



Ministry of Higher
Education and Scientific
Research

Al-Zahrawi University College

Department of Pharmacy

Graduation Project Guidelines

Preparation and in Vitro Evaluation of Some Popular Pharmaceutical Preparations

By:

Laith Aqueel Hussein

Ahmed Yassein Nasser

Wahab Nabil Kareem

Zaynab Amjed Ahjel

Israa Ibraheim Abdel-Sada

Supervized by:

Prof. Dr. Samir M.Awad

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Abstract:

Many new drugs are discovered annually, and then there is a need to formulate them to convert them into a pharmaceutical form. Major pharmaceutical companies compete in this field, which has resulted in their reluctance to produce many pharmaceutical preparations, which they have left to small laboratories. Therefore, we were interested in producing these preparations, which we prepared in the college laboratories from simple pharmaceutical raw materials, and they include the preparations of many solutions, ointments, creams, oral, nasal, ear drops, lotions, shampoos and others of medical importance, hoping that they will be useful to society in the field of health care and that they will be the beginning of a small production project for pharmaceutical preparations.

Key words: Popular pharmaceutical preparations, preparation and evaluation.

Introduction:

Pharmaceutical formulation is the process of combining various substances to create a final medicinal product that is suitable for consumption or administration. This involves careful consideration of the active ingredients, excipients (inactive ingredients), dosage forms, and the intended route of administration. The key aspects of pharmaceutical formulation includes:

1. Active pharmaceutical ingredients (APIS): The key substances in a formulation that provide the therapeutic effect.
2. Excipients: These are inert substances added to the formulation to aid in the manufacturing process, enhance stability, improve bioavailability, and facilitate drug delivery. Common excipients include fillers, preservatives and colorants.
3. Dosage forms: The specific form in which the drug is delivered to the patient, which can include tablets, capsules, liquids (solutions, suspensions), ointments, creams, gels, patches, aerosols and injectable formulations.
4. Stability: Formulations must be stable over their intended shelf life, meaning they do not degrade or change in effectiveness under specific storage conditions.
5. Bioavailability: This refers to the extent and rate at which the active ingredient or active moiety is absorbed and becomes available at the site of action, thus formulation can significantly, affect bioavailability..

6. Manufacturing process: The chosen methods for mixing, granulation, compression, coating and packaging the formulation affect the final product s' quality, efficacy and safety.

7. Patient considerations: Such as ease of use, taste, dosage frequency and the specific patient populations (e.g pediatrics, geriatrics).

The formulation of a pharmaceutical product is a complex and multidisciplinary field, requiring knowledge of chemistry, biology, pharmacology and engineering , along with understanding of the regulatory environment here, we develop a program aimed to formulate many simple raw materials to solutions, ointments, creams, ear ,nasal drops, sprays, shampoos and others in an attempt to submit these formulations to the local pharmaceutical market to share in the field of health care of the population.

Material and methods:

All raw materials, package containers, glass wares, mortars, hot plates and other facilities were submitted from the laboratory store of the college and/or purchased from external laboratory stores. Labels were designed and printed by students project.

Experimental:

1- Solutions

1. Potassium Permanganate Solution: KMnO_4

Preparation: dissolve 1gm KMnO_4 crystals in 1 litre distilled water.

Uses:

1.To disinfect vegetables & fruits by soaking in 1 liter solution for 15min.,then wash with running water to remove any traces of KMnO_4 .

-The solution is valid for one year.

2. As skin disinfectant, cleansing agent, for



soothing eczema (skin rash), fungal infections of the foot. impetigo, superficial wounds, dermatitis.

2. Boric acid lotion:

Preparation: dissolve 2.5 gm boric in 100 ml hot water.

Uses:

Antiseptic, antifungal, insecticide, cleaning agent and eye wash.

3. Spray for washing eye glasses & sun glasses:

Preparation: 50 ml distilled water + 50 ml isopropyl alcohol + 2 drops liq. soap, shake and put in a spray bottle.

or. 50 ml distilled water + 150 ml vinegar in a spray bottle.

Uses:

A spray for washing eye glasses & sun glasses.

4. Lugol 's iodine solution:

Preparation: Dissolve 10 g of potassium iodide in 100 ml distilled water. Slowly add 5 g of iodine crystals while shaking then, filter & store in tightly stoppered brown bottle.

- Valid for one month
- Add 8 drops to a cup of milk or juice.
- Do not use this solution if it turns brownish yellow.

