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FORMULATION, APPLICATION, AND ACCEPTABILITY OF PEARL CRAYONS

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Abstract: This research explored the possibility of oyster shell powder mixed with mica pearl powder, and beeswax. The study aimed to determine the physical properties of the Pearl Crayons in terms of visual appearance, firmness, vibrancy, texture, finished product and its fusibility, acceptability when applied to coupon bond, vellum board, and illustration board as well as the significant difference in three (3) treatments: Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax), Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax), and Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax). The instrument used in gathering the data is a sensory evaluation score sheet. The acceptability of the crayons will be evaluated among a limited sample of fifty (50) participants, likely to include thirty (30) learners, ten (10) teachers, and ten (10) artists. The data was tabulated and statistically analyzed by SPSS software using the Arithmetic Mean and the Analysis of Variance (ANOVA).

The physical properties of pearl crayons showed that statistically treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) got the highest mean. The fusibility of pearl crayons, statistically treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) got the highest mean. The level of acceptability of pearl crayons statistically showed that Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) got the highest mean. Additionally, the level of acceptability results of pearl crayons when applied to coupon bond, vellum board, and illustration board, statistically showed that Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) got the highest mean. The significant differences found in the pearl crayons sensory qualities were visual appearance, vibrancy, texture, and finished product. But, for firmness it clearly showed no significant difference between treatments. Further research could look at different changes or treatments to improve their visual appearance, firmness, and texture. Educational institutions and art organizations should incorporate information about pearl crayons into their curricula and workshops, raising awareness about their environmental benefits and artistic potential. This fosters greater adoption of sustainable, non-toxic, and eco-friendly crayons practices among emerging and established artists alike.

Keywords: Formulation, Applicability, Acceptability, and Pearl crayons

I. INTRODUCTION

The feeling of the researcher as a child when opening a new box of crayons remains today, a very nostalgic event. It goes against conventional wisdom to think that art could be created with ordinary crayons. From my earliest years until sometime in elementary school, coloring with crayons remained to be a creative and fun activity. Later, the researcher discovered the importance of fun and how it plays a significant role in art as a learning style that develops sensory perception at all levels. Eyes learn to see, hands develop control, the imagination begins to process as they all work in harmony to release creativity to accomplish the vision. But due to our economic crisis, some parents couldn't afford to buy their children crayons.

Crayon, an implement for drawing made from clay, chalk, graphite, dry color, and wax. There are two types of crayons: the coloring crayon and the chalk crayon. The coloring crayon, or wax crayon, is the one used by most children in making pictures, but artists also use it. It consists of waxes such as paraffin, beeswax, carnauba wax and dry color. Some synthetic waxlike materials are also used in the modern crayon. The beeswax is melted and mica pearl powder added with continuous mixing until thoroughly dispersed. Normally, crayons are entirely consumed during the marking process through abrasion. The blackboard crayon, or chalk, that is used in classrooms is commonly composed of calcium carbonate, kaolin clay, oleic acid, and caustic soda. Dry color may be added to increase the whiteness or to impart specific colors. Modifications of the formulation, such as mixing pigments with a nongreasy binder as with pastels, have provided chalk crayons for more specialized use by artists, tailors, and carpenters. For lithographic prints, a plain dark-colored crayon made of wax, soap, lac, mastic, sheep tallow, lampblack, and sometimes copal is used to draw an image directly on the stone surface (Zelazko, 2021).

The *Magallana bilineata*, commonly known as the Philippine cupped oyster or slipper oyster, a popular bi- valve mollusks delicacy because of its excellent flavor and taste. Slipper oyster or cupped oyster is an economically important species of true oyster found abundantly in the Ivisan, Capiz, from the Philippines.

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The increasing demand for slipper oysters has propelled farmers to expand oyster cultivation areas in the Capiz, specifically at Cabugao, Ivisan, chiefly for local consumption. Because of the abundance of this oyster in the area, I can see it everywhere, from houses, markets, and restaurants. But because of this also, many oyster shells are being thrown away as garbage.

The researcher came up with an idea to make crayon out of oyster shells because of the properties found in oyster shells such as calcium carbonate. As an artist also, the researchers like crayons as medium especially because they are so colorful, economical, and convenient. Focusing on the broader issue of sustainability in art supplies, this study will investigate the possibility of formulation and acceptability of using oyster shell powder as the main ingredient in making crayons. It would also be cheaper and would be environmentally friendly to use our product because this crayon is made from oyster shells which are mostly thrown away after eating the insides of the bi-valve mollusks. This organic component may be recommended to make a safe and useful substitute crayon that learners may use. Oyster shells are also attainable, abundant and easy to find all over the markets of Ivisan.

II. METHODOLOGY

Phases	Description
Phase 1	Evaluation Design
Phase II	Experimentation
Phase III	Analysis

Methodology: Phase I Evaluation Design

- In this study, a completely randomized design (CRD) was used in the developmental research design. The formulation and acceptability of pearl crayons will be investigated, and subsequent replications were carried out to determine the cause for the variation. Samples for assessment were coded, and randomization was done using scorecards. Three treatments and three replications were used in the experiment.
- Developmental Research Design was employed in this study to determine the effectiveness of the different treatments in the formulation of pearl crayons in terms of physical characteristics. This study was conducted using a questionnaire and validated through the mean of the results with the factors considered. All treatments were replicated three times.
- In evaluating this product, the researcher prepared a sample product to be tested by the evaluators. This conformed to the development design/layout of the study adopted by the researcher using the five (5) criteria for evaluating the pearl crayons physical characteristics such as visual appearance, firmness, vibrancy, texture, and finish product. Pearl crayons will also evaluate its fusibility, applicability, acceptability, and significant differences for each treatment.
- A development design/layout was followed that guides the researcher in the preparation, development as well as in the evaluation of output steps and procedures were thoroughly observed and noted as whether unanticipated events or changes had occurred. Below is the developmental design / layout of the study from the preparation to the development process.
- The experiment was conducted and categorized into three (3) treatments such as:
  - Treatment A (five grams (5g) of oyster shell powder, five grams (5g) of mica pearl powder, and twenty grams (20g) of beeswax).
  - Treatment B (ten grams (10g) of oyster shell powder, five grams (5g) of mica pearl powder, and twenty grams (20g) of beeswax).
  - Treatment C (fifteen grams (15g) of oyster shell powder, five grams (5g) of mica pearl powder, and twenty grams (20g) of beeswax).
- The proportions of the ingredients are found in Table 3 below. The purpose of the treatment was to find out the formulation and acceptability of pearl crayons.

