Study of Separation of Pigments in Paints for Development of Multicolor Paint

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Abstract

The multicolor paint is a full waterborne product, has low Voc, is environmental friendly and solvent free and is an ideal substitute for marble, granite; And the full waterborne granite multicolor painting has good elasticity and can cover small cracks of a wall body. A multicolor Paint can be formed by optionally mixing two or more color spot color lumps and then spraying the mixture at a time. The multicolor Paint can imitate and decorate textures of various real granites and is natural and vivid. The production process is simple, does not need dispersion at a high speed and only needs uniform stirring. The product has the texture of natural marble, good weather resistance and water resistance, does not fade and age, has a strong adhesive force, contamination resistance, convenient construction, high hardness of film and scratch resistance, and is applied to surface coating of indoor and outdoor brick walls, concrete and cement walls and the like. The present paper relates to a coating, in particular to protect the surface for a building facade and apparatus Decorated with imitation granite, marble effect paint, it belongs to the field of chemical technology coatings. Water in liquid hydrocarbon multicolored paint composition is provided having a disperse phase and continuous phase. The disperse phase preferably is comprised of water soluble, film forming, crosslink able, carboxylated polymer; crosslinking agent; hydroxy (lower alkyl) cellulose; Cationic quaternized water soluble cellulose ether; Peptized clay and water. The continuous phase preferably is a hydrocarbon composition containing film forming polymer, wax and thickener. Methods for preparing the paint are also provided.

Keywords: Multicolor Paint, Granite, Water Based Paint

I. INTRODUCTION

A. Paint

A colored substance which is spread over a surface and dries to leave thin decorative or protective coating. Paint is used to decorate, protect and prolong the life of natural and synthetic materials, and acts as a barrier against environmental conditions. Paint is one major segment of the surface coatings. The paint industry produces a huge variety of products that protect, preserve, and also beautify the objects to which they are applied. Typical products include Decorative paints, Industrial paints, Marine paints, Automotive Paints, Road Marking paints, architectural paints.

All paints are basically similar in composition in that they contain a suspension of finely ground solids (pigments) in a liquid medium (vehicle) consisting of a polymeric or resinous material (binder) and a volatile solvent. During the drying of paint, the binder forms the continuous film with the necessary attributes of adhesion, flexibility, toughness and durability to the substrate (the surface being coated). Paints also contain additives, which are added in small quantities to modify some property of the pigments and binder.

B. The Composition of Paint

Paint is essentially a mixture of a binder, which sticks the paint to the surface, pigments, to give the paint colour, make it opaque and occasionally to prevent corrosion and solvents to make the paint spreadable.
There are four categories of paint ingredients: Pigment, Solvent, resins (Binder), Additives as shown in above figure 1.1.

- **Pigment** provides color, hiding and bulk
- **Solvent** affects consistency and drying time and carries the pigment and resin to the substrate.
- **Resin** binds the pigment particles together and affects adhesion, durability and level of protection of the paint film.
- **Additives** enhance the coating’s performance with specific desirable characteristics.

### Types of Paints

1) **Alkyd Paint**

The solvent-thinned resin in the alkyd paints is made from synthetic oils. Alkyd resins are oil-modified polyesters made primarily from alcohol and acids. Alkyd paints are faster drying hardener, and more durable and have better color-retention properties than oil-based paints. They are easy to apply, are washable, and have less odor than other paints using solvent thinners. Alkyd paints have poor resistance to alkaline surfaces, such as masonry, and should not be used unless these substrates are properly primed.

2) **Latex Paint**

Most water-based paints are referred to as latex paint. Latex paints have very little odor and a fast drying time. Their water-based thinner makes latex paints easy to apply, clean up and discard. Latex paints are porous; when applied, a latex coating retains microscopic openings that allow it to breathe. Adhesion failure is prevented because moisture that might become trapped beneath the paint’s surface can evaporate through these openings. Latex paints have a greater blistering tendency when high levels of tinting color are present.

3) **Oil-Based Paints**

The solvent-thinned resin in oil based paints is made from natural oils, such as linseed oil, soya oil and Tung oil (from China wood tree fruit).

4) **Primers**

Primers makes surface more paintable by providing improved adhesion for coatings. Primers are selected in relation to the characteristics of the selected top-coat.

- Conceal the substrate surface so that the existing coating color does not read through.
- Provide a barrier to prevent moisture from destroying the paint bond.
- Bind substrate surface with the top coat.
- Limit the paint absorption of a porous substrate, such as a skim coat of plaster.
- Recondition old paint to receive future paint coatings.
- Acts as rust inhibitors.

5) **Catalyzed Epoxy Paint**

Catalyzed epoxy coatings resist chemicals, solvents, stains, physical abrasion, traffic and cleaning materials. They have good adhesion and color retention. Catalyzed epoxies come in two parts, resin and catalyst. They have limited “pot life”, hence are required to be mixed just prior to use. When applied to a substrate, a chemical action occurs that causes a dense hard film to form, similar to baked enamel. Adequate ventilation must be provided during and after application.

Three types of catalyzed epoxies are commonly used in commercial interiors:

- Polyester epoxies produced a tough glossy surface.
- Polyamide epoxies provide a flexible but durable film.
- Urethane epoxies are the most versatile of the epoxy coatings.