Uses:

- It is used with thyroid medicines to prepare the thyroid gland for surgical removal & treatment of hyperthyroidism and thyroid storm.
- An effective bactericide & fungicide.

5. Sodium thiosulphate lotion:



Preparation: Sodium thiosulphate (30 g) is dissolved in boiled water then, cooled, complete the volume to 100 ml distilled water. Then, filter & store in tightly Stoppard brown bottle.

Uses:

Topical antifungal agent for tinea versicolor , used to treat cyanide poisoning.

6. Lead subacetate lotion:

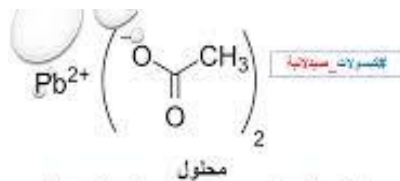
Preparation: Lead acetate (250 gm) is dissolved in boiled water, then complete the volume to 1 liter with distilled water, put in dark colored bottle then add lead monoxide (175 gm), shake the solution every 1/2 hour for 2 days apart from light, filter & use the clear filtrate.

Uses:

-Reducing skin tumors, bruises and bruises. It is a constrictor for blood vessels to relieve hemorrhoid pain. Compresses in case of testicle congestion. An antiseptic and astringent in cases of increased foul-smelling vaginal secretions, and as a vaginal wash.

كنوز طبيعية
خلات الرصاص
LEAD SUBACETATE

فوائد خلات الرصاص للتورم والإحمرار
وعلاج البواسير والتهاب النسيج الخلوي
أين يباع ويتوفر خلات الرصاص
طريقة التحضير والاستخدام



خلات الرصاص
يستخدم كغسول موضعي للبواسير حيث تبذل
قطنة أو قطعة شاش بالمحلول وتوضع على
موضع الألم ثلاث مرات في اليوم حيث يعمل
على تقليل التورم وتخفيف الألم الشديد
والمزعج وتقليل الإحمرار والتهيج.



7.Panthenol lotion:

Preparation: Panthenol (20gm) & Glycerol (10gm) are dissolved in rose water (100 ml), stored in tightly Stoppard brown bottle.

Uses:

Treating skin infections and diaper rashes in children.

8.Argyrol drops:

Preparation: Argyrol (5gm) & ephedrine HCl (1gm) are dissolved in distilled water (100ml), stored in dropper bottles away from light.

Uses:

Antiseptic in cases of sinusitis.



9.Menthol nasal drops:

Preparation: Menthol (1gm), camphor (1gm), eucalyptus oil (0.5ml) are dissolved in liquid paraffin (99 ml). stored in dropper bottles away from light.

Uses:

Relieve nasal congestion in cases of colds and flu.

10.Alkaline nasal wash:

Preparation: Sodium chloride, sodium bicarbonate & borax (5gm of each) are dissolved in hot water, cooled, complete to 250 ml water, filter and stored in dropper bottles away from light.

Uses:



Astringent in sinusitis.

11.Salicylic acid ear drops:

Preparation: Salicylic acid(2gm) is dissolved in alcohol (50 ml) ,add water (50 ml),mix well, filter and stored in dropper bottles away from light.

Uses:

Antibacterial & antifungal ear drops.

12. Aluminium acetate ear drops:

Aluminium acetate (13 gm) is dissolved in water, complete the volume to 100ml distilled water, filter & stored in dropper bottles away from light.

13. Hydrogen peroxide ear drops:

Preparation: Hydrogen peroxide(5ml,10 volume) is mixed with distilled water (95 ml), & stored in dropper bottles away from light.

Uses:

Antibacterial & antifungal agent.

14. Glycerin phenol ear drops:

Preparation:Phenol (5gm) is dissolved in hot glycerol (100 ml, heated on water bath),left to cool & stored in dropper bottles away from light.

Uses:

-Antiseptic and analgesic in bacterial & fungal inflammation.

15. Glycerin magnesia:

Preparation:Anhyd. Mg-sulphate (25 gm) is dissolved in boiled water (10 ml), then added to hot glycerin ((100 ml, heated on water bath), shake slowly till complete dissolution, left to cool & stored in bottles away from light.

Uses:

Disinfectant for use in burns, bed sores, and large purulent wounds, especially for diabetics

16. Glycerin Iodine:

Preparation: KI (2gm) is dissolved in distilled water (2ml), then, add I₂ (1gm) till dissolved then add glycerin (100 ml) & mix well, finally add peppermint or lemon oil (0.2 ml), filter & stored in bottles away from light.