Table 1. Treatment used for Formulation of Pearl Crayons.

Ingredients	Treatment		
	A	B	C
Oyster shell powder	5g	10g	15g
Mica pearl powder	5 g	5g	5g
Beeswax	20 g	20g	20g

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In evaluating this product, the researcher prepared a sample product to be tested by the evaluators. This conformed to the development design/layout of the study adopted by the researcher using the five (5) criteria for evaluation of physical characteristics such as visual appearance, firmness, vibrancy, texture, and finish product. Additionally, pearl crayons will also evaluate their fusibility, applicability, acceptability, and significant differences for each treatment.

There are five (5) responses categories for each variable and each category is given appropriate or corresponding weight or rank value based on the point scale.
The finished products will be evaluated by evaluators composed of some selected teachers and students at Capiz State University, and some Visual Artist in Capiz. This will be chosen by purposive sampling. Purposive sampling determines the target population. The fifty (50) evaluators will be composed of thirty (30) drafting students, ten (10) Capiz State University Teachers, and ten (10) Capiz Artists. The correspondents will be chosen based on their knowledge of the information desired (Calderon et. Al 1993).

To effectively observe and evaluate the development of pearl crayons, the structured procedure aligned with the specified objectives will be followed. First to determine the visual appearance of the crayon for uniformity in shape, size, and smoothness of surface. Inspect the surface for imperfections such as cracks, bubbles, dents, or uneven coatings. Looking for streaks, discoloration, or uneven pigmentation. The researcher used standardized methods to observe the physical appearance of the crayon. This is done through repeating the experiments multiple times (or three times/trials) to ensure consistency and reliability of results.

To determine the firmness of the pearl crayons testing the crayon by applying pressure to measure how easily it breaks. A crayon shall withstand reasonable force without snapping. Dropping the crayons from a standard height onto a hard surface to ensure they remain intact or show minimal chipping. Apply gradual pressure to the crayon using a force gauge or manually with consistent force. Record the amount of pressure or force required to break the crayon. Standardized metrics will be used to evaluate the firmness of the pearl crayons. Then the data is documented regarding how the crayon breaks when used.

To determine the vibrancy of the pearl crayons. Testing the crayon on different paper types to evaluate how smoothly it applies color. Evaluating the intensity, brightness, and consistency of the colors they produce on different surfaces. Apply varying pressure levels light, medium, heavy to observe how the intensity changes. Observe how well the crayons blend and if the vibrancy of both colors remains noticeable.

To determine the texture of the pearl crayons. This is to evaluate how smoothly the crayon applies to a surface. Observe the glide of the crayon as it draws. Holding the crayon and feel its surface for smoothness of the crayon body and absence of rough edges, chips, or uneven surfaces. Rub the surface lightly to see if the texture smudges or loses its pearlescent effect.

To determine the acceptability of pearl crayons which involves assessing whether the crayons meet the expectations and needs of the intended users, such as children, artists, or educators. This type of evaluation considers user experience, safety, performance, and satisfaction. Distribute the crayons to a diverse group of intended users, such as children, parents, teachers, or artists. The researcher employs 50 evaluators with stakeholders, including thirty (30) learners, ten (10) teachers, and ten (10) artists. Then the evaluation is conducted to gather feedback on visual appearance, firmness, vibrancy, and texture. The data collected is then analyzed to identify trends, preferences, and areas for improvement. The researcher iteratively refines the design based on feedback to enhance acceptability and usability.

Methodology: Phase II Experimentation

Materials Used in the Study

For the preparation of the product, the following materials in making Pearl Crayons will be used: Oyster shell, mica pearl powder, and beeswax.

Table 2. Materials used in the Formulation of Pearl Crayons for Acceptability Evaluation.

Materials	Quantity
Oyster Shell Powder	30g
Mica Pearl Powder	15g
Beeswax	60g

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Tools and Equipment

Table 3. Tools and Equipment used in the Formulation of Pearl Crayons for Acceptability Evaluation.

Tools and Equipment	Quantity
Weighing Scale	1
Measuring cups and spoon	1
Mortar and Pestle	1
Sieve	1
Wax Warmer	1
Mixing Rod	1
Silicone Crayon Mold	2

Ingredients Used in the Study

The ingredients used in the conduct of the study were oyster shell powder, mica pearl powder, and beeswax.

Table 4. Proportion of Ingredients of the Pearl Crayons for Acceptability Evaluation.

Ingredients	Treatment		
	A	B	C
Oyster shell powder	5g	10g	15g
Mica pearl powder	5 g	5g	5g
Beeswax	20 g	20g	20g

General and Specific Procedure

The general and specific procedure applied in interpretation preparation of Pearl Crayons. The first step is to prepare all the tools, materials, and workplace. Second step, using the mortar and pestle pulverize the shells of the oyster. Third step, sieve the pulverized shells of the oyster by using the sieve. Fourth step, in a wax warmer, melt the beeswax. Fifth step, in the same wax warmer, add the pulverized shell of the oyster and the pigment. Sixth step, mix the mixture well. Seventh step, pour the mixture in the silicone crayon mold. Eighth step, place the silicone crayon mold with mixture in a cool and dry place and let it cool. After being cooled and dried the pearl crayon is ready to use.

Tools and Equipment Used in the Study

For the preparation of the product, the following tools and equipment in making Pearl Crayons will be used: One (1) weighing scale, one (1) mortar and pestle, one (1) sieve, one (1) set measuring cup and spoon, one (1) wax warmer, one (1) mixing rod, and silicone crayon mold.

