

Retraction

Retracted: Application of Chemical Technology of Water-Based Acrylic Dipping Paint in Art Painting Creation

Journal of Chemistry

Received 15 August 2023; Accepted 15 August 2023; Published 16 August 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] X. Kong and X. Meng, "Application of Chemical Technology of Water-Based Acrylic Dipping Paint in Art Painting Creation," *Journal of Chemistry*, vol. 2022, Article ID 7715011, 7 pages, 2022.

Research Article

Application of Chemical Technology of Water-Based Acrylic Dipping Paint in Art Painting Creation

Xiangfeng Kong  and Xiangzhen Meng 

Hebei Academy of Fine Arts, Shijiazhuang, Hebei 400072, China

Correspondence should be addressed to Xiangzhen Meng; 1865400018@e.gzhu.edu.cn

Received 15 July 2022; Revised 3 August 2022; Accepted 8 August 2022; Published 25 August 2022

Academic Editor: K. K. Aruna

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In order to better sort out the superiority of water-based acrylic in painting art, explore and understand the uniqueness of water-based acrylic painting materials and apply this to art creation. The author proposes a chemical process based on water-based acrylic dipping paint, by discussing the coating and film properties of water-soluble acrylic dip paint, combined with the practical application of a casting tank; summarizing the countermeasures to solve the disadvantages of common paint films; and proving that the paint has a good comprehensive performance by comparing with other dipping paints. Experimental results show that based on the chemical process of water-based acrylic dipping paint, it has waterproof, high gloss, gloss retention, color retention, high weather resistance, and good corrosion resistance in the process of art painting; the physical parameters are better than other dipping paints, such as gloss can reach 70~80%. *Conclusion.* In art painting, water-based acrylic dip paint is a kind of comprehensive performance paint with waterproof, high gloss, gloss retention, and color retention.

1. Introduction

Looking at the development of art, it is not difficult to find that today's painting art is shifting from a single dimension to a multivalue dimension; similarly, artists are also aware that traditional art creation can no longer meet the needs of the public's aesthetics and their own artistic expression. As a result, artists began to experiment, integrate, and innovate traditional art creation from different perspectives, thereby opening up "new" breakthroughs. These breakthroughs lie in the introduction of water-based acrylic painting materials into modern art creation; although water-based acrylic painting materials have been introduced to my country for a short period of time, it has brought a huge innovative theory [1]. In terms of time, water-based acrylic painting material is a relatively young painting material, and its essence is synthetic resin material. Compared with traditional art, watercolor, and other art materials, water-based acrylic painting materials are still a baby, and their wide range of applications is obvious despite their young age. From this point of view, the uniqueness of water-based acrylic painting

materials provides more visual language for our art creation and further brings more unknown exploration space to traditional art creation, as shown in Figure 1. In the current field of painting, water-based acrylic paintings often appear in people's field of vision. On the one hand, water-based acrylic painting materials are very inclusive; they can be connected with the canvas in the process of canvas creation; and they can become part of the watercolor when they are used on paper. On the other hand, water-based acrylic painting materials can expand the painting language and visual effects of the picture. Relying on its own unique characteristics, water-based acrylic painting materials express various "new" concepts in multiple layers, angles, and all directions [2]. With the general understanding and in-depth understanding of water-based acrylic materials by painters and the effects of water-based acrylic painting materials in the practice of art, it is further proved that promoting the widespread use of water-based acrylic painting materials is a quite correct strategy. This also just makes the water-based acrylic materials better serve the fine arts. In a sense, the integration of water-based acrylic

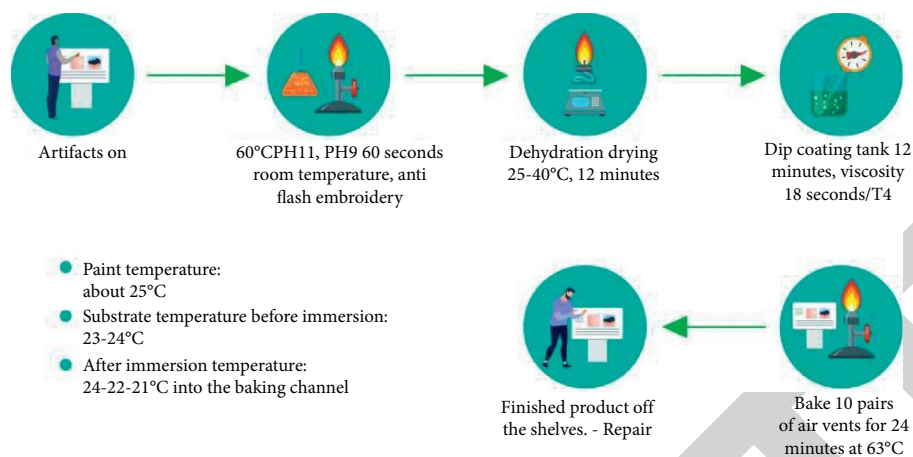


FIGURE 1: Chemical process of water-based acrylic dipping paint.

