APISARA

COLORANTS IN SOAPMAKING

Pigments, natural colorants, stability, dispersion, bleeding and control of results

PURPOSE OF THIS GUIDE

To understand why colour succeeds or fails in soap: distinguish the main families of colouring materials, anticipate their behaviour in an alkaline environment, select a dispersion method, control dosage and reproducibility, and verify suitability and compliance for the intended cosmetic use.

Audience: beginners, artisans, professionals, trainers and self-learners.

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DISCLAIMER

> This guide is an educational resource. It does not replace laboratory analysis, a Safety Data Sheet (SDS), supplier specifications, a cosmetic safety assessment, or verification of the regulations applicable to the colorant, finished product and country of sale.

1. Colouring soap: a formulation operation

The colour of a soap does not depend only on the colorant added. It results from interactions between the colouring material, the natural colour of the oils, high pH, temperature, gel phase, fragrance, additives, process and curing time.

A red powder in its container may become pink, brownish or almost disappear in soap. A bright green botanical infusion may turn khaki. A fragrance containing vanilla-related materials may brown an area intended to remain white. Colour must therefore be tested in the actual formula.

APISARA RULE

A colorant suitable for soap should answer four questions: is it permitted for the intended use? is it stable in this environment? can it be dispersed correctly? is the result reproducible after cure?

2. Main families of colorants

Family	General behaviour	Advantages	Points to watch
Insoluble pigments	Remain as dispersed particles	Potentially good stability, strong colours	Dispersion, clumps, excessive loading
Micas / pearlescents	Mineral platelets coated with pigments/dyes	Luminous effects and complex shades	Some coatings or dyes are unstable at high pH
Soluble dyes	Dissolve in a suitable phase	Intense colour at low dosage	Possible bleeding; variable stability
Lakes	Dyes rendered insoluble on a substrate	Less migration than corresponding soluble dye	Dispersion and suitability of grade
Botanicals / natural materials	Complex pigments in plants, powders, infusions	Artisanal palette, material identity	High variability, pH shifts, light stability
Approved carbon / black pigments	Very powerful pigments	Deep blacks and greys	Dosage, dust, cosmetic compliance

Commercial descriptions are not enough. “Blue mica”, “natural pigment” or “food colour” do not precisely describe composition or cosmetic authorisation.

3. Alkaline environment: why colours change

Freshly made soap is strongly alkaline. Many coloured molecules change structure or ionisation state with pH, so their colour may shift dramatically. Others are degraded by alkalinity, heat or oxidation.

Anthocyanins from many flowers, berries and cabbages are particularly pH-sensitive. Chlorophyll likewise does not provide a universally stable green in soap. By contrast, some mineral pigments are much more resistant.

QUICK TEST ≠ VALIDATION

Observing a powder in an alkaline solution can provide an indication, but it does not replace a real mini-batch. Soap contains a fatty phase, salts and fragrance and undergoes curing; final behaviour may differ.

4. Mineral pigments and oxides

Iron oxides and several mineral pigments are valued for colouring strength and stability. They are insoluble: they must therefore be dispersed, not dissolved.

Type	Typical colours	Practical behaviour
Iron oxides	Yellow, red, brown, black	Generally robust in soap; high colouring strength
Titanium dioxide	White, opacity	Very effective; dispersion is important; increases opacity
Approved green oxides / pigments	Greens depending on reference	Check CI identity, grade and permitted use precisely
Composite pigments	Various shades	Stability depends on every component

A mineral pigment should be of a grade suitable for cosmetic use and supported by specifications. Being “mineral” does not remove the need for regulatory verification or impurity control.

5. Ultramarines, violets and related pigments

Ultramarines provide useful blues, violets and pinks in cosmetics. Their stability in soap can be good when the material is suitable for this use, but correct dispersion remains necessary.

Some pigment materials can react unfavourably in strongly acidic environments or with other components. In alkaline soap, the main practical issues are usually dispersion quality, the shade obtained in the actual base and regulatory suitability.

DO NOT BUY BY COLOUR NAME ALONE

Two powders sold under the same colour name may have different compositions. Ask for the INCI/CI name, composition, technical data and intended cosmetic use.

6. Micas and pearlescent pigments

Cosmetic mica acts as a substrate for pigments, oxides or other coatings that create colour and pearlescence. Behaviour in soap therefore depends less on the word “mica” than on what is coating the mica.

Some micas perform very well in cold-process soap; others fade, shift colour or lose brilliance. A mica intended for make-up is not automatically optimised for soap.