Procedure in making Pearl Crayons

The procedure for making Pearl Crayons, the first step is to prepare all the tools, materials, and workplace. Second step, using the mortar and pestle pulverize the shells of the oyster. Third step, sieve the pulverized shells of the oyster by using the sieve. Fourth step, in a wax warmer, melt the beeswax. Fifth step, in the same wax warmer, add the pulverized shell of the oyster and the mica pearl powder. Sixth step, mix the mixture well. Seventh step, pour the mixture in the silicone crayon mold. Eighth step, place the silicone crayon mold with mixture in a cool and dry place and let it cool. After being cooled and dry the pearl crayon is ready to use.

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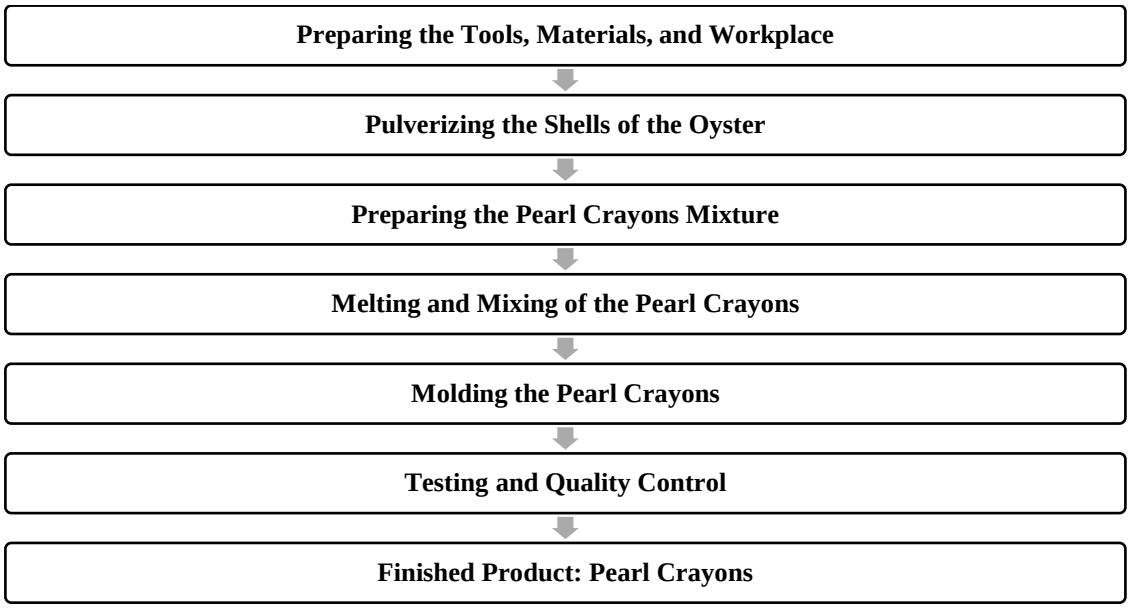

Figure 1. Process flow chart showing the procedure in making Pearl Crayons.

Preparation for making Pearl Crayons

Treatment A. Preparation and development of Pearl Crayons. Five (5)g of pulverized oyster shells, twenty (20)g of beeswax, and ten (5)g of mica pearl powder. The first step is to prepare all the tools, materials, and workplace. Second step, using the mortar and pestle pulverize the shells of the oyster. Third step, sieve the pulverized shells of the oyster by using the sieve. Fourth step, in a wax warmer, melt twenty grams (20g) of beeswax. Fifth step, in the same wax warmer, add the five grams (5g) of oyster shell powder and the five grams (5g) of mica pearl powder. Sixth step, mix the mixture well. Seventh step, pour the mixture in the silicone crayon mold. Eighth step, place the silicone crayon mold with mixture in a cool and dry place and let it cool. After being cooled and dry the pearl crayon is ready to use.

Treatment B. Preparation and development of Pearl Crayons. Ten (10)g of pulverized oyster shells, twenty (20)g of beeswax, and ten (5)g of mica pearl powder. The first step is to prepare all the tools, materials, and workplace. Second step, using the mortar and pestle pulverize the shells of the oyster. Third step, sieve the pulverized shells of the oyster by using the sieve. Fourth step, in a wax warmer, melt twenty grams (20g) of beeswax. Fifth step, in the same wax warmer, add the ten grams (10g) of oyster shell powder and the five grams (5g) of mica pearl powder. Sixth step, mix the mixture well. Seventh step, pour the mixture in the silicone crayon mold. Eighth step, place the silicone crayon mold with mixture in a cool and dry place and let it cool. After being cooled and dry the pearl crayon is ready to use.

Treatment C. Preparation and development of Pearl Crayons. Ten (10)g of pulverized oyster shells, ten (10)g of beeswax, and twelve (12)g of mica pearl powder. The first step is to prepare all the tools, materials, and workplace. Second step, using the mortar and pestle pulverize the shells of the oyster. Third step, sieve the pulverized shells of the oyster by using the sieve. Fourth step, in a wax warmer, melt twenty grams (20g) of beeswax. Fifth step, in the same wax warmer, add the fifteen grams (15g) of oyster shell powder and the five grams (5g) of mica pearl powder. Sixth step, mix the mixture well. Seventh step, pour the mixture in the silicone crayon mold. Eighth step, place the silicone crayon mold with mixture in a cool and dry place and let it cool. After being cooled and dry the pearl crayon is ready to use.

Methodology: Phase III Analysis

Parameter for Analysis

To analyze the effectiveness and acceptability of pearl crayons, several parameters can be considered. The parameters will be to evaluate the visual appearance, firmness, vibrancy, texture, and acceptability. For the visual appearance, the evaluators evaluate the crayon's color is evenly distributed across its surface. Look for any inconsistencies, such as streaks, blotches, or fading areas. For firmness, it involves evaluating how well it performs over time and how resistant it is to break, crumbling, and wear during use. Assess how the crayon colors the surface over time. A durable crayon shall not wear down too quickly or lose its ability to color evenly after repeated use. The application shall remain smooth and consistent.

