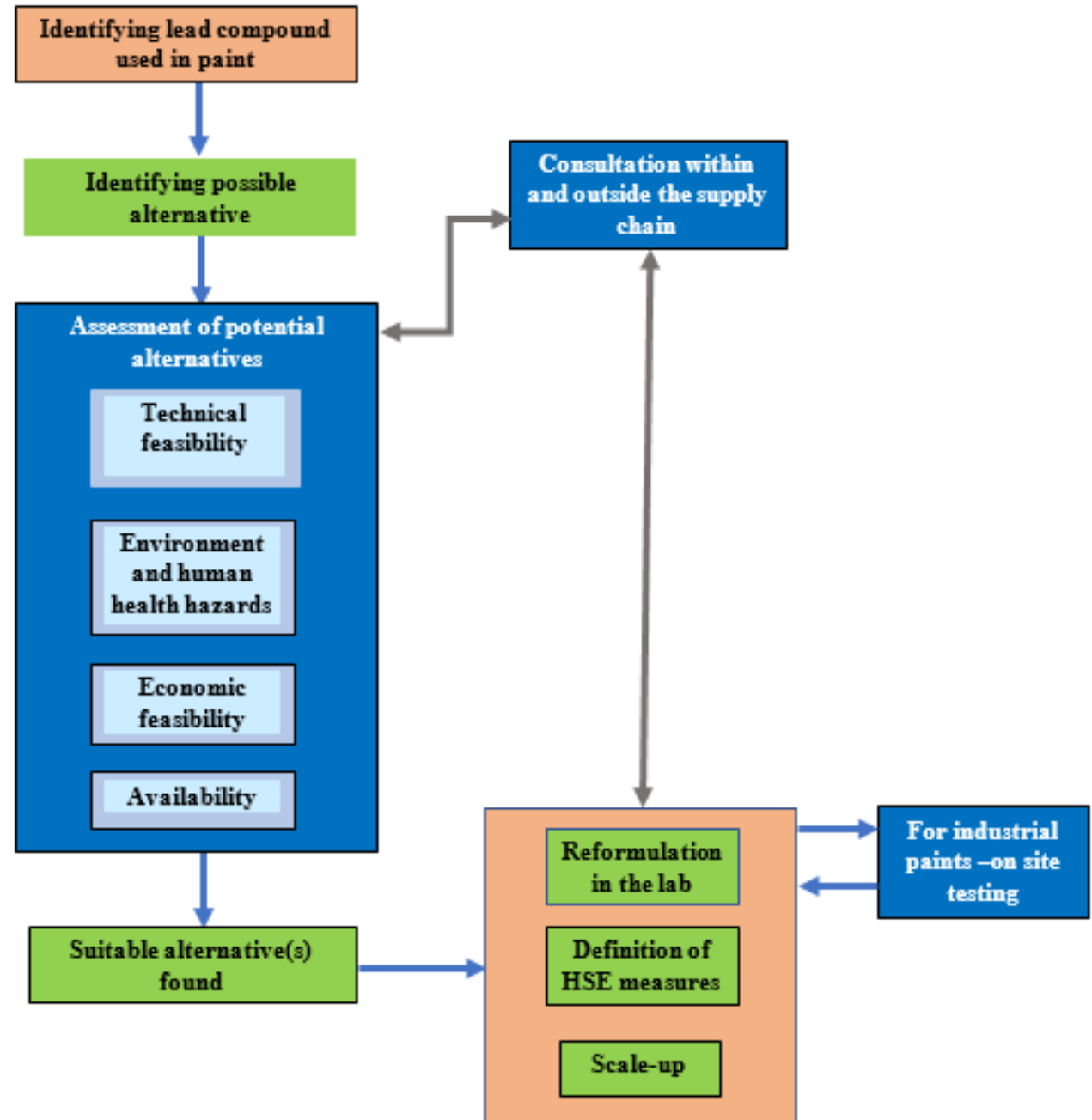
Paint Raw Materials that may Contain Lead Compounds (2)

- **Natural extenders or pigments** (like ferro oxides) may contain lead compounds;
- By using these extenders or pigments, lead compounds may be added unintentionally;

Hazardous Properties of Lead Compounds in Paints

Chemical	Hazard statements according to GHS
PIGMENTS	
Lead chromate molybdate sulphate red 	H350 – may cause cancer H360 - May damage fertility or the unborn child H373 - May cause damage to organs through prolonged or repeated exposure
Lead chromate 	H400 - Very toxic to aquatic life H410 - Very toxic to aquatic life with long lasting effects

5. Substitution Process



Lead Compounds Substitution

Anticorrosive pigment Red Lead

~~Zinc chromate~~, ~~Zinc~~ phosphate?, Calcium (poly)phosphate?