materials has enriched the artistic value of art, so as to better reflect the artist's creative concept and personal aesthetic orientation [3]. Therefore, we need to pass the corresponding theoretical basic research and specific material tests; only then can we understand the uniqueness of water-based acrylic painting materials and apply them to art creation. Based on the artistic creation of fine arts, with the help of the unique properties of water-based acrylic painting materials and the application of water-based acrylic painting materials in art creation as the point of convergence, this paper discussed the advantages of water-based acrylic.

2. Literature Review

Lee et al. proposed the integration of human nature, consciousness, and the human condition into visual representations. In terms of painting language, they used various means and water-based acrylic paints to create a series of painting techniques [4]. Arul et al. proposed nailing the canvas to the ground and using a stick, paintbrush, board brush, or a box with a small hole, dipped in water-based acrylic paint and dripped or flung onto the canvas [5]. He created with a series of improvisational movements, such as intuition, experience, and emotions, leaving a criss-cross of colors and patterns to express his ideas. Tafuro et al. raised the issue of garnet gel in water-based acrylic painting materials; since it is composed of mined garnet, it appears white in appearance when wet. But, after air-drying, it will be colored and become transparent [6]. In the artistic process, after unfolding it and patterning it with a paintbrush, use the palette knife to apply garnet gel only where needed; you will find that in areas where the gel coat of the coarse garnet is thinner, you can see different colors of the garnet: pink, brown, and red, where the coating is thick and deep. The gel can be seen to be a reddish-brown color close to black. Zhang et al. proposed different techniques to fully exploit the potential of water-based acrylic painting materials. While condensing the beauty of the rolling Loess Plateau terrain with irregular geometric figures, they also did not forget to express the majestic and rough northwest natural features vividly through technical effects such as color contrast, solid

edge lines, and textured brushstrokes [7]. Li et al. proposed that water-based propylene belongs to synthetic resin materials. Sprinkle appropriate amount of water on the base of different humidity or on the pigment that has not yet dried. The pigment on the top and the pigment on the bottom before or the pigment and the base are separated due to the action of water, which can form the ice crack effect similar to porcelain [8]. In the process of painting, through the control of the flow, penetration, fusion, drying, and other factors of the pigment, the interestingness of the picture shape and structure is enriched, and a modern visual painting style is formed. Pk et al. proposed that unlike oil paints, water-based acrylic paints do not turn yellow and become brittle, wrinkle, or crack. When oil paints dry and solidify, the paint layer will become hard, and it will become brittle after a long time, while acrylic paints dry and solidify very quickly, but at the same time, they can maintain their elasticity and durability; after drying, the acrylic painting painted on the canvas can be rolled up, stored somewhere, and taken out and restretched on the frame after a few years, without worrying about the color layer [9]. On the basis of the current research, the author proposes a chemical process based on water-based acrylic dipping paint, by discussing the coating and film properties of water-soluble acrylic dipping paint, combined with the application of pouring tank construction; the countermeasures to solve the common problems of paint film are summarized [10]. Compared with other dipping paints, it is proved that this paint has a good comprehensive performance in art painting.

3. Research Methods

3.1. Use Characteristics of Water-Based Acrylic Materials

3.1.1. Use Characteristics of Water-Based Acrylic Materials on Paper. The advantage of acrylic material is that it dries quickly, but the disadvantage is also that it dries quickly. This seemingly paradoxical statement sums up the embarrassment of water-based acrylic paint. Their faster setting times are better than slower drying oil paints, but there are some drawbacks. For example, soak a paintbrush in water when