For vibrancy, ensure the color is vibrant, bright or dull and shall focus on how rich and intense the color appears when applied to a surface. Compare the crayon to others in the same color family and observe if it stands out with more vividness. Also, assess the crayon in different lighting conditions to see if the vibrancy holds up under various

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environments. For the texture, evaluating how it feels to the touch, how it performs when applied to a surface, and how it behaves during use. The texture of a crayon plays a significant role in how smoothly it colors and whether it provides a pleasant or frustrating user experience. For the acceptability the researcher gathers the evaluators or users, including learners, teachers, and artists to assess their acceptance and satisfaction with the pearl crayons. Conduct surveys or interviews to understand user perceptions, preferences, and experiences with crayons. To evaluate the safety impact of the evaluators, evaluate the impact of pearl crayons, such as in case the user accidentally eats the crayon and if it causes allergy to their skin. For cost-effectiveness the evaluators evaluate the cost-effectiveness of the pearl crayons compared to the other brands of crayon.

Statistical Tools and Analysis

The data was tabulated and statistically analyzed by SPSS software using the Arithmetic Mean and the Analysis of Variance (ANOVA). The Analysis of Variance (ANOVA) was used to determine the physical characteristics of the product in terms of visual appearance, firmness, vibrancy, texture, and as finished product. It was also used to determine the pearl crayons fusibility. The acceptability and application were also tested using this, and as well as the significant differences among the three treatments (Larson, 2008). The level of significance was set at the 0.05 level.

The scores gained from the evaluators' rating were used to interpret the results and for the purpose of attaining the objectives being set. Considering the three factors or criteria for evaluation of the pearl crayons physical characteristics such as visual appearance, firmness, vibrancy, texture, and as finished product, its fusibility, application, and acceptability, the parameters for analysis of results were set to a five-point Likert scale.
Each was reflected on a data sheet. The mean was computed for each sample and product for descriptive data. It was subjected to a quality description using Likert scale reflected in the scoring of variables as follows.

Cost Analysis

Cost of the materials used from the actual price pf procurement of formulation of Pearl Crayons. The table of materials described the quantity, unit, description**,** value, and total cost of expenses.

Table 5. Cost of tools and materials used in the study.

Quantity	Unit	Description	Value
1	kg	Oyster Shell	Owned
1	kg	Natural Beeswax	₱ 329.00
25	g	Black Mica Pearl Powder	₱ 59.00
25	g	White Mica Pearl Powder	₱ 59.00
25	g	Red Mica Pearl Powder	₱ 59.00
25	g	Blue Mica Pearl Powder	₱ 59.00
25	g	Yellow Mica Pearl Powder	₱ 59.00
1	pc	Weighing Scale	₱ 216.00
1	set	Measuring Cups and Spoon	Owned
1	pc	Mortar and Pestle	Owned
1	pc	Sieve	₱ 99.00
1	pc	Wax Warmer	₱ 141.00
1	pc	Mixing Rod	₱ 25.00
2	pcs	Silicone Crayon Mold	₱ 300.00
1	Pack	Vellum Board	₱ 30.00
1	Pack	Sticker Paper	₱ 30.00
TOTAL			₱ 1, 767.00

Table 6. Total Cost of Labor and Materials used for making Pearl Crayons.

Description	Quantity and Unit	Value
Oyster shell powder	10.72 g	Free
Mica pearl powder	10.72 g	₱ 25.30
Natural beeswax	42.9 g	₱ 14.12
Vellum board	1/2 pc	₱ 1.50
Sticker paper	1/2 pc	₱ 1.50
Labor		Free
Total Cost of Pearl Crayons		₱ 42.42

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III. RESULTS AND DISCUSSION

Sensory Characteristics of Pearl Crayons in terms of Visual Appearance

The following tables show the result of the evaluation of the sensory characteristics results of pearl crayons were evaluated in terms visual appearance, firmness, vibrancy, texture, and finished product among three treatments: Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax), Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax), and Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax). First table 7 shows the result of the evaluation of sensory characteristics in terms of visual appearance. Statistic shows that Visual Appearance for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.76 which was implied that it was "Very Appealing". Next, in Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) data shows that Visual Appearance had a mean score of 4.02 which was implied that it was "Appealing". Lastly, in Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) figure shows that Visual Appearance had a mean score of 3.92 which was implied that it was "Appealing". These numbers showed that Treatment A is the most appealing pearl crayons among Treatment B, and Treatment C.

Crayons are primarily composed of paraffin wax combined with various pigments. This composition results in a smooth, slightly glossy surface that can vary in texture and color intensity based on the specific materials used. A comprehensive study analyzing 44 pastel crayons from the Munch Museum utilized techniques like X-ray fluorescence and mass spectrometry to identify components such as ultramarine, Prussian blue, and beeswax. These materials influence not only the crayon's appearance but also its performance and longevity (La Nasa et al., 2021).

Table 7. Physical characteristic of Pearl Crayon in terms of visual appearance.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.92**	**Very Appealing**
Treatment B	**4.78**	**Appealing**
Treatment C	**4.66**	**Appealing**

Visual Appearance

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Appealing*	*VA*
3.41 – 4.20	*Appealing*	*A*
2.61 – 3.40	*Moderately Appealing*	*MA*
1.81 – 2.60	*Less Appealing*	*LA*
1.0 – 1.80	*Least Appealing*	*LtA*

Sensory Characteristics of Pearl Crayons in terms of Firmness

Table 7.1 shows the result of the evaluation of physical characteristics of Pearl Crayons in terms of firmness. First, statistics shows that firmness for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.56 which was implied that it was "Very Firm". Next, figures shows that firmness for Treatment B A (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.32 which was implied that it was "Very Firm". Lastly, data shows that Firmness for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.34 which was implied that it was "Very Firm". Therefore, the data showed that even though the three treatments were implied as "Very Firm", still the Treatment A has the highest mean score among the three treatments.

Various crayon manufacturers use chemicals to strengthen the wax, stretch it (producing more crayons with the same quantity of wax), lessen its stickiness, or enhance "rub-off." High-quality crayons will have a high pigment concentration to provide vivid color and a semi-firm waxy consistency. Stick-shaped crayons are extremely difficult to keep from breaking. Excessive pressure will cause them to shatter, even the more costly ones. Although there are more robust stick crayons on the market, they are not advised for the type of work we will be doing together since they can be difficult for larger hands to hold and can occasionally cause control problems. Block-shaped crayons have become my favorite since they help me avoid some of the difficulties associated with breaking. They are quite resilient. They readily produce a wide range of line quality when applied with dexterity—many more than a stick crayon could provide. Additionally, due of the quantity of wax they contain, they last a lot longer (Beckman, 2024).

