
Technical Information

T/P 3116 e
October 1993 (RV)

Manufacture of colored pencils, wax crayons, watercolors, poster paints and artist's colors

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1. Leads for colored pencils Two methods may be adopted for the production of colored pencils.

Method A: First the compound for the lead is prepared.

This is compacted into leads, which are set aside to dry and later treated with wax.

Leads produced by Method A have a lower binder content and hence write somewhat softer than those produced by Method B. However, Method A has the disadvantage that it involves two separate operations.

Method B: The compound is prepared and a wax emulsion is incorporated all in one operation. The compound is then compacted into leads, which are set aside to dry.

The advantage of this technique is that the leads are produced in one operation. Afterwards they need only be dried.

All our pigments in the ranges Fanal[®], Heliogen[®], Lithol[®], Sico[®], Pallogen[®] and Palitol[®] are suitable colorants. We particularly recommend the corresponding S types where these conform to Type 8082 or EN 71/3.

Typical formulations

Method A

Parts by weight

65 kaolin
23 Tylose[®] MH 300 (Hoechst), 10 % in water
12 pigment

Mix the ingredients in a kneader until the compound is ready for compacting. Put aside the leads thus obtained for a few days to dry and subsequently treat them for about 24 hours at approx. 85 °C with a 1:1 molten mixture of Japan wax and stearin.

Method B

Parts by weight

48 kaolin
12 pigment
15 tragacanth (35 %)
25 wax emulsion consisting of:

20 % ozokerite 70/72 °C
5 % stearin
15 % Luwax[®] LG
10 % Emulan[®] OU
50 % water

Grind the kaolin and the pigment together in an edge runner and mix with the wax emulsion in a kneader to form a homogeneous mass. Then add the tragacanth and continue mixing until ready for compacting. Set aside the formed leads to dry.

2. Wax
crayons

Wax crayons should be able to write on practically all materials. They consist essentially of wax, extender and pigment. Titanium dioxide is usually added as a whitener to ensure that the crayons have the same appearance as the markings they make.

Practically all our pigment powder products are suitable for wax crayons. Where extremely high fastness to light is required, our Heliogen, Paliogen, Paliotol and Sicofast pigments may be used.

The lightfastness of our Fanal, Lithol and Sico pigments is not quite as high, but is quite adequate for most of the applications encountered in practice.

A suitable mixer is not always available to produce a very fine dispersion of the pigment in the wax compound. In such cases we recommend our Eupolen[®] preparations, which are melted together with the wax and homogenized by stirring. Another possibility is the Rakusol[®] preparations. These liquid preparations need only be stirred into the warm wax compound, the temperature required being lower than that for incorporating Eupolen preparations. However, the compatibility of the Rakusol types with the wax compound should first be tested.

Typical
formulation 1

Parts by weight

37	Luwx A
28	ozokerite
10	bee's wax
15	kaolin
4	titanium dioxide
5-6	pigment (calc. 100 %)

Grind the kaolin, titanium dioxide and powder pigment in an edge runner and stir the resulting mill base (or alternatively a pigment preparation) into the molten blend of waxes. Cast the mixture obtained in heated moulds.

Typical
formulation 2

Parts by weight

38	microcrystalline wax (m. p. 40 - 50 °C)
15	stearic acid
4	Luwx A
38	kaolin
4	mineral oil
5-6	pigment (calc. 100%)

Disperse the pigments in the oil in a three-roll mill and then incorporate into the molten blend of waxes.

Typical
formulation 3

Parts by weight

- 25 soft ozokerite
- 50 paraffin wax m. p. 50 - 52 °C
- 25 Eupolen preparation (20 parts in the case of black)

Melt the ingredients at 120-140 °C while stirring and then cast in moulds. Under certain conditions the crayons can also be extruded. In this case we recommend replacing part or all of the paraffin wax by Luwax A. It should be noted that Luwax A influences the hardness and hence the writing qualities of the crayons. The composition should be adapted to the particular extruder used.

Typical
formulation 4

Parts by weight

- 40 Luwax A
- 30 Lupolen® (LDPE)
- 30 filler and pigment or pigment preparation

This formulation for pressure-resistant wax crayons can be processed in an extruder.

Typical
formulation 5

Special wax crayons offer considerable scope to home and professional textile designers. A design can be drawn on paper and immediately transferred onto the fabric to be printed, e.g. with a flat-iron. The following formulation gave good results in our trials:

Parts by weight

- 32.5 stearin
- 32.5 paraffin in wax m. p. 50 - 52 °C
- 10 Japan wax
- 20 talc
- 5 Lurafix® dye

Luwax A can be added in small amounts to increase the hardness. The properties of Lurafix dyes and the conditions under which transfers can be made are described in the Technical Information Bulletin "Lurafix dyes".