Pigments for topcoats – Red molybdate, Lead chromate

There is a wide choice of possible, non-hazardous alternatives

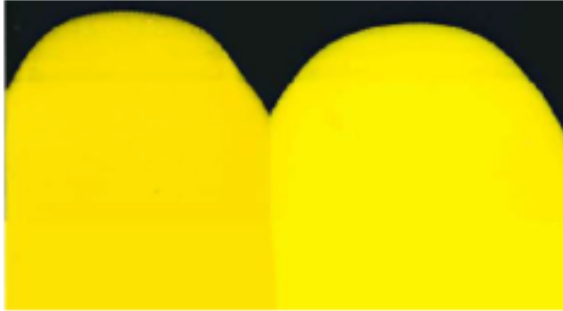
Lead additives (driers)

Zirconium or Strontium ~~octoate~~, Zirconium or Strontium neodecanoate

6. Assessment of Alternative Pigments and Additives

Alternative Pigments Assessment (1)

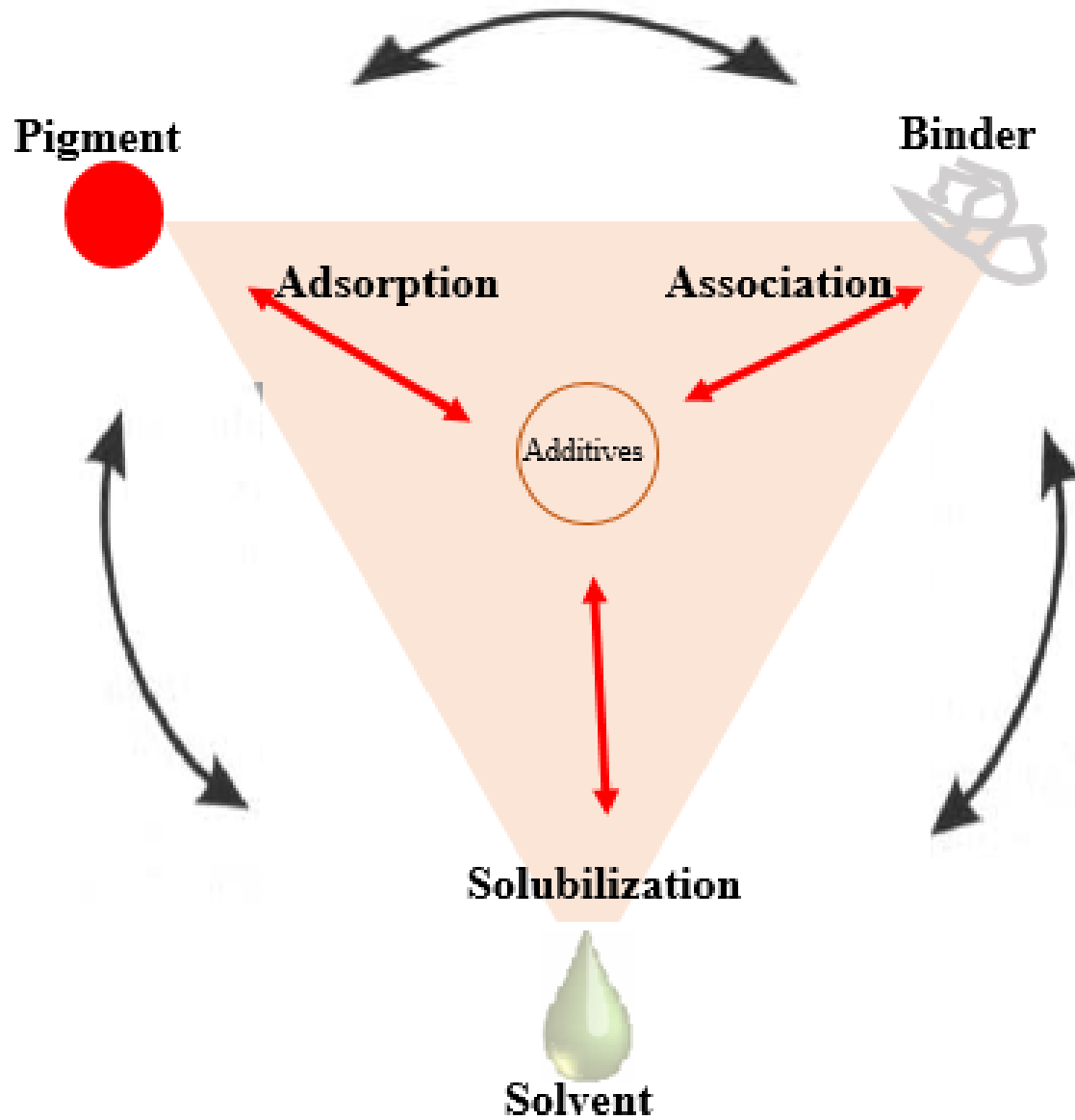
- Alternatives to anticorrosive pigment Red Lead
- Alternatives to pigments molybdate orange and lead chromate yellow