not in use; otherwise, the paint will dry out on the bristles. The paint on the palette will dry quickly, so spray some water on it often. Or you can use a palette designed for water-based acrylic paints. Water-based acrylic paints can be applied to many substrates, drawing paper, canvas, wood, metal, and even exterior walls. But remember one very important thing, waterborne acrylic paints do not adhere to any oily or waxy substrates [11]. This principle excludes the possibility of painting water-based acrylic on oil painting boards and canvases, so when buying, you must ask clearly whether the painting board or canvas is prepared for water-based acrylic painting and whether it does not contain any oil-based materials. In terms of expression techniques, water-based acrylic paints show their unique flexibility. With the transparency of watercolor paints, the heaviness of oil paints, the covering power of gouache paints, and the elegance and softness of other emulsion paints, water-based acrylic paints can almost all be achieved or similar. It can be piled up repeatedly like oil paints to create a heavy feeling; add an appropriate amount of water, similar to gouache; and add a lot of water. You can draw watercolor and fine brushwork effects. Traditional techniques such as thin rubbing, thick coating, overcoating, and scratching can also be used in water-based acrylic paintings, which are more convenient and more effective than other pigments [12]. The effect of water-based acrylic works on paper is very similar to watercolor paintings, and the techniques are somewhat the same. If you are not particularly professional, you may not be able to distinguish whether it is a water-based acrylic or a watercolor painting. So many watercolor painters nowadays use water-based acrylic paint as the first step because it dries very quickly and the color is very bright after drying. But do not use too dark color in the first step; otherwise, the watercolor paint will not cover it. After drying, water-based propylene can form a plastic film. The second step is to use watercolor paint to further shape [13].

3.1.2. The Use Characteristics of Water-Based Acrylic Materials on Cloth. The thin water-based acrylic painting can reveal the original texture of the cloth. The first pass is no longer a single picture; the picture is thick and thin; and the sense of layering is clear, and the sense of picture has begun to show. The sunflower in the painting is composed of many small dots, and the paint on the pen is very full when painting. Rational thinking began to be added to the picture, and the in-depth depiction from the marquee to the picture layout and then to the framing [14]. The square frame gives a sense of stability and every step is well thought out. Including the color matching, the works of this period have high color purity and are very bright, giving people a very new feeling. The picture began to pay attention to the meaning of the dots, lines, and planes in the picture, and the painting language became richer. Water-based acrylic mineral pigments are much more delicate and can be mixed with water to become as transparent as watercolor; sprinkling paint on the wetted bottom can form an uncontrolled swimming state of the paint; it is the picture that produces a definite or uncertain relationship between the image and

color blocks; and some unexpected and accidental results are obtained; this may be the beauty of ink art and watercolor [15]. Compared to oil paints and watercolor paints, there are relatively few types of water-based acrylic paint colors because colorants such as Alizarin Crimson do not easily bond with resin binders, and these colors tend to set. In this case, other colorants have to be used instead. Between different manufacturers, there is a big difference between the types and names of colors. Water-based acrylic paints dry quickly, making it impossible to apply color over a wide range of substrates for extended periods of time, as oil paints do. This is a hassle for people who like to draw slowly and tend to evenly blend techniques. This is also a painting material that is more suitable for people to create in a modern society that pursues efficiency. But the reason why most artists choose water-based acrylic paint, that is why they can quickly apply color layer by layer, without worrying about disturbing the underlying colors [16]. Because water-based acrylic paint is water-based paint, it is easy to wipe off spills or clumps of color when it is wet. But once dry, the paint can be difficult to wash off, especially on fibers. Therefore, when painting, you can only wear old clothes, at the same time protect the surrounding furniture and floors, and put a damp cloth for an emergency.

3.1.3. The Use Characteristics of Water-Based Acrylic Materials on the Wall. The earliest use of water-based acrylic paint was to paint on walls, and due to its inclusiveness, it was gradually used to paint on various materials. There is not much difference between painting on the wall and painting on the cloth, but the area of the wall is very large, and the overall effect needs to be grasped. You cannot add too much water, and the techniques can all be used. The light and shadow effect cannot be painted by hand; it is sprayed with an airbrush; and the water-based acrylic paint can be injected into the airbrush to spray out many beautiful patterns. The walls are generally relatively large, so it is difficult to paint evenly; if half of the color is gone, it will be very troublesome; and it will be difficult to readjust the color to connect [17]. When painting on the wall, the smear is often not very even, and it will be ugly. It is not like drawing on canvas; the brushstrokes will look good when left. So, after painting it once, use a soft brush to dab some water with it while it is still dry, and the brush marks will disappear. The development of wall painting in China is getting faster and faster; in some villages, there are often many water-based acrylic paintings for publicity; now, interior decoration is often decorated with water-based acrylic paintings.

