

FORMULATION AND EVALUATION OF EGG-BASED HOMEMADE PHENYL FOR ECO-FRIENDLY CLEANING APPLICATIONS

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ABSTRACT

The growing concern over environmental pollution and health hazards caused by chemical-based cleaning agents has led to increased interest in eco-friendly alternatives. This study focuses on the formulation and evaluation of a homemade phenyl using egg-based components, specifically utilizing egg white and shell derivatives, combined with natural antimicrobial agents and essential oils. The objective is to develop a sustainable, cost-effective, and biodegradable floor cleaner with disinfectant properties suitable for household use. The prepared formulation was evaluated for key parameters such as pH, antimicrobial activity, cleaning efficiency, stability, and shelf life. Comparative analysis with commercially available phenyl products indicated that the egg-based phenyl exhibited comparable, and in some cases superior, performance in terms of microbial inhibition and surface cleaning. The findings suggest that waste egg materials can be repurposed into value-added cleaning products, promoting both environmental sustainability and public health safety.

1. INTRODUCTION

Microorganisms are both a person's friend and enemy and are found both within and outside the body. The presence of moisture on the human body acts as the ideal environment for the growth of various organisms.^[1] For an effective reduction in the potential infection induced by such organisms, sanitary conditions must be maintained. Personal hygiene is a state that encourages hygienic activities, whereas hygiene is described as a science concerned with the prevention of illness and preservation of health.^[2] Regular cleaning of floors, especially kitchen and bathroom is required because without regular cleaning lime scale builds up on tiles and taps, mold grows in wet areas, toilets smells and cobwebs accumulate in the homes.^[3] Plan experiments to avoid generating large quantities of contaminated glass or metal; these materials are difficult to incinerate, and large quantities can create waste disposal problems.^[4]

• BACKGROUND

- Rising concerns over chemical-based cleaners' environmental and health impacts.
- Interest in biodegradable and cost-effective natural alternatives.

• Eggshells/Egg-derived materials

- Rich in calcium carbonate (CaCO_3), protein, and membrane enzymes.

- Natural deodorizing, abrasive, and potential antibacterial properties.

• Phenyl

- Commonly used disinfectant in homes/institutions.

• OBJECTIVE

- To formulate an eco-friendly homemade phenyl using egg-based components.
- To evaluate its physicochemical and antimicrobial properties compared to commercial phenyl.
- To beautify the floor.
- To remove stains, dirt, litter and obstructions.
- To remove allergens, in particular dust.
- To prevent wear to surface

2. LITERATURE OF SURVEY

- 1) Phenols were isolated in crude form for the first time at the end of the eighteenth century. In 1834, pure phenol was isolated, and its structure was established in 1842. In Germany, Küchenmeister was the first to utilize phenol as a wound dressing in 1860. Lister intended to employ it in his classic antiseptic surgical trials.^[3]
- 2) Indian Medical Association phenyl, identified as the most effective disinfectant against the floor micro flora, and therefore they are considered as standards to analyze effectiveness of other commercial surface cleaners.^[5]

- 3) Metal-Binding Proteins Respond to MPTP-Induced Neurotoxicity. Implications for Using For Human.^[6]
- 4) Phenyl-substituted polyquinoxalines have been prepared by the reaction of combinations of two tetraamines.^[7]

3. MATERIALS AND METHODS

A. Materials

- Waste eggs (including shells)
- Vinegar (acetic acid source)
- Laboratory reagents for testing (agar plates, microbial cultures, etc.)
- Neem oil
- Lemongrass oil
- Pine oil
- Jiggery

B. Requirement

- 1) Beaker 1000ml
- 2) Stirrer
- 3) Measuring cylinder
- 4) Weighing balance
- 5) Hand gloves
- 6) Empty bottle
- 7) Mask

C. Formulation

Sr.No	Component	Quantity
1.	Water	2 liter
2.	Vinegar	100 ml
3.	Neem oil	50 ml
4.	Pine oil	50 ml
5.	Lenon Grass Oil	10 ml
6.	Jiggery	50 gm

D. Method Process

- **Eggshell Preparation**
 - Cleaning
 - drying,
 - grinding eggshells to fine powder
- **Formulation**
 - Adding surfactant, essential oils, and water to achieve desired consistency.
 - Optional: Natural colorants or preservatives.
 - Cleaning the egg shells
 - Dry thr eggshells then to fine powder
 - Two liter water and mix eggshells powder
 - Fermentation for 2-3 day's
 - Then add Neem oil, Pine oil, lemongrass oil, vinegar, jiggery

E. Evaluation Parameters

1. Physicochemical Properties

- pH
- Viscosity
- Appearance (color, odor)
- Shelf life

2. Cleaning Efficiency Test

- On stained tiles, glass, or plastic surfaces.
- Comparison with commercial phenyls.

3. Cost Analysis

- Estimation of per-liter production cost.