Uses:

Antiseptic for gum and throat infections.



17. Glycerin Ichthammol:

Preparation: Ichthammol (10 gm) is dissolved in hot glycerin (90 ml), left to cool, & stored in dropper bottles away from light.

Uses:

Ear drops to relieve inflammation and remove fluids and pus.

18. Glycerin Tannic:

Preparation: Tannic acid (15 gm) is dissolved in hot glycerin (85 ml), left to cool, & stored in dropper bottles away from light.

Uses:

An astringent for inflammation, bleeding gums and mouth ulcers.

19. Glycerin Borax:

Preparation: Borax (13 gm) is dissolved in hot glycerin (87 ml), left to cool, & stored in dropper bottles away from light.

Uses:

An astringent for inflammation, bleeding gums and mouth ulcers.

20. Glycerin Boric:

Preparation: Boric acid (10 gm) is dissolved in hot glycerin (90 ml), left to cool, & stored in dropper bottles away from light.

Uses:

Antiseptic in cases of boils, scratches and minor burns.

21. Glycerin bicarbonate ear drops:

Preparation: Sod.bicarbonate (5gm) is dissolved in distilled water (65 ml), add glycerol (35 ml) , stored in dropper bottles away from light.

Uses:

Wax removal.

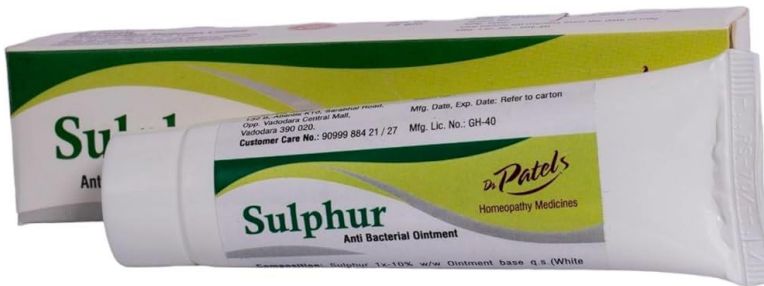
2-Ointments & Creams

22. Sulphur ointment 10% w/w:

Preparation: Grind well precipitated sulphur (10 gm) and zinc oxide (3gm) in a mortar in a counter clockwise direction, mix with paraffin oil or glycerin (5 ml) till a smooth paste, then add molten vasline (82 gm), mix and leave to cool the ointment.

Uses:

Sulfur ointment is used to treat seborrheic dermatitis and scabies. Sulfur may also as antifungal and for treatment of acne.

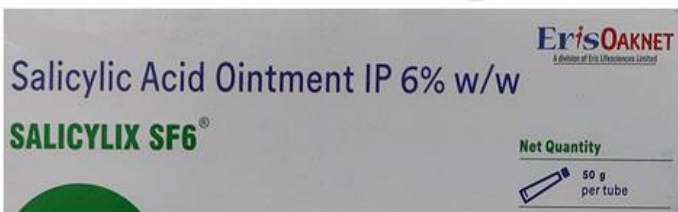


23. Salicylic acid 10% w/w:

Preparation: Grind well salicylic acid (10 gm) in a mortar in a counter clockwise direction, mix with paraffin oil (7 ml) or glycerin till a smooth paste, then add molten vasline (80 gm) and white bees wax (3gm), , mix and leave to cool the ointment.

Uses:

Psoriasis, hyperkeratosis, and seborrheic dermatitis.



24. Ichthammol ointment 5% w/w:

Preparation: Ichthammol (10 gm) and liq. Paraffin (7 ml) are mixed well in a dry mortar till smooth paste, then molten vasline (80 gm) & white bees wax (3 gm) are added, mix well till cooled.

Uses:

To treat boils, abscesses, and insect bites or stings, especially bees (sedative) and seborrheic dermatitis.



25. Boric acid ointment 10% w/w:

Preparation: Grind well boric acid (10 gm) in a mortar ,then mix well with paraffin oil (5ml) till a liquid paste , mix well with molten vasline (85 gm) till cooled.

Uses:

-Antiseptic in boils, abscesses, and burns and bed sores.

26. Zinc oxide ointment 15% w/w:

Preparation: Grind well Zinc oxide (15 gm) in a mortar ,then mix well with paraffin oil (5ml) till a liquid paste , mix well with molten vasline (78 gm) and white bees wax (3gm) till cooled.

Uses:

-An astringent and soothing agent for skin infections, insect bites and itching, an antifungal and antibacterial agent for treating boils, and an auxiliary treatment for acne.



27. Whitefield 's ointment:

Preparation: Grind well salicylic acid (3gm) an benzoic acid (6gm) in a mortar add, liq. paraffin (8 ml) then mix with molten vasline (80gm) & white bees wax (3gm) ,allow to cool.

Uses:

-Antifungal, for tinea, dandruff, eczema and psoriasis.



28.Ammoniated mercury ointment 5% w/w (White precipitate):

Preparation: Grind well ammoniated mercury (5gm) till a smooth powder,mix with paraffin oil (5ml) till a liquid paste, add molten vasline ,mix well & allow to cool.

Uses:

-Paint around the anus to kill worms at night.



29. Calamine ointment:

Preparation: Grind well calamine (10 gm), bentonite (4gm), ZnO (10 gm) & phenol (0.5gm),mix with paraffin oil (5ml), mix with molten vasline (70gm), allow to cool then add rose oil (0.5 ml)& mix well.

Uses:

-Antiseptic and soothing in cases of itching, eczema, soothing for sunburns, anti-allergic and prickly heat redness.



30. Cod liver oil ointment:

Preparation: Mix well olive oil, almond oil, jojoba oil (5ml of each) in molten vasline (65 gm), allow to cool then mix with lemon oil (0.2ml).

Uses:

-Severe dry skin, cracked and rough heels and feet.

31.Resorcinol ointment:

Preparation: Grind well salicylic acid (2 gm), resorcinol (2gm), precipitated sulphur (3 gm), mix well with paraffin oil (6ml) & coal tar (2gm) till smooth paste then mix with molten vasline (80 gm) & white bees wax (5 gm), allow to cool.

Uses:

-It is used as an antiseptic and disinfectant in topical pharmaceutical products in the treatment of skin disorders and infections such as acne, seborrheic dermatitis, eczema, psoriasis, corns, calluses, and warts. It exerts a keratolytic activity. resorcinol works by helping to remove hard, scaly, or roughened skin.

32. Kaoline Poultrice:

Preparation: Boric acid (5gm) is dissolved in hot glycerin (42 ml), then add heavy kaolin powder (portion wise), mix and allow to cool & a smooth paste is formed. Thymol (0.1 gm) is dissolved in a mixture of peppermint oil (0.1 ml) & methyl salicylate (0.3 ml) then add to the paste, mix well & allow to cool.

Uses:

-Kaolin Poultrice BP possesses emollient properties. It provides heat and moisture locally to relieve pain and draw pus, if present, from a wound. It also exerts an osmotic effect, collecting fluid and toxic products at the site of application. A rubefacient or counter – irritant action may be obtained.

POULTICES

1. (Cataplasma) It is a soft mass of vegetable constituents or clay, usually heated before application.
2. They are solid or semisolid masses of solid matter applied to skin in order to Reduce inflammation and in some cases to act as a counter irritant.
3. After heating the preparation is spread on dressing and applied to the affected area of the skin.
4. Kaolin poultrice BP is prepared by mixing and heating dried, heavy kaolin and boric acid with glycerin. The product is spread on a dressing and applied hot to the skin.



33. Zinc olive cream:

Preparation: In a mortar, grind well ZnO (50gm), then add and mix well olive oil (50gm) portion wise till a homogenous whitish cream is obtained.

Uses:

-A soothing agent and has mild astringent and antiseptic action zinc oxide has the ability to reflect ultraviolet radiation. Olive when applied to the skin forms a

very thin layer which acts a barrier protection the skin from water soluble irritants .

-Cases of itching, eczema, insect bites, a soothing agent for sunburn, anti-allergy, redness and skin irritation.



34. Hydrous wool fat ointment:

Preparation: To molten wool fat (70 gm),add water (20 ml),mix well then add liquid paraffin (10 ml),mix well & allow to cool.

Uses:

-Cases of dry and cracked skin

35. Methyl salicylate ointment (Vick 's oint.):

Preparation: Dissolve camphor (2gm),menthol (2gm) in a mixture of eucalyptus oil (3ml),turpentine oil (3ml), methyl salicylate (10 ml), liquid paraffin, then add gradually to molten vasline (65 gm), mix well and allow to cool.