Pigment	Possible Alternative to	Colour comparison
Bismuth Vanadate PY 184	PY 34	<p>Pigments have similar chroma, but PY 184 has lighter shade than PY 34 which leads to difficulty in obtaining a deeper yellow colour. These colours can be obtained by addition of other pigments.</p> <p>PY 34 PY 184</p> 

Alternative Pigments Assessment (2)

Request	Lead chromate yellow PY 34	Alternative
		PY 184
Function	Excellent hiding power. Excellent bleeding properties and gloss retention, the vibrant and deep colours of PY 34 and PR 104 do not fade or become dull.	Durable paints, the same colour range cannot be achieved without other pigments Excellent bleeding properties
Production process		There is no need for changes in the production process
Environmental and human health hazard	<p>H350 – may cause cancer</p> <p>H360 - May damage fertility or the unborn child</p> <p>H373 - May cause damage to organs through prolonged or repeated exposure</p> <p>H400 - Very toxic to aquatic life</p> <p>H410 - Very toxic to aquatic life with long lasting effects</p>	Not classified as hazardous to human health and the environment
Economic feasibility		The best alternative for PY 34, but 5 to 6 times more expensive (22 to 35 EUR per kg)
Availability		Somewhat limited; due to limited sources of raw materials (Bi, V)

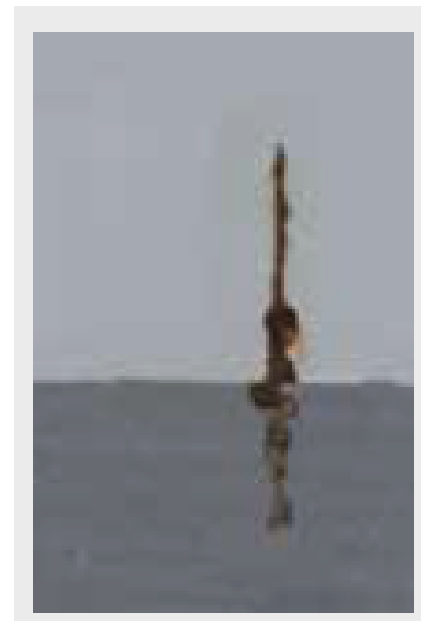
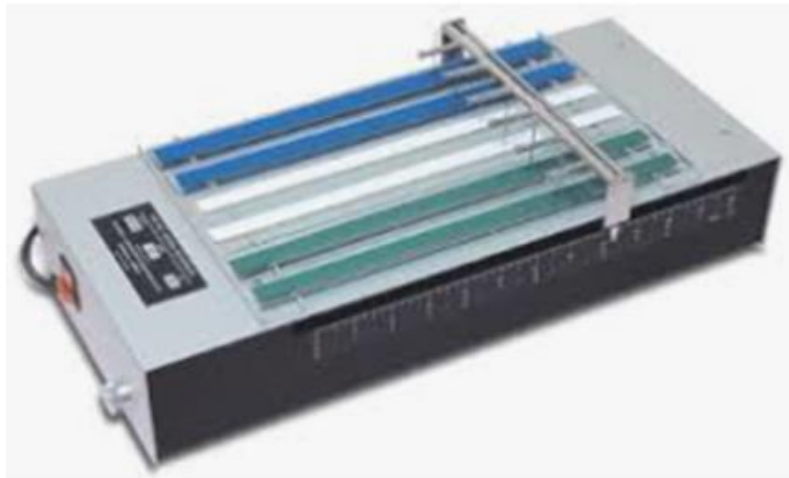
6. REFORMULATION PROCESSES



The main practical problem in (re)formulation is the large number of components present in a paint

Reformulation – Anticorrosive Pigments, Driers

- Lead driers and anticorrosive pigments substitution do not require complex reformulation;
- Parallel paints testing is necessary to check if reformulation is effective



Reformulation – Pigments for Topcoats

- Molybdate orange and Lead chromate cannot be substituted by a single pigment;
- Substitution by combination of the organic and the inorganic pigments is necessary;
- Pigments choice depend on desired performance properties of a paint



CONCLUSION

- Lead is classically a chronic or cumulative toxin. **Exposure to lead is a major public health concern;**
- Lead compounds **should have priority in substitution;**
- There are many pigments and driers **available on the market that may effectively substitute lead compounds;**
- Lead Paint Reformulation Technical Guidelines provide information on alternatives, their assessments and reformulation processes. This helps companies to effectively substitute lead compounds;
- We will work with participating SMEs on specific reformulations, according to their needs

THANK YOU!

謝謝

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