GOOD PRACTICE

With a reliable supplier, look for an explicit cold-process-soap compatibility statement or high-pH test. If none is available, make a mini-batch before production.

7. Soluble dyes and lakes

A soluble dye is distributed at molecular level in the phase in which it dissolves. This can provide strong colour at low dosage, but may also promote migration from a coloured area into a neighbouring one.

A lake is a dye associated with an insoluble substrate. It behaves more like a dispersed pigment and may reduce some migration phenomena, without necessarily eliminating them.

Property	Soluble dye	Lake / insoluble pigment
Application	Dissolve in compatible phase	Disperse
Intensity	Often high at low dose	Depends on pigment loading
Migration in designs	Can be significant	Often lower
Risk of specks	Low if fully dissolved	Possible if poorly dispersed

8. Botanical and natural colouring materials

Plants provide a rich but less predictable palette. A powder may colour through its own pigments, oxidation, reaction with alkalinity, or simply its particulate colour. An infusion, an oil maceration and a whole powder therefore do not necessarily give the same result.

Family / example	Possible tendency	Main limitation
Turmeric / curcuminoid-rich materials	Yellow to orange	Dose, light, shade evolution
Roots / red powders	Pink, red or brown depending on material and process	Alkaline shift and variability
Indigo / indigotin materials	Blue to blue-grey depending on preparation	Dispersion technique and raw-material quality
Suitable botanical charcoals	Grey to black	Very strong colouring power, dust
Leaves / green powders	Often unstable green, khaki or brown	Sensitive chlorophylls and pigments

Traditional names are useful for experimentation, but professional reproducibility requires material identification, supplier, batch, particle size and a fixed incorporation method.

NATURAL ≠ REGULATORILY UNRESTRICTED

An edible plant or traditionally used powder is not automatically permitted as a cosmetic colorant in every market. The claimed function and local regulations must be checked.

9. White, black and very dark colours

White depends as much on the soap base as on the pigment. Very yellow oils, some fragrances or an intense gel phase can make a clean white difficult to obtain. Titanium dioxide can increase opacity and lighten the base, but it cannot always overcome substantial chemical browning.

For black, a small change in dosage can shift the result from grey to deep black. Carbon pigments are very powerful; excessive loading may produce visibly coloured lather or increase transfer to some surfaces.

DESIGN WITH THE BASE

Before adding more white pigment, ask whether the colour comes from the colorant, oils, fragrance or process. Correcting the cause is often more effective than overloading the formula with pigment.

10. Dispersion and incorporation

Method	Especially suitable for	Control points
Dispersion in a small portion of oil	Oxides, micas, oil-dispersible pigments	Break up agglomerates; account for oil taken from formula
Dispersion in glycerin / compatible liquid	Some pigments and powders	Check compatibility and added quantity
Dissolution in water	Truly water-soluble dyes	Complete dissolution and alkaline stability
Direct addition through sieve	Some fine botanical powders	Risk of specks, clumps and texture
Commercial pre-dispersion	Supplier-prepared pigments	Know concentration and carrier

Homogeneous dispersion is often more important than increasing dosage. Small pigment clumps become very visible after cutting.

DUST

Avoid creating clouds of fine powder. Work cleanly, consult the SDS and use protective measures appropriate to the material being handled.

11. Dosage: build your own working range

There is no universal percentage for “colorants”. Colouring strength varies enormously between mica, oxide, soluble dye, charcoal and botanical powder. Supplier recommendations are the best starting point when available.

To develop a formula, make several mini-batches using a simple progression: low, medium and high. Photograph them under the same conditions and evaluate again after cure. The aim is not merely to obtain the strongest colour, but the minimum dose that achieves the intended result without unwanted effects.

WATCH THE UNITS

Always state the basis: grams per kilogram of oils, percentage of batter, percentage of finished product, or quantity per batch. A dosage without a calculation basis is not reproducible.

12. Migration, bleeding, swirls and sharp lines

The professional term bleeding describes colour migration into a neighbouring area. It is particularly undesirable in multicoloured soaps where sharp boundaries are intended.

Soluble dyes are generally more prone to bleeding than insoluble pigments. However, the phenomenon also depends on the formula, moisture, colorant and time.

Visual objective	Preferred approach
Very sharp boundaries	Pigments / micas tested as non-bleeding

Visual objective	Preferred approach
Intentional gradient	Some migration may occasionally be acceptable
Complex swirl	Stable colorant + control of trace
Transparent / diffuse colour	Compatible soluble dye if migration is acceptable

13. Base colour, gel, heat and cure

Gel phase can intensify or alter some colours. Two portions of the same soap, one gelled and one not, may show different shades. Manufacturing temperature and mould insulation should therefore be recorded as process parameters.