3.2. Determination of Chemical Process Parameters of Water-Based Acrylic Dipping Paint. Water-based acrylic dipping paint is a dipping paint with water as solvent, alcohol ether solvent as cosolvent, and acrylic monomer as the main film-forming material after solution polymerization. The main pigments used include strontium chrome yellow, No. 4 carbon black, silica, and precipitated barium sulfate. Additives are BYK products. The crosslinking agent is made of water-based amino resin (HMMM), which is prepared by

grinding and dispersing. It can be sprayed or dipped and is suitable for bottom-in-one coating. The main process parameters of acrylic water-based dipping paint are solid content, viscosity, PH value, paint temperature, paint dipping time, and so on. Under the condition that the PH value and paint temperature are guaranteed, the thickness of the paint film depends on the viscosity of the paint [18]. Low temperature is conducive to the stability of the paint liquid, but if the temperature is too low, the viscosity will increase, the leveling of the paint film after dipping is poor, the film thickness and flow marks increase, the mixed air bubbles are not easy to eliminate, and bubble pinholes are formed after drying, causing the paint film to fail. When the temperature is higher than 30°C, the cosolvents and amines in the paint solution volatilize rapidly; the pH value drops; the paint solution system deteriorates; and the water solubility becomes poor. In order to maintain the stability of the bath liquid, the actual temperature control selection is 15~30°C [19]. The viscosity-temperature curve of dipping paint (T-4 cup) is shown in Figure 2.

It can be seen from the curve in Figure 2 that the viscosity decreases with the increase of temperature, the average temperature decreases by 1°C, and the viscosity increases for 2~4 s.

The viscosity dilution curve of dipping paint (thinner: deionized water, temperature: 25 ± 1°C, T-4 cup) is shown in Figure 3.

It can be seen from the curve in Figure 3 that from the viscosity of the original paint, with the increase of water addition, the viscosity decreases significantly, and when the addition of water continues to increase, the viscosity rises slightly (pseudothickness phenomenon), the lacquer liquid is hydrolyzed, and the system will be completely destroyed [20]. The influence of the solid content of the paint liquid on the appearance and film thickness of the paint film is shown in Table 1.

Since dip-coated parts include cold-rolled sheets, hot-rolled sheets, and castings, water-based dip coating should follow the principle of low viscosity and high solid content; if the workpiece gets a thick coating, the effect of secondary dip coating is better without increasing the viscosity. According to the test data, the parameters of the dipping process are determined as follows, and the casting is carried out: solid content: 33%~38%, dilution ratio: 2.6~3.6:1, viscosity: (30~40) s > 25%, T-4 cup, paint temperature: 15~30°C, pH value: 8~10, and film thickness: 16~24 μm.

3.3. Process Management and Precautions.

- (a) After degreasing, washing, surface conditioning, phosphating, and drying; the workpiece is guaranteed to be oil-free; phosphating is uniform and meticulous; sag can be reduced after dipping; and it is beneficial to improve adhesion, corrosion resistance, and film thickness and reduce the shrinkage.
- (b) The dipping tank adopts a boat-shaped structure and suitable pump pressure to ensure the circulation of the tank liquid; the liquid surface flow rate is 0.5 m/min, which is beneficial to defoaming, preventing

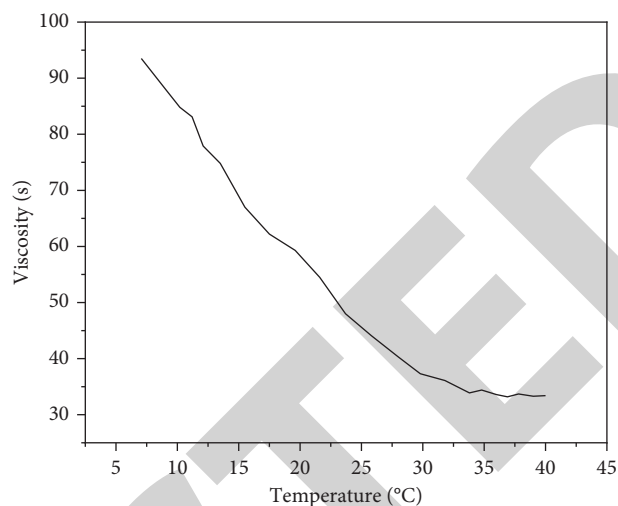


FIGURE 2: Viscosity-temperature curve.