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Table 7.1. Physical characteristics of Pearl Crayons in terms of firmness.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.56**	**Very Firm**
Treatment B	**4.32**	**Very Firm**
Treatment C	**4.34**	**Very Firm**

Firmness

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Firm*	*VF*
3.41 – 4.20	*Firm*	*F*
2.61 – 3.40	*Moderately Firm*	*MF*
1.81 – 2.60	*Soft*	*S*
1.0 – 1.80	*Very Soft*	*VS*

Sensory Characteristics of Pearl Crayons in terms of Vibrancy

Table 7.2 shows the result of the evaluation of the physical characteristics of Pearl Crayons in terms of vibrancy. First, statistics shows that vibrancy for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.62 which was implied that it was “Very Vibrant”. Next, data shows that vibrancy for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 3.94 which was implied that it was “Vibrant”. Lastly, numbers shows that vibrancy for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.00 which was implied that it was “Vibrant”. Consequently, Treatment A is the most vibrant pearl crayons compared to Treatment B, and Treatment C.

Wax and pigment are used to make crayons. Each producer of crayons has a "secret recipe" that creates the distinct texture and feel of their products. Melted wax is combined with powdered color in a finely ground form to create crayons. Lighter hues require less pigment, whereas stronger hues demand more. The color remains suspended in the wax after being mixed and subsequently solidified (Beckman, 2024).

Table 7.2. Physical characteristics of Pearl Crayons in terms of vibrancy.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.62**	**Very Vibrant**
Treatment B	**3.94**	**Vibrant**
Treatment C	**4.00**	**Vibrant**

Vibrancy

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Vibrant*	*VV*
3.41 – 4.20	*Vibrant*	*V*
2.61 – 3.40	*Moderately Vibrant*	*MV*
1.81 – 2.60	*Dull*	*D*
1.0 – 1.80	*Very Dull*	*VD*

Sensory Characteristics of Pearl Crayons in terms of Texture

Table 7.3 shows the result of the evaluation of physical characteristics of Pearl Crayons in terms of texture. Fist, statistics shows that texture for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.62 which was implied that it was “Very Smooth”. Also, numbers shows that texture for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.24 which was implied that it was “Very Smooth”. Moreover, data shows that Texture for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.32 which was implied that it was “Very Smooth”. Regardless of the fact that these three treatments were declared “Very Smooth”, still Treatment A achieved the highest mean score among three treatments.

Beyond their visual appeal, crayons offer a distinct tactile experience. The smooth, waxy feel of a crayon in hand, combined with the resistance felt when applying it to paper, contributes to its sensory characteristics. This tactile feedback is particularly significant in educational settings, where it aids in the development of fine motor skills in children. Moreover, the sensory experience of using crayons has been harnessed to create tactile crayons that produce textured lines, enhancing accessibility for individuals who are visually impaired (Kandalam et al., 2019).

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Table 7.3. Physical characteristics of Pearl Crayons in terms of texture.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.62**	**Very Smooth**
Treatment B	**4.24**	**Very Smooth**
Treatment C	**4.32**	**Very Smooth**

Texture

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Smooth*	*VS*
3.41 – 4.20	*Smooth*	*S*
2.61 – 3.40	*Moderately Smooth*	*MS*
1.81 – 2.60	*Rough*	*R*
1.0 – 1.80	*Very Rough*	*VR*

Sensory Characteristics of Pearl Crayons as a Finished Product

Table 7.4 shows the result of the evaluation of physical characteristics of Pearl Crayons as a finished product. First, statistics shows that the finished product for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.76 which was implied that it was "Excellent". Secondly, figures shows that the finished product for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.40 which was implied that it was "Excellent". Lastly, data shows that the finished product for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.46 which was implied that it was "Excellent". In general, Treatment A had the highest mean score compared to Treatment B and Treatment C. Therefore, we could also conclude that the lower the amount of oyster shell powder the better the product is formulated. Overall, the numbers show that the overall and highest rating was achieved by Treatment A.

Although the finished result seems straightforward, the procedure really calls for several natural substances, some of which took millions of years to produce. The brand Crayola is well-known, but few people are aware of the petroleum byproducts needed to make the art tool that so many kids use daily.

Table 7.4. Physical characteristics of Pearl Crayons as a finished product.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.62**	**Very Smooth**
Treatment B	**4.24**	**Very Smooth**
Treatment C	**4.32**	**Very Smooth**

Finished Product

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Excellent*	*E*
3.41 – 4.20	*Very Good*	*VG*
2.61 – 3.40	*Good*	*G*
1.81 – 2.60	*Moderately Good*	*MG*
1.0 – 1.80	*Needs Improvement*	*NI*

Fusibility of Pearl Crayons

Table 8 displays the result of the evaluation of pearl crayons fusibility. First, statistics shows that Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.92 which was implied that it was "Very Fusible". On the other hand, Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.78 which was implied that it was "Very Fusible". Lastly, Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.66 which was implied that it was "Very Fusible". Overall, Treatment A had the highest mean score in terms of fusibility compared to Treatment B and Treatment C. Additionally, the lower the amount of oyster shell powder the faster it melts.

Crayola crayons begin to soften at approximately 105°F (40.5°C) and fully melt between 120°F and 147°F (49°C–64°C). These relatively low melting points make crayons suitable for melting-based art techniques, such as encaustic painting and crayon melting crafts.

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Table 8. Fusibility of Pearl Crayons.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.92**	**Very Fusible**
Treatment B	**4.78**	**Very Fusible**
Treatment C	**4.66**	**Very Fusible**

Fusibility

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Fusible*	*VF*
3.41 – 4.20	*Fusible*	*F*
2.61 – 3.40	*Moderately Fusible*	*MF*
1.81 – 2.60	*Low Fusibility*	*LF*
1.0 – 1.80	*Very Low Fusibility*	*VLF*

Level of Acceptability of Pearl Crayons in terms of Visual Appearance

The following tables show results of the evaluation of the level of acceptability results of pearl crayons in terms of visual appearance, firmness, vibrancy, texture, and finished product in three treatments: Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax), Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax), and Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax). Table 9 shows the level of acceptability of pearl crayons in terms of visual appearance. First, statistics shows that Visual Appearance for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.74 which was implied that it was “Very Acceptable”. Secondly, in Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) data shows that Visual Appearance for Treatment B had a mean score of 4.02 which was implied that it was “Acceptable”. Lastly, in Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) number shows that Visual Appearance for Treatment C had a mean score of 3.92 which was implied that it was “Acceptable”. For that reason, Treatment A has the highest score compared to Treatment B, and Treatment C.

