MARRI LAXMAN REDDY INSTITUTE OF PHARMACY

(Approved by AICTE & PCI, New Delhi and Affiliated to JNTUH)

Dundigal - Gandimaisamma (V) &(M), Medchal (Dt), Hyderabad, Telangana - 500 043.

HERBAL DRUG TECHNOLOGY

LAB MANUAL

B. PHARMACY III-II

About MLRIP

To be an educational Institute of par excellence and produce competent pharmacy professionals to serve the community through research and the ever-increasing needs of Industry.

1. Imparting quality education and innovative research for various career opportunities.
2. Creating conducive academic environment to produce competent pharmacy professionals.
3. Indoctrination of students adorned with high human values and make them aware of their responsibility as health care professionals.

Program Educational Objectives

PEO 1: To produce graduates with sound theoretical knowledge and technical skills required for their career opportunities in various domains.

PEO 2: To incite the students towards research and to address the challenges with their innovative contributions for the benefit of the mankind.

PEO 3: To instill the essence of professionalism, ethical commitment to become a health care professional with sound integrity and adherence to the core human values in the service of the society.

PROGRAM OUTCOMES

1. **Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
2. **Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
3. **Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
4. **Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
5. **Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
6. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
7. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
8. **Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
9. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
10. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
11. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

PS611: HERBAL DRUG TECHNOLOGY LAB

B.Pharm. III Year II Sem. **L T/P/ C**
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List of Experiments:

1. To perform preliminary phytochemical screening of crude drugs.
2. Evaluation of excipients of natural origin
3. Incorporation of prepared and standardized extract in cosmetics formulations like creams, lotions, Shampoos and their evaluation.
4. Incorporation of prepared and standardized extract in cosmetics formulations like Syrups, Mixtures and tablets and their evaluations as per pharmacopoeial requirements
5. Monograph analysis of herbal drugs from recent Pharmacopoeias
6. Determination of Aldehyde content
7. Determination of phenolic content
8. Determination of total alkaloids

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

EVALUTION OF EXCIPIENTS OF NATURAL ORIGIN

***Definition* of *excipient* : - "Pharmaceutical** excipients are pharmacologically inert or inactive substances other than the active pharmaceutical ingredient (API)

Appropriately serves as the vehicle or medium for a drug or other active substance".

Purposes served by excipients:

- Protection, support or stability of the formulation.
- Bulking up the formulation in case of potent drug for assisting in formulation of an accurate dosage form.
- Improve patient acceptance.
- Help in improving bioavailability of active drug.
- Enhancing overall safety and effectiveness of the formulation during its storage and use.

Ideal properties of excipients:-

- Stable and reproducible
- It should be chemically stable ,non-toxic and non reactive
- No unwanted interaction with drug
- It should be pharmacologically inert
- Desired functionality
- Cost effective

Various Excipients Used in Different Dosage Forms Design

I) Excipients used in TABLETS formulation :

Excipient	Function	Examples
Diluents	To act as bulking agent and filling material.	Sugar compounds e.g. lactose, dextrin, glucose, sucrose, Sorbitol. Inorganic compounds e.g. silicates, calcium and magnesium salts, sodium or potassium chloride

Binders, compression aids, granulating agents	Bind the tablet ingredients together giving form and mechanical strength for tableting.	Mainly natural or synthetic polymers e.g. starches, sugars, sugar alcohols and cellulose derivatives
Disintegrants	To facilitate the breakup of tablet the in gastrointestinal tract.	Compounds which swell or dissolve in water e.g. starch, cellulose derivatives and alginates, crosspovidone
Glidants	To improve the flow of granules from hopper to the die cavity to ensure uniform fill for each tablet.	Fine silica ,magnesium stearate, purified talc
Lubricants	To reduce the friction between the granules and die wall during compression and ejection of tableting process.	Stearic acid and its salts (e.g. magnesium stearate),carbowaxes
Antiadherents	To minimize the problem of picking	Talc, corn starch, metal stearate, Sodium lauryl sulphate
Tablet coatings and films	Protect tablet from the environment (air, light and moisture), increase the mechanical strength, mask taste and smell, aid swallowing, and assist in product identification. Can be used to modify release of the active ingredient. May contain flavours and colourings.	Sugar (sucrose) has now been replaced by film coating using natural or synthetic polymers. Polymers that are insoluble in acid, e.g. cellulose acetate phthalate, are used for enteric coatings to delay release of the active ingredient.
Sorbents	Sorbents are used for tablet/capsule moisture-proofing by limited fluid sorbing	Fatty acids, waxes, shellac
Solubilizing agents	To promote the solubility of the poorly soluble drugs	Tweens ,Spans
Colouring agents	Improve acceptability to patients, aid identification and prevent counterfeiting. Increase stability of light-sensitive drugs.	Mainly synthetic dyes and natural colours. Compounds that are themselves natural pigments of food may also be used.
Sweeting agents	To improve taste of the tablet , Improve patient acceptance	Aspartame,Saccharine sodium,sucrose.,

II) Excipients used in CAPSULES formulation :

Excipient	Function	Examples
Diluents	To act as bulking agent and filling material.	Sugar compounds e.g. lactose, dextrin, glucose, sucrose, Sorbitol. Inorganic compounds e.g. silicates, calcium and magnesium salts, sodium or potassium chloride
Binders, compression aids, granulating agents	Bind the tablet ingredients together giving form and mechanical strength for tableting.	Mainly natural or synthetic polymers e.g. starches, sugars, sugar alcohols and cellulose derivatives
Disintegrants	To facilitate the breakup of tablet the in gastrointestinal tract.	Compounds which swell or dissolve in water e.g. starch, cellulose derivatives and alginates, crosspovidone
Glidants	To improve the flow of granules from hopper to the die cavity to ensure uniform fill for each tablet.	Fine silica ,magnesium stearate, purified talc
Lubricants	To reduce the friction between the granules and die wall during compression and ejection of tableting process.	Stearic acid and its salts (e.g. magnesium stearate),carbowaxes
Antiadherents	To minimize the problem of picking	Talc, corn starch, metal stearate, Sodium lauryl sulphate
Tablet coatings and films	Protect tablet from the environment (air, light and moisture), increase the mechanical strength, mask taste and smell, aid swallowing, and assist in product identification. Can be used to modify release of the active ingredient. May contain flavours and colourings.	Sugar (sucrose) has now been replaced by film coating using natural or synthetic polymers. Polymers that are insoluble in acid, e.g. cellulose acetate phthalate, are used for enteric coatings to delay release of the active ingredient.
Sorbents	Sorbents are used for tablet/capsule moisture-proofing by limited fluid sorbing	Fatty acids, waxes, shellac
Solubilizing agents	To promote the solubility of the poorly soluble drugs	Tweens ,Spans

Colouring agents	Improve acceptability to patients, aid identification and prevent counterfeiting. Increase stability of light-sensitive drugs.	Mainly synthetic dyes and natural colours. Compounds that are themselves natural pigments of food may also be used.
Sweeting agents	To improve taste of the tