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Utilizing Cuttlebone Powder for Educational Children's Toys: An Applied Study

توظيف مسحوق عظم الحبار في صناعة ألعاب الأطفال التعليمية: دراسة تطبيقية

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Abstract:
This research investigates the potential use of cuttlebone powder as a natural raw material for producing educational toys for children. The study focuses on the preparation, physical properties, safety assessment, and educational value of the toys. Cuttlebone powder was mixed with natural binders such as cornstarch and plant gum to form a safe, cohesive toy material. Results showed promising durability, child safety, and educational attractiveness.

Keywords: Cuttlebone powder, educational toys, Child safety, Sustainable materials.

الملخص:

يبحث هذا البحث في إمكانية استخدام مسحوق عظم الحبار كمادة خام طبيعية لإنتاج ألعاب تعليمية للأطفال. تركز الدراسة على تحضير المادة، وخصائصها الفيزيائية، وتقييم سلامتها، وقيمتها التعليمية. تم خلط مسحوق عظم الحبار مع مواد رابطة طبيعية مثل نشا الذرة والصمغ النباتي لتكوين مادة ألعاب آمنة ومتماسكة. وأظهرت النتائج متانة واعدة، وسلامة للأطفال، وجاذبية تعليمية.

الكلمات المفتاحية : مسحوق عظم الحبار، الألعاب التعليمية، سلامة الأطفال، المواد المستدامة.

Introduction

Educational toys play a vital role in children's cognitive and motor skills development. However, the use of synthetic materials like plastic raises health and environmental concerns. This study proposes using natural cuttlebone powder as a filler material for developing safe, environmentally friendly educational toys.

Objectives

1. Investigate cuttlebone powder's properties for toy production.
2. Develop a cohesive toy dough suitable for children.
3. Assess physical safety and educational value.
4. Explore market potential and competitiveness.

Literature Review

- Cuttlebone Powder: Derived from cuttlefish, rich in calcium carbonate, porous, and absorbent.
- Educational Toys: Enhance learning, motor skills, and cognitive development.
- Natural Materials: Growing global trend to use eco-friendly raw materials in educational products.

Methodology

Materials: Cuttlebone powder, cornstarch, plant gum/edible glue, water, natural colorants, vegetable oil.

Preparation Steps:

1. Mix dry ingredients.
2. Gradually add water and oil to form dough.
3. Knead thoroughly to ensure even distribution.
4. Shape toys using molds.
5. Dry at low temperature (<60°C) to maintain integrity.

Testing:
- Physical tests: hardness, cohesiveness.
- Safety: free from harmful substances, smooth edges.
- Child engagement: observed through play testing.

Results

- Physical Properties: Cohesive, slightly firm toys capable of standard handling.
- Safety: Non-toxic and safe for children.
- Educational Engagement: High interest due to texture, shapes, and learning elements.

Discussion

Pros: Natural, safe, educational, and environmentally friendly.
Challenges: Requires proper binder ratios; sensitive to moisture.

Conclusion

Cuttlebone powder is a viable natural raw material for educational toys, providing safety, educational value, and market potential when used with suitable binders.

Recommendations

1. Develop diverse product lines with various shapes and colors.
2. Conduct safety testing according to international standards.
3. Include educational guides with toys.
4. Plan commercial-scale production.

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