Table 9. Level of Acceptability of Pearl Crayons in terms of visual appearance.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.74**	**Very Acceptable**
Treatment B	**4.02**	**Acceptable**
Treatment C	**3.92**	**Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons in terms of Firmness

Table 9.1 shows that result of the evaluation of level of acceptability of pear crayons in terms of firmness. First, statistics shows that firmness for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.54 which was implied that it was “Very Acceptable”. Secondly, figures shows that firmness for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.34 which was implied that it was “Very Acceptable”. Lastly, data shows that firmness for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.32 which was implied that it was “Very Acceptable”. Even thought they were all implied as “Very Acceptable”, Treatment A scored the highest score of them all.

Table 9.1. Level of Acceptability of Pearl Crayons in terms of firmness.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.54**	**Very Acceptable**
Treatment B	**4.34**	**Very Acceptable**
Treatment C	**4.32**	**Very Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*

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2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons in terms of Vibrancy

Table 9.2 shows that result of the evaluation of the level of acceptability of pear crayons in terms of vibrancy. Initially, statistics shows that vibrancy for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.60 which was implied that it was "Very Acceptable". Succeeding, data shows that vibrancy for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 3.92 which was implied that it was "Acceptable". Lastly, figures shows that vibrancy for Treatment C A (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 3.98 which was implied that it was "Acceptable". On the account of these data Treatment A is the most acceptable among the three treatments.

Table 9.2. Level of Acceptability of Pearl Crayons in terms of vibrancy.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.60**	**Very Acceptable**
Treatment B	**3.92**	**Acceptable**
Treatment C	**3.98**	**Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons in terms of Texture

Table 9.3 shows that result of the evaluation of level of acceptability of pear crayons in terms of texture. Utmost, statistics shows that texture for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.60 which was implied that it was "Very Acceptable". Next, data shows that texture for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.20 which was implied that it was "Acceptable". Lastly, numbers shows that texture for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.30 which was implied that it was "Very Acceptable". Because of these data, Treatment A has the highest score among the three treatments.

Table 9.3. Level of Acceptability of Pearl Crayons in terms of texture.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.60**	**Very Acceptable**
Treatment B	**4.20**	**Acceptable**
Treatment C	**4.30**	**Very Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons as a Finished Product

Table 9.4 shows that result of the evaluation of level of acceptability of pear crayons in terms of finished product. First, statistics shows that the finished product for Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.74 which was implied that it was "Very Acceptable". Secondly, figures shows that the finished product for Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.40 which was implied that it was "Very Acceptable".

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Overall, data shows that the finished product for Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.44 which was implied that it was "Very Acceptable". In general, Treatment A had the highest mean score compared to Treatment B and Treatment C. Therefore, we could conclude that the lower the amount of oyster shell powder the more acceptable it is.

Table 9.4. Level of Acceptability of Pearl Crayons as a finished product.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.74**	**Very Acceptable**
Treatment B	**4.40**	**Acceptable**
Treatment C	**4.44**	**Very Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons when applied to Coupon bond

The following tables show results of the evaluation of the level of acceptability results of pearl crayons when applied to coupon bond, vellum board, and illustration board in three treatments: Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax), Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax), and Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax). Table 10 shows the result of the evaluation of the level of acceptability of pearl crayons when applied to coupon bond. First, statistics shows that Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.74 which was implied that it was "Very Acceptable" when applied to a coupon bond. Next, data shows that Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.30 which was implied that it was "Very Acceptable" when applied to a coupon bond. Lastly, figures shows that Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.26 which was implied that it was "Very Acceptable" when applied to a coupon bond. Even though they were all scored "Very Acceptable", Treatment A has the highest score compared to the three treatments.

Table 10. Level of Acceptability of Pearl Crayons when applied to coupon bond.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.74**	**Very Acceptable**
Treatment B	**4.30**	**Very Acceptable**
Treatment C	**4.26**	**Very Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons when applied to Vellum board

Table 10.1 shows the result of the evaluation of the level of acceptability of pearl crayons when applied to vellum board. First, Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.68 which was implied that it was "Very Acceptable" when applied to vellum board. Next, Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.28 which was implied that it was "Very Acceptable" when applied to vellum board. Lastly, Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.28 which was implied that it was "Very Acceptable" when applied to vellum board. Although the three treatments were implied as "Very Acceptable", Treatment A scored the highest among them all.

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Table 10.1. Level of Acceptability of Pearl Crayons when applied to vellum board.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.68**	**Very Acceptable**
Treatment B	**4.28**	**Very Acceptable**
Treatment C	**4.28**	**Very Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Level of Acceptability of Pearl Crayons when applied to Illustration board

Table 10.2 shows the result of the evaluation of the level of acceptability of pearl crayons when applied to illustration board. First, Treatment A (5g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.52 which was implied that it was “Very Acceptable” when applied to illustration board. Secondly, Treatment B (10g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.34 which was implied that it was “Very Acceptable” when applied to illustration board. Lastly, Treatment C (15g oyster shell powder, 5g mica pearl powder, and 20g beeswax) had a mean score of 4.28 which was implied that it was “Very Acceptable” when applied to illustration board. Overall, even though they are all very acceptable, Treatment A shows the highest mean score compared to Treatment B and Treatment C.

The pressure and friction created as you rub the crayon across the paper cause the wax to melt a little. It will create a trail of color as it moves over the paper. The crayon will break easily, lump, or smear on the paper if the wax is too soft. This is known as the "rub-off." The crayon will either shatter and crush under excessive pressure or leave insufficient color on the paper if it is too firm. Petroleum is used to make paraffin wax, which is often softer, simpler to melt, and less costly. When refined to colorless wax, beeswax is typically more costly and tougher.

Table 10.2. Level of Acceptability of Pearl Crayons when applied to illustration board.