Uses:

-Strong analgesic for rheumatic & muscular pains.



36. Non staining Iodine ointment:

Preparation: In a mortar, grind well Iodine (5gm), mix well with arachis oil (20 ml), add molten yellow soft paraffin (75 gm) and mix well, allow to cool.

Uses:

-Fungal skin infections.

37. Sun screen ointment:

Preparation: In a dry mortar, mix well a mixture of olive oil, almond oil (10 ml for each), Jojoba oil (5 ml), ZnO (22.5 gm), Titanium dioxide (17.5 gm) till a smooth paste then add portion molten vasline (32.5 gm) & yellow bees wax (2.5 gm), mix well and allow to cool.

Uses:

-For protection & treatment of sun burns.



3- Powders

38. Soothing dusting powder:



Boric Acid 2 gm
Zinc Oxide 21 gm
Calamine 21 gm
Lavender Oil 0.5 gm
Rose Oil 0.5 gm
Talc Powder 55 gm

Preparation: Grind all components in a dry mortar till very fine, smooth and soft powder is obtained then passed through a suitable screen.

Uses:

-Antiseptic and soothing agent in case of skin irritation & itching.

39. Vaginal douche (alkaline powder):



Borax..... 17 gm
Aluminium Alum 7 gm
Sodium Bicarbonate..... 76 gm
Rose Oil 0.1 gm

Preparation: Grind all components in a dry mortar till very fine, smooth and soft powder is obtained then passed through a suitable screen.

Uses:

-Vaginal douche as an antifungal and antibacterial agent, to treat unpleasant secretions, and for general hygiene.

-Dissolve a teaspoon in a liter of warm water.

40. Antifungal powder:



Zinc Oxide 10 gm
Benzoic Acid..... 6 gm
Aluminium Alum 10 gm
Phenol 2 gm
Lavender Oil 1 gm
Lemon Oil 1 gm
Talc Powder 70 gm

Preparation: Grind all components in a dry mortar till very fine, smooth and soft powder is obtained then passed through a suitable screen.

Uses:

-Antifungal & for tinea foot.

4- Paints

41. Mercurochrome paint:

Preparation: Dissolve mercurochrome (3gm) in water, filter then stored in bottles away from light.

Uses:

-Antifungal & antiseptic in wounds.



42. Gentian violet paint:



Preparation: Dissolve gentian violet crystals (1gm) in 95% alcohol (10 ml), then add to water (90 ml), filter & stored in bottles away from light.

Uses:

-Antifungal & antiseptic in wounds, oral candidiasis.

43. Methylene blue paint:

Preparation: Dissolve methylene blue crystals (0.5 gm) in 95% alcohol (10 ml), then add to water (90 ml), filter & stored in bottles away from light.

Uses:

Antifungal & antiseptic in wounds.-

44. Castellani 's paint:



Basic Fuchsin 0.4 gm
Phenol 4 gm
Boric Acid 0.8 gm
Resorcinol 8 gm
Acetone 4 ml
Alcohol 95 % 8 ml
Distilled Water 88 ml

Preparation: Dissolve Fuchsin in acetone & alcohol (1), Boric acid is dissolved in boiled water (2). Resorcinol & phenol are dissolved in boric acid solution (3), allow to cool, mix solution (2) & (3), leave 24 hr in a dark place, filter & stored in bottles away from light.

(10 ml), then add to water (90 ml), filter & stored in bottles away from light.

Uses:

-Antifungal & antiseptic .



5. Clove oil paint:



Clove Oil 15 ml
Peppermint Oil 5 ml
Liquid Paraffin 85 ml

Preparation: Mix oils well, then stored in bottles away from light.

Uses:

-Toothache treatment.



5-Hair Formulations:

46. Hair oil mixture:



Olive Oil 40 ml
Almond Oil 50 ml
Jobba Oil 24 ml
Wheat Germ Oil 15 ml
Coconut Oil 25 ml
Castor Oil 15 ml
Rose Oil 1 ml
Liquid Paraffin 80 ml

Preparation: Mix oils well, then stored in bottles away from light.

Uses:

-Treating dry hair loss and breakage, and increasing its density, softness and vitality.

47. hair oil mixture:

Preparation: Mix well equal volumes of olive, sweet almond, aloe,rocket, jojoba, coco nut & castor oils, then stored in bottles away from light.