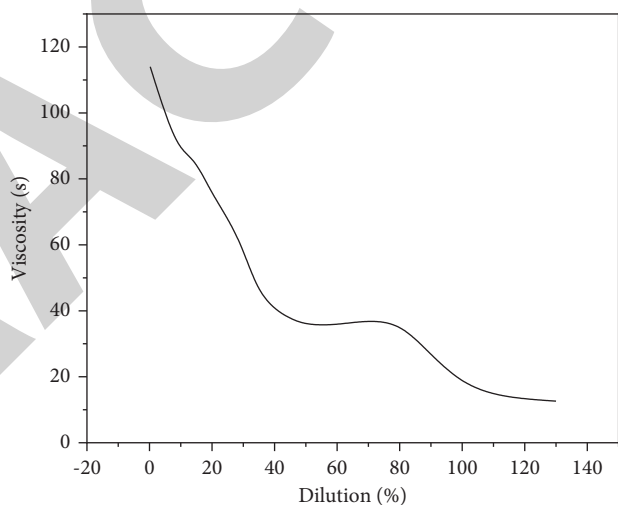


FIGURE 3: Viscosity-dilution curve.

pigment precipitation, and reducing viscosity; and the auxiliary tank is equipped with a 100-number copper mesh filter to remove impurities.

- (c) The dip coating time is 2~3 min; the chain speed should not be too fast; and the vertical speed increase $v \leq 1$ m/min; too fast is easy to produce sag and flow marks. The leveling time is guaranteed to be 10 min to facilitate leveling. The solvent of traditional solvent-based paint evaporates quickly and does not need flash evaporation, while water-based paint has a strong intermolecular hydrogen bonding force, strong cohesion, and high latent heat of evaporation; if it is directly baked at a high temperature, the internal water will evaporate and break through the paint film after the surface is cured, forming a solvent, explosion holes, and pinholes, so low temperature flashing is required.
- (d) The drying temperature is guaranteed to be 140°C, and the time is 25~30 min; otherwise, it will affect the performance of the paint film [21].

TABLE 1: Effect of paint liquid solid content on paint film appearance and film thickness (25°C).

Paint liquid solids (%)	50	45	40	38	35	33	30
Reference viscosity (s)	70–100	60–90	45–70	33–40	30–36	28–33	22–30
Cold rolled sheet film thickness (μm)	35–40	30–36	24–30	20–24	18–22	15–20	13–15
Appearance of cold-rolled sheet	Difference	Difference	Better	Better	Good	Good	Good
Hot rolled sheet film thickness (μm)	45–60	40–55	30–45	25–35	22–30	20–26	18–22
Appearance of hot rolled sheet	Difference	Difference	Better	Better	Good	Good	Good
Hot rolled sheet film thickness (μm)	50–70	45–60	40–55	35–45	30–40	25–35	20–30
Appearance of hot rolled sheet	Difference	Difference	Better	Better	Good	Good	Good

TABLE 2: Control of dipping bath liquid, parameter changes, and their influence on the paint film.

Process parameters	Detection frequency	Question	Ills	Countermeasures
Solid content, 33%–40%	1 Time/day	High Low	Film thickness, flow marks, pinhole bubbles Film Thickness, Shrinkage, Bottom Exposed	Add original paint Add pure water
Viscosity, 28–45 s	2 Times/class	High Low	Flow marks, fat edges Shrinking, film thin	Add pure water, solvent Add original paint
pH, 8–10	2 Times/week	High Low	Pigment settles and the system deteriorates	Refill original paint, amines
Temperature, 15–30°C	2 Times/class	High Low	Paint film sagging Flow marks, fat edges, matte paint film	Chilled water cooling Heat exchange cooling

TABLE 3: Performance index and comparative test.