Treatment	Mean	Verbal Interpretation
Treatment A	**4.60**	**Very Acceptable**
Treatment B	**4.20**	**Acceptable**
Treatment C	**4.30**	**Very Acceptable**

Acceptability

Scale	*Verbal Interpretation*	*Legend*
4..21 – 5.00	*Very Acceptable*	*VA*
3.41 – 4.20	*Acceptable*	*A*
2.61 – 3.40	*Moderately Acceptable*	*MA*
1.81 – 2.60	*Less Acceptable*	*LA*
1.0 – 1.80	*Least Acceptable*	*LtA*

Difference in Sensory Characteristics of Pearl Crayons in terms of Visual Appearance, Firmness, Vibrancy, Texture and Finished Product in three treatments

Table 11 results of the analysis of variance (ANOVA) revealed varying levels of significance across the evaluated sensory qualities of the pearl crayons. For visual appearance, the F-value was 20.930 with a p-value of 0.000. Since the p-value less than the standard significance level of 0.05, this indicates that there are statistically significant differences in visual appearance among the three treatments. In other words, while minor differences may exist, they are strong enough to conclude that the treatments had a meaningful effect on the visual appearance of the crayons.

In contrast, significant differences were found in the other sensory qualities. For firmness, the F-value was 1.859 and the p-value was 0.159, clearly indicating that the treatments had a statistically no significant impact. While vibrancy showed a significant difference with a F-value of 14.337 and the p-value of 0.000, meaning the type of treatment influenced the vibrancy of the crayons. The texture of the crayons varied even more substantially between treatments, with an F-value of 3.443 and a p-value of 0.035, still suggesting a strong treatment effect.

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Overall, the evaluation of the finished product, which considers the overall acceptability and quality, also showed a significant difference among treatments, supported by a F-value of 4.706 and a p-value of 0.010.

In general, these findings suggest that while the firmness remained relatively consistent, the other qualities such as visual appearance, vibrancy, texture, and finished product quality, were all significantly influenced by the specific mixture of pearl crayons used in each treatment.

Table 11. Difference in the acceptability of pearl crayons in terms of visual appearance, firmness, vibrancy, texture and finished product in three treatments.

Physical Characteristics	Sum of Squares	df	Mean square	F-value	P-value	Remarks
Visual Appearance	20.013 70.280 90.293	2 147 149	10.007 .478	20.930	.000	S
Firmness	1.480 58.520 60.000	2 147 149	.740 .398	1.859	.159	NS
Vibrancy	14.173 72.660 86.833	2 147 149	7.087 .494	14.337	.000	S
Texture	4.333 92.500 96.833	2 147 149	2.167 .629	3.443	.035	S
Finished Product	3.453 53.940 57.393	2 147 149	1.727 .367	4.706	.010	S

*. The mean difference is significant at the 0.05 level.

IV. CONCLUSION

Based on the findings and objectives of the study, the following conclusions were formulated.
This study based on the formulation, application, and acceptability of pearl crayons concludes that the lesser the amount of oyster shell powder mixed with the constant amount of mica pearl powder, and beeswax showed that it is the visual appealing, sturdy, vibrant, and smooth.

The visual appearance, firmness, vibrancy, texture, and finish product quality of the pearl crayons were all deemed acceptable. The highest scores were consistently given to Treatment A for all criteria, indicating that less oyster shell powder improved the crayons physical and sensory features. Treatment A performed better than Treatments B and C, suggesting that lesser amount of these oyster shell powder produce better crayons quality.

The pearl crayons fusibility, the data showed that all treatments were highly fusible. Pearl crayons can be heated and melted and that gives the users information that it can be used in other art media. Additionally, this also gives users to understand these properties can aid in the safety of each user.

The pearl crayons visual appearance, firmness, vibrancy, texture, and finished product all shown great acceptability, with every treatment falling into the "Very Acceptable" range. The findings show that the pearl crayons is appropriate for a variety of applications on different drawing media due to its advantageous properties, which include a very appealing appearance, firm structure, vibrant color, and smooth texture. The high approval ratings imply that pearl crayon can satisfy industry requirements for physical characteristics including visual appearance, firmness, vibrancy, and texture.
The importance of formulation in achieving ideal physical attributes is highlighted by the notable variations in visual appearance, firmness, vibrancy, texture, and final product quality that were found, with Treatment A continuously surpassing the others. These results imply that Treatment A's particular mixture of oyster shell powder, mica pearl powder, and beeswax has the best physical characteristics. In comparison to the other treatments, the formulation of Treatment A might also be more successful in improving the pearl crayon, making it more vibrant.

Treatment A received the highest rating in all three applications, indicating its superior quality and application across variety of drawing papers.

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The acceptability of pearl crayons was also rated as "Very Acceptable" in normal applications, such as coloring on the coupon bond, vellum board, and illustration board. According to these data, pearl crayons in Treatment A showed the most vibrant application compared to Treatment B and Treatment C. Because of its adaptability across several applications, the material has the potential to be marketed in the art industry.

This study based on the formulation, application, and acceptability of pearl crayons concludes that the lesser the amount of oyster shell powder mixed with the constant amount of mica pearl powder, and beeswax showed that it is the visual appealing, most vibrant, and the smoothest, but it does not affect one physical characteristic which is the firmness. The analyzes carried out make it is possible to make crayons from the mixture into pearl crayons, according to the organic materials that make up the samples. However, other complementary analytical techniques will be performed to aggregate more information about the composition of these crayons to increase knowledge about wax-based drawing materials of the invaluable researcher collection.