Uses:

-Treating hair loss and breakage, and increasing its density, softness and vitality.

6-Miscellaneous

48. Shampoo for hair loss treatment:

Preparation: One table spoonful of coffee powder is dissolved in 40 ml hot water, cool then add one table spoonful of honey and mix well, add one table spoonful of almond or castor oil + 8 drops of peppermint oil + 8 drops of rosemary oil , mix well then add 100 ml normal shampoo.

Uses:

-Treating hair loss and breakage, and increasing its density, softness and vitality.

49. Formulation for Nail Breakage:

Preparation: 5gm of sodium bicarbonate is mixed with 15 ml of olive oil.

Uses:

-Nail breakage treatment.

50. Quinine hair lotion:



Quinine HCl	1.5 gm
Pilocarpine Nitrate	1.5 gm
Salicylic Acid	3 gm
Resorcinol	1 gm
Tincture Cantharidis	7.5 ml
Tincture Jaborandi	15 ml
Panthenol	50 ml
Rosemary Oil	0.5 ml
Distilled Water	30 ml
Alcohol 95 %	220 ml

Preparation: Quinine & pilocarpine are dissolved in water ,add panthenol (1). Salicylic acid and resorcinol are dissolved in alcohol then add rosemary oil, Tr. cantharidis & Tr. Jaborandi (2). Add (1) to (2), mix well ,store in bottles away from light.

Uses:

-Treating hair loss and breakage, and increasing its density, softness and vitality.

51. Mouth wash

Boil 3 cups of water + 2 tablespoonful of clove flowering buds ,leave to cool filter ,put in 500 ml bottle and complete the volume with vinegar.

Uses:

-antiseptic & antifungal to be used every 12hour.

Results and analysis of data of some preparations:

1.Potassium permanganate solution:

Physical Characteristics:

-Appearance: pink color, clear solution

-Odor: odorless

-Particle size: clear watery, mobile solution.

Chemical Characteristics:

-Assay: by redox titration or spectrophotometrically.

-Impurities: test for impurities like potassium hydroxide, potassium carbonate, and manganese dioxide.

-pH: neutral.

Microbiological Characteristics:

-Sterility testing: to ensure the absence of microorganisms.

-Endotoxin testing test for endotoxins, which can indicate contamination.

Packaging and Labeling:

1. Packaging integrity: no visible defects

2. Labeling compliance: label meets regulatory requirements.

2. Boric acid lotion:

Physical Characteristics:

-Appearanc: colorless, clear and watery.

-pH = 4.6 ,within the specified range (typically 4.5-5.5).

-Viscosity: mobile(measured by a viscometer).

-Specific Gravity : measured by hydrometer or pycnometer.

Chemical Characteristics:

-Boric acid content: by adding glycerol to enhance the acidity then titrated with 0.1N NaOH using ph.ph as indicator.

Microbiological Characteristics:

-Sterility testing: testing for the absence of viable microorganisms.

-Microbial limit testing: determination of the total viable aerobic microbial count.

Packaging and Labeling:

1. **Packaging** integrity: inspection for any defects or damage.

2.Labeling Compliance:

Verification that the labeling meets regulatory requirements, including ingredient listing, instructions for use, and warnings.

Discussion:

Many popular pharmaceutical formulations were highlighted, including solutions such as potassium permanganate lotion, boric acid lotion, salicylic acid in alcohol and others. They were prepared by simple agitation method in which the active ingredient was dissolved in solvents such as water and alcohol either on cold or on hot such as boric acid lotion. In many cases glycerin is used as a cosolvent as in glycerib bicarbonate ear drops and glycerin magnesia lotion. Also Leugol s' iodine solution in which iodine is dissolved in water by complex formation by potassium iodide. Powder such as alkaline nasal wash was prepared by simple mixing method. Ointments and creams were prepared using different bases such as vasline, bees wax and others. Hair oils were prepared by mixing different oils such as castor , coconut oil, almond oil ...etc. Medical shampoos were formulated such as Caffiene shampoo that inhibits dihydrotestosterone that is responsible for hair loss espwcially in men.

Conclusion:

Some popular pharmaceutical formulation could be prepared in small scale as a blocking unit in the field of industrial pharmacy.

Recommendation:

We hope in the future that our project will be converted to small factory.

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Conflict of Interest:

No potential conflict of interest was reported by the students, there is no funding associated with work featured in this work.

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