6) **Epoxy Ester Paints**

Epoxy esters are similar to catalyzed epoxy but have no pot life restrictions and are packaged like conventional paints. The paint film occurs due to oxidation rather than a chemical reaction triggered by a catalyst. Epoxy esters are less durable than catalyzed epoxies.
Flame Retardant Paints
Flame retardant paints slow the rate at which fire spreads by delaying the ignition of the surface that has been coated. They are used on combustible materials such as wood to achieve the required flame spread ratings. These paints delay but do not prevent a fire from spreading. Flame retardant paints are intumescent and protect the substrate from burning by swelling to form a charred layer of blisters when exposed to extremely high heat.

Flame retardant paints are foam like material made with either water-based thinner or solvent-based thinners. Requisite fire ratings are achieved with these materials based on the number of coatings applied to the substrate at a prescribed thickness. Intumescent paint manufacturer certify painters to ensure that their product are correctly applied.

Fire-Resistant Paints
Fire-resistant paints resist the spread of fire by not contributing to the flame. They are less effective at controlling the spread of fire than intumescent coatings.

Multicolor Paints
Multicolor paints are durable and scratch-resistant. They add a three dimensional quality to a surface similar to hand-sponge techniques. Multicolor coating can be water-thinned or solvent-thinned. Traditional solvent-thinned multicolor coatings are composed of tiny bubbles of different sizes and colors suspended in non-pigmented solutions. The separated beads of pigments remains until they are spray–applied. They burst upon impact with the surface.

Decorative Paint Finishes
These are used for their aesthetic qualities and for masking minor surface defects. Generally they provide a surface multitoned color and a texture. Decorative paint finishes can be achieved with oil or water-based paints.

D. Multicolor Paint
Multicolor Paints are specially designed waterborne paints in which different colors co-exist as fully separated. Separate tinted base paints are mixed together and are completed with continuous phase.

It is a pair of two water borne acrylic dispersions giving the full system for multicolor coating. The cured film is extremely durable and may be washed repeatedly without causing damage.

In addition these MCP offer a lightweight solution that is durable, easy to apply and enables the creation of a customized look; Multicolor paints offer several other additional benefits including, excellent dirt pick-up, Water whitening and Weathering resistance and long term color retention. To provide a vivid decorative effect by acting as a replacement for natural stones and other building materials.

Multicolor paints are used to coat surfaces where it is desirable for more than one color to appear in the coating. Generally there is a prominent color with speckles, streaks, or blotches of one or more additional colors dispersed therein. Granite like appearance can be created by the utilization of multicolor paints. However, multicolor paints can be applied to many substrates where it would not be possible or practical to put granite. For instance multicolor paints can be easily applied irregular surfaces and can be utilized in exterior applications. In fact, multicolor paints offer significant advantages as coatings for rough surfaces. Multicolor paints can also normally be applied at a lower cost than granite. Granite like appearance can be created by the utilization of multicolor paints.

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Today most multicolor paints function on the basis of water/solvent incompatibility. This incompatibility keeps the different colors separated, thus creating a multicolor system with one application of the paint.

Application of Multicolor paints
Application Suitable for commercial building, civil building, office, hotel, school, hospital, apartments and other interior walls surface decoration and the protection.

Multicolor Paint Features
- High degree of simulation: By using color particle coating granulation technology, the degree of simulation can reach 95%. It also makes up for the shortcomings of high cost and difficult construction when using granite.
- Simple construction: With only a single spray, the colorful granite stone effect can be completed. Construction is simple and it can avoid uncontrollable risk.
- Durable weather resistance: With the whole silicone acrylate resin system, the coating has strong chemical stability which making its anti-ultraviolet ability excellent and weather resistance durable. At the same time, the adopting of ceramic inorganic pigments ensures its lasting color retention. Service life can be more than 20 years.
- Good cracking resistance, excellent self-cleaning property and environmentally friendly: Raw material meet EU environmental standards. VOC is extremely low. No pollution produced during construction.
- Cost-effective: The weight of granite paint is only the 1/40 of stone, so it is very suitable for spraying on the external insulation wall to improve security.

II. METHODS FOR PREPARATION OF MCP

![Fig. 3: Preparation of MCP]

As shown in above figure 2.1, we have to make base paint for getting the effect of required chips in the Multicolor Paint.
- This Base Paint is then tinted as per the color of the chips in the selected multicolor required for the image such as tiles, granite etc.
- This tinted portion when mixed should not lose the pigments of individual’s chips; for this purpose it is mixed with the Protective colloid solution.
- The mixture of Base paint and the protective colloid solution it forms the disperse phase. In order to get the final product as Multicolor Paint this disperse phase is then mixed with a Continuous Phase.

III. CONCLUSION

The processing technology provided by this paper is simple, the finish coat paint is made on the outer surfaces of water borne multicolor coatings, and the effects of gloss, such as natural granite and marbles can be formed on the surface of a base, and also the effects of the natural granite and the marbles, such as expensive price, rare resources, high radiation, high manufacturing cost, complex construction, high self weight, poor temperature preservation are also overcome.
- It is a low cost option to imitate costly stones like granite;
- It can also be used to give better look and finish to the walls at comparatively low cost;
- Pigments have been separated to form a multicolor paint.

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