REFERENCES

[1]. "Crayola Crayons"
Augsburg, D. R. (1906). Drawing with colored crayons. New York, NY: Educational Publishing Company.
[2]. Bell, L. (2016). The art of crayon: Draw, color, resist, sculpt, carve! Beverly, MA: Quarto Publishing Group USA Inc.
[3]. Binney & Smith, INC. [B & S]. (1947). The story of the rainbow.
[4]. Brinkman, Robert B. "Crayon wax composition." U.S. Patent No. 3,933,708. 20 Jan. 1976.
[5]. Carlin, P. A. (2010, August 21). Oregon collector amasses the largest Crayola collection in the country. The Oregonian. Retrieved from http://www.oregonlive.com/O/index.ssf/2010/08/oregon_collector_amasses_the_l.html
[6]. Crayola exhibition. (1912, July 17). Paint, Oil and Drug Review, p. 18.
[7]. Crayola, . "Crayola ColorCycle - Turn Crayola Markers Into Energy!." Color Cycle (2014): n.pag. Crayola. Web. 11 Mar 2014. <http://www.crayola.com/colorcycle>.
[8]. Crayola, . "Crayola ColorCycle - Turn Crayola Markers Into Energy!." Color Cycle (2014): n.pag. Crayola. Web. 11 Mar 2014. <http://www.crayola.com/colorcycle>.
[9]. Daywalt, D., & Jeffers, O. (2013). The day the crayons quit. New York, NY: Penguin Group.
[10]. Daywalt, D., & Jeffers, O. (2015). The day the crayons came home. New York, NY: Penguin Group.
[11]. Fun facts. (n.d.). Retrieved from Crayola website:
[12]. Gillis, J. B. (2005). Lives and times: Edwin Binney: The founder of Crayola crayons. Chicago, IL: Heinemann Library.
[13]. Hall, E. A. (2005). Pennsylvania's Crayola country. American History, 40(2), 66-67, 77-79.
[14]. http://squirrellyminds.com/2017/04/24/diy-all-natural-beeswax-crayons/
[15]. http://www.crayola.com/crayolaexperience/landing-page/easton/about/funfacts.aspx
[16]. http://www.seashellworld.com/oyster-shells.html
[17]. http://www.unp.me/f150/health-benefits-of-oyster-174756/#ixzz273VkXlPV
[18]. https://catalyst.risd.edu/Shellon
[19]. https://catalyst.risd.edu/Shellon
[20]. https://en.wikipedia.org/wiki/Magallana_bilineata
[21]. https://intellectdiscover.com/content/journals/10.1386/eta.13.2.193_1
[22]. https://pubs.aip.org/aip/acp/article-abstract/2667/1/060004/2877318/The-evaluation-of-heavy-metal-content-in-the
[23]. https://repositories.lib.utexas.edu/items/1293ab60-54f3-4375-869e-3261f443b8aa
[24]. https://thecrayonartist.com/pages/why-crayons
[25]. https://tscpl.org/articles/coloring-is-more-than-just-fun-coloring-is-a-learning-experience
[26]. https://www.britannica.com/animal/oyster
[27]. https://www.britannica.com/art/crayon
[28]. https://www.britannica.com/topic/beeswax
[29]. https://www.designlife-cycle.com/crayons
[30]. https://www.gamberorossointernational.com/news/oyasai-crayons-japanese-crayons-made-with-food-waste-scraps/
[31]. https://www.handheldarts.com/blog/all-about-crayons
[32]. https://www.joosang-lee.com/shellon
[33]. https://www.learningresources.com/blog/6-surprising-benefits-of-drawing-with-crayons/?srsltid=AfmBOorAypZw70N_lL9cBCfp5URBvcAmOwvAM1hZm0k2SPDXb5soCr7Q
[34]. https://www.madehow.com/Volume-2/Crayon.html

DOI: 10.17148/IARJSET.2025.12603

[35]. https://www.mommytomax.com/best-non-toxic-crayons-toddler-guide/
[36]. https://www.researchgate.net/profile/George-Odoh/publication/353879801_WASTE_AND_FOUND_OBJECTS_AS_POTENT_CREATIVE_RESOURCES_A_REVIEW_OF_THE_ART_IS_EVERYWHERE_PROJECT/links/611651eb169a1a0103f9e6a5/WASTE-AND-FOUND-OBJECTS-AS-POTENT-CREATIVE-RESOURCES-A-REVIEW-OF-THE-ART-IS-EVERYWHERE-PROJECT.pdf
[37]. https://www.researchgate.net/publication/330202161_The_Potential_Use_of_Oyster_Shell_Waste_in_New_Value-Added_By-Product
[38]. https://www.sciencedirect.com/science/article/pii/S0362028X22056253\
[39]. https://www.stablemicrosystems.com/MeasureFirmness.html#:~:text=The%20physical%20nature%20of%20some,force)%20the%20firmer%20the%20sample.
[40]. https://www.studocu.com/ph/document/don-honorio-ventura-technological-state-university/practical-research/paprika-beeswax-as-crayons/83151290
[41]. https://www.thebalancemoney.com/entrepreneur-what-is-an-entrepreneur-1794303
[42]. M. Holben Ellis, M. Brigitte Yeh, The history, use and characteristics of wax-based drawing media, The Paper Conservator, 22, 1998, pp. 48-55.
[43]. M. Masae, P. Pitsuwan, L. Sikong, K. Kooptarnond, P. Kongsong, P. Phoempoon, Thermo-physical characterization of paraffin and beeswax on cotton fabric, Thammasat International Journal of Science & Technology, 19(4), (2014), pp. 69-77.
[44]. N. Ash, S. Homolka, S. Lussier, Descriptive Terminology for Works of Art on Paper, (editor: R.Wolcott), Philadelphia Museum of Art, 2014.
[45]. Py-Lieberman, Beth. "The Colors of Childhood."Smithsonian.com. Nov. 1999: n. page. Web. 11 Mar. 2014. <http://www.smithsonianmag.com/history/the-colors-of-childhood-36067809/?no-ist=>.
[46]. Rickerty, S. (2014). The crayon. London, UK: Aladdin.
[47]. Slater, L. (2016). Toy trailblazers: Crayola creators: Edwin Binney and C. Harold Smith. Minneapolis, MN: Abdo Publishing.
[48]. The Barbican Estate – 2019, Stefi Orazi
[49]. Vyshniak, O. Dimitriev, S. Litvynchuk, V. Dombrovskiy, Identification of beeswax and its falsification by the method of infrared spectroscopy, Ukrainian Food Journal, 7(3), 2018, pp. 421-433.
[50]. Welter, E. (2017, March). Crayola is Retiring another color on National Crayon Day 2017 [Blog post]. Retrieved from CrayonCollecting.com website: 133 http://crayoncollecting.blogspot.com/2017/03/crayola-is-retiring-another-coloron.html