Curing may also transform colour: water loss, oxidation, fragrance evolution and slow reactions can change appearance over several weeks.

PHOTOGRAPH AT THE RIGHT TIME

For a useful formulation library, photograph at least the fresh batter or newly made soap and the soap after cure. A photograph taken only at unmoulding may lead to a misleading conclusion.

14. Defects: diagnosis and corrections

Defect	Possible causes	Corrective approach
Dull / weak colour	Low dose, strongly coloured base, unstable pigment	Review base, dose, material and process
Coloured specks	Poor dispersion / agglomerated powder	Pre-disperse, sieve, break up agglomerates
Colour bleeding	Soluble dye / formula favourable to migration	Choose a tested non-bleeding pigment or lake
Brown / khaki shift	Unstable botanical pigment, fragrance, heat	Test another material or integrate the shift into design
Strongly coloured lather	Excess pigment/colorant	Reduce dosage
Batch-to-batch difference	Natural-material variation, weighing, gel, supplier	Tighten specifications and process parameters
White turns brown	Fragrance / base / reaction, not simply lack of white	Identify cause before adding more TiO2

15. Testing method and professional reproducibility

1. Define the target colour and design.
2. Identify the colorant precisely: name, CI/INCI where applicable, supplier and batch.
3. Verify permitted cosmetic use and restrictions.
4. Choose a fixed dispersion method.
5. Make mini-batches at several dosages.
6. Record temperature, gel phase, fragrance and additives.
7. Evaluate after cure, during use and after storage.
8. Select the lowest satisfactory dosage.
9. Add the reference and method to the master formula.

ONE COLOUR = ONE SYSTEM

Validation is not simply about “1 g of red pigment”. It concerns this exact pigment + this formula + this fragrance + this process + this dispersion + these curing conditions.

16. Safety, quality and regulation

In the European Union, substances used as colorants in cosmetic products are governed by Regulation (EC) No 1223/2009. Annex IV lists permitted colorants and may specify conditions concerning product type, body area, maximum concentration or other restrictions.

The CI number is an important identification tool, but the relevant regulatory entry and supplier documentation must be checked. The European Commission's CosIng database is useful for ingredient identification and functions, but compliance must be assessed against the applicable legislation and the finished-product safety assessment.

In the United States, color additives used in cosmetics must be permitted by the FDA for the intended use; some are also subject to batch certification. A material permitted in food is therefore not automatically permitted for every cosmetic use.

PROFESSIONAL PRINCIPLE

Never infer “cosmetic suitability” from “food grade”, “natural”, “mineral” or “sold for DIY”. For commercial production, verify identity, grade, specifications, restrictions and the regulations of the target market.

For powders, occupational risks from inhalation and handling must also be considered. For natural materials, contaminants, heavy metals, microbiology or other relevant criteria should be controlled as appropriate to the material and supplier.

17. Key points

- Final colour depends on the colorant and the formula.
- High soap pH destroys or transforms many botanical pigments.
- Insoluble pigments and soluble dyes require different handling.
- Micas must be assessed by composition and stability, not only by commercial name.
- Good dispersion can improve the result more than a higher dose.
- Bleeding is especially important in multicolour designs requiring sharp lines.
- Gel phase, fragrance and cure can substantially alter shade.
- A “natural” or “food-grade” material is not automatically an authorised cosmetic colorant.
- In professional production, every colorant should be identified, documented, tested and traceable.

THE RIGHT QUESTION

Do not ask only: “What colour will I get?” Ask: “Is this material permitted, stable, correctly dispersed and reproducible in my soap after cure?”

References and resources

• European Union — Regulation (EC) No 1223/2009 on cosmetic products, particularly Annex IV: list and conditions of use of

permitted colorants.

• European Commission — CosIng cosmetic ingredient database; for colorants, preservatives and UV filters, it references substances

included in the relevant regulatory annexes.

• U.S. Food and Drug Administration (FDA) — Color Additives and Cosmetics and tables of color additives permitted in cosmetics;

check intended use, specifications, restrictions and any certification requirement.

• Technical data sheets, SDSs, specifications and certificates of analysis supplied for each colorant.

APISARA RESOURCES

In addition to the saponification calculator, Apisara provides technical guides and reference sheets as well as educational articles published on Facebook and Substack. The collection is designed for self-learning, training and professional practice.

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