Test items	Acrylic dip paint	Epoxy ester dip paint	Stoulook	Lesonal	Solvent dip paint	Asphalt dipping paint	Detection method
Original paint viscosity (s)	65~110	45~100	111	148	60~80	84	GB/T1723-93
Original paint fineness ($\leq\mu\text{m}$)	30	40	35	35	30	35	GB/T1724-89
pH	8~10	6.5~7	8~10	8~10	—	—	Precision test paper
Drying temperature (time)	140°C/30 min						GB/T1729-89
Appearance of paint film	Black, smooth						Visual inspection
Gloss (60°; %)	70 ~ 80	40~50	2	80	30~50	88	GB/T1754-88
Pendulum hardness, (\geq)	0.55	0.7	0.641	0.54	0.5	0.34	GB/T1730-93
Adhesion (grade)	1	3	1	1	1	1	GB/T1720-89
Flexibility (mm)	1	2	1	1	1	1	GB/T1731-93
Impact resistance (kg cm)	50	50	50	50	50	50	GB/T1732-93
Salt spray resistance (without phosphating; (\geq h)	96	140	32	48	60	8	GB/T1771-91
Salt spray resistance (phosphating; (\geq h)	206	240	206	214	144	50	GB/T1771-91
Water resistance (phosphating; (\geq h)	650	650	650	263	500	550	
Moisture and heat resistance (\geq h)	240	240	—	—	350	100	GB/T1740-79
Artificial aging test (h)	260	—	—	—	—	—	GB/T1865-80
Storage stability (months)	6	6	6	6	6	6	Visual inspection
No. 70 gasoline resistance (\geq h)	550	168	550	550	96	550	GB/T1734-93

The following Table 2 shows the control of dipping bath liquid, parameter changes, and their effects on the paint film and their countermeasures.

4. Analysis of Results

Water-based acrylic dip paint is a thermosetting coating because the molecular chain of the polymer contains a

considerable number of active functional groups such as carboxyl, hydroxyl, amine, ether, amide, and so on and guaranteed water solubility. During thermal curing, the reactive group reacts with methylol and methoxy in the crosslinking agent (water-based amino resin); it forms a coating film with a dense network structure and has the dual coating properties of acrylic and amino paint, such as high gloss, gloss retention, color retention, high weather

resistance, and good corrosion resistance, as shown in Table 3.

Through the above performance comparison, the water-based propylene of this process is used for practical drawing, and the following is the result discussion. Water-based acrylic paints dry quickly, can be diluted with water, and are waterproof when dry. In fact, they can be applied to any substrate in any thickness and by any technique, from the thinnest coat to the heavy impasto. The color is intense and vibrant, even when diluted, and the hue of the color does not change after the paint dries. The water-based acrylic paint dries to form a drab, slightly rough coating. However, the addition of water-based acrylic additives to the pigments can change the density of the pigments, resulting in different texture effects, while also making the colors brighter and deeper [22]. With the addition of additives, the diluted pigments can preserve their original adhesion, and at the same time, flow and drawability are improved. Some additives can be used to control the drying rate of pigments. There are no special regulations when using water-based acrylic paint additives. This is different from oil painting; when painting oil paintings, the colors are stacked; and the elasticity of the upper layer is better than that of the lower layer. It can paint opaque layers of color; it can also be diluted with water or solvent to form a transparent color layer. Canned paint is smoother and more fluid than tube paint and can be easily diluted with water or a solvent. This property makes water-based acrylic paints well-suited to the watercolor technique. It also works well for covering large areas of a single color. The paint dries to a smooth, even coating that is less glossy than using a tube of water-based acrylic paint. Finished paint comes in beakers, jars, or plastic bottles with spouts. All brushes suitable for oil painting and watercolor painting, whether natural or artificial, can be used for water-based acrylic painting. Liquid water-based acrylic paints flow quickly and smoothly, very close to sketch inks, compared to many colored inks that fade when exposed to light, most liquid water-based acrylic energy paints are very durable. Liquid water-based acrylic paints come in a bottle with an eyedropper, and they are suitable for expressing coating skills and detailed pen style. Liquid water-based acrylic paints are made with base resin and can be removed with an alkaline scrubber. Limit blending to two or three colors to avoid muddy colors. When the resin binder still contains moisture, it is cream-colored. So wet water-based acrylic paint will look lighter and softer than dry. When the paint dries, the binder becomes transparent, so the color appears brighter, also a little deeper.

5. Conclusion

The author proposes a chemical process based on water-based acrylic dipping paint, discusses the coating and film properties of water-soluble acrylic dipping paint, combines the application of art practice, summarizes the countermeasures to solve the disadvantages of common paint films, and proves that this paint has a good comprehensive performance by comparing with other dipping paints. The results show that the chemical process of water-based acrylic

dipping paint has water resistance, high gloss, gloss retention, color retention, high weather resistance, and good corrosion resistance in the process of art painting.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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