4. PACKING AND MARKING

Packing should be proper because it protects the product from deterioration and increases its shelf life. The material should be packed in glass bottles or suitable plastic containers, provided with a pilfer-proof cap made of either metal or plastic. The size of the container should be 200 ml, 500 ml or 1 liter. Each pack should feature the following details about the product: a) Indication of the source of manufacture 1) Net content of the material 2) Name of the material 3) Month and year of manufacture, and Batch No. and Code No. 4) Direction for use 5) Cautionary label stating 'do not mix with household soap & detergents' g) MRP 6) Customer-care details^[5] phenyl group^[7] Reaction of the monomers in the absence of solvent.^[8]

5. MARKET DEMAND

Phenyl has several advantages over other similar products and the same are listed below:

1. Pine cleaners are non toxic to human and pets.
2. These cleaners are non-irritating ho human skin, unlike phenol and creosote based black disinfectants.
3. Smell is very pleasant which lingers after use.
4. Do not discolor surfaces.
5. Pine oil is obtained from pine tree therefore the cleaner are herbal and environment friendly.
6. Pine oil has germicidal properties, therefore it is used in hospitals and clinics and pet disinfection.
7. Applicable on a variety of surfaces like glass, metal. Porcelain, enamel, ceramic, plastic, linoleum, stone and concrete etc.
8. It imparts shine to hard surfaces after cleaning.

6. ADVANTAGES

1. Utilization of Natural Antibacterial Properties
2. Reduction of Chemical Use
3. Promotion of Recycling and Waste Reduction
4. Cost-Effectiveness
5. Versatility in Cleaning Applications

7. DISADVANTAGES

- **Limited Antibacterial Efficacy:** Eggshells contain calcium carbonate, which has some antibacterial properties. However, their effectiveness may not match that of commercial disinfectants, especially against a broad spectrum of pathogens. This limitation could be a concern in environments requiring stringent hygiene standards, such as hospitals or kitchens.
- **Short Shelf Life:** Homemade cleaners, including egg-based phenyl, often lack preservatives, leading to a shorter shelf life. Without proper storage, these

formulations can degrade or become breeding grounds for bacteria, reducing their effectiveness and potentially posing health risks. Eco Clean DIY

- **Potential Skin and Respiratory Irritation:** Some individuals may experience skin irritation or allergic reactions to certain components, such as essential oils or other additives used in the formulation. Inhalation of fumes from homemade cleaners can also cause respiratory discomfort in sensitive individuals.
- **Inconsistent Cleaning Results:** The effectiveness of homemade cleaners can vary based on the formulation and application method. They may not perform as well on tough stains or heavily soiled surfaces compared to commercial cleaners, potentially requiring more frequent cleaning or additional effort. Eco Clean DIY
- **Surface Compatibility Issues:** Certain natural ingredients may not be suitable for all surfaces. For example, acidic components can damage marble or granite surfaces, and abrasive materials might scratch delicate finishes. It's crucial to test the cleaner on a small, inconspicuous area before widespread use.
- **Time and Effort in Preparation:** Creating homemade cleaners requires time and effort to source ingredients, mix formulations, and ensure proper storage. This process may not be convenient for individuals with busy schedules or those seeking quick solutions.
- **Potential for Cross-Contamination:** Improper handling or storage of homemade cleaners can lead to contamination, especially if utensils or containers are not adequately sanitized. This risk underscores the importance of cleanliness during preparation and storage.

8. CONCLUSION

The study on the formulation and evaluation of egg-based homemade phenyl for eco-friendly cleaning applications concludes that utilizing egg components, particularly eggshells, can serve as a sustainable alternative to conventional cleaning agents. Eggshells are rich in calcium carbonate, which possesses natural antibacterial properties, making them effective in disinfecting surfaces. Incorporating essential oils into the formulation enhances its antimicrobial efficacy and imparts a pleasant fragrance. This approach not only reduces reliance on synthetic chemicals but also promotes the recycling of egg waste, aligning with environmentally friendly practices.

By leveraging the natural properties of eggshells and essential oils, this homemade phenyl formulation offers an eco-conscious solution for household cleaning needs. Its effectiveness in eliminating germs and odors makes it a viable alternative to traditional cleaning products, contributing to a cleaner and greener environment. Sources.

9. RESULT

- **Antibacterial Efficacy:** Eggshells, primarily composed of calcium carbonate, exhibit natural antibacterial properties. When combined with essential oils, these properties are enhanced, making the formulation effective against a broad spectrum of pathogens.
- **Environmental Benefits:** This homemade phenyl reduces reliance on synthetic chemicals, aligning with environmentally friendly practices and promoting the recycling of egg waste.
- **Cost-Effectiveness:** Utilizing readily available and low-cost resources like eggshells makes the formulation an economical alternative to commercial cleaning products.
- **Versatility:** The egg-based phenyl formulation can be used for various cleaning tasks, offering a versatile solution for household cleaning needs.

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