3. Water
colors

The manufacture of water colors requires a great deal of experience because the binders and auxiliaries vary according to the colored pigments used. In this respect, almost all our powder pigment types and some of our Dispers and Pigmosol® preparations are suitable.

Some typical formulations for water colors are presented below:

Water color pastes

Parts by weight

- (a) 30 capillary syrup
- 15 white dextrin (50% in water)
- 10 water
- 3 Tamol® NNO
- 15 colored pigment

- (b) 40 capillary syrup
- 20 white dextrin (50% in water)
- 5 Pluriol[®] E 9000
- 50 Dispers preparation

With this formulation grinding is unnecessary; a mixer is sufficient.

Opaque water colors in tablet form

Parts by weight

- (a) 1.25 colored pigment
- 2.5 Pluriol E 400

Grind these two ingredients together in the three-roll mill. Then add

- 15 Pluriol E 9000
- 5 BASF Silica[®] Powder B, air-classified
- 1 Luviskol[®] K 30

Melt the mixture in a water bath. Allow to cool, pulverize and tablet.

- (b) 1 Pigmosol preparation
- 15 barytes
- 10 Pluriol E 9000

Grind on edge runner, screen and tablet.

- (c) 15 calcium carbonate
- 3 sugar
- 10 white dextrin
- 7 gum arabic 30%
- 1 capillary syrup
- 3 pigment
- 10 water

Homogenize and tablet.

Gouache

- (a) 52 gypsum, barytes or precipitated calcium carbonate
- 7 colored pigment
- 24 yellow dextrin (50% in water)
- 12 gum arabic (30% in water)
- 3.6 sugar
- 1.4 capillary syrup

Grind ingredients on three-roll mill and then tablet.

- (b) 1 Dispers preparation
- 0.5 Dispers White 00-2207
- 0.5 capillary syrup

Water color pencils (colored leads that flow when wet)

A water-soluble binder is necessary to make the leads flow and blend like water colors.

80 kaolin
40 siliceous chalk
20 colored pigment (50 parts for black)
16 tragacanth (40 %)
10 Emulan[®] OC
5 Pluriol E 9000
29 Turkey red oil 50%

Manufacture is the same as for colored pencils.

4. Poster paints All our pigment powder types and Dispers preparations can be recommended for poster paints.

Typical
formulation 1

Parts by weight

30 blanc fixe
10 lithopone
1 colored pigment (not Lumogen[®])

Mix the dry pigments in an edge runner and then add

25 Acronal[®] 290 D
10 casein solution 20%
10 water

Homogenize the ingredients with a high-speed stirrer.

Typical
formulation 2

Poster paints with Lumogen pigments

15 Lumogen Yellow S 0790
80 casein solution 12.5 %
20 Propiofan[®] 661 D
10 water

Disperse the ingredients in a bead mill

Typical
formulation 3

Poster paints with Dispers preparations

60 blanc fixe
20 lithopone
2 Dispers preparation (20 parts for black)
60 Acronal 290 D with 5 % white spirit
2 % Natrosol[®] 250 HR (supplied by Hercules)
20 water

Homogenize ingredients with high-speed stirrer.

5. **Tempera paints** Classical artists tempera paints contain drying oils and water-soluble binders. However, the term is also applied to opaque water colors containing aqueous binders and no oil. The following example is a formulation for a poster tempera paint:

Typical
formulation

Parts by weight

1	Pigmosol preparation
20	gypsum
10	dextrin
15	gum arabic
x	water (as required)

Disperse in a bead mill (the amount of water added depends on the desired consistency).

6. **Artists colors** High-quality artist's oil colors generally contain very lightfast inorganic colors and organic pigments. For this purpose we recommend our Sico Fast, Sicotan[®], Sicopal[®], Heliogen, Pallogen and Paliotol pigments. Where the lightfastness requirements are less exacting, our Lithol, Fanal and Sico pigments may also be used.

Our Dispers preparations are suitable for acrylic paints.

Typical
formulations

(a) Oil paints

Parts by weight

1	linseed oil
1	poppy seed or sunflower oil
2	colored pigment

Grind the ingredients in a roller mill. The consistency of the paint is adjusted only by varying the oil/pigment ratio.

(b) Acrylic paint

50	Acronal 290 D
5	blanc fixe
4	Dispers preparation
1	white spirit

Homogenize the ingredients well and fill into tubes.

The formulations given above are basic or typical formulations that do not reflect the most recent developments.

Safety

We know of no ill effects that could have resulted from using the pigments described here for the purpose for which they are intended and from processing them in accordance with current practice.

According to the experience we have gained over many years and other information at our disposal, the pigments do not pose any risk to health when they are used for the purpose for which they are intended and the principles of sound industrial practice and the information and advice contained in our Safety Data Sheets are observed.

Note

The information submitted in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processors of the responsibility of carrying out their own tests and experiments; neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed.

Printed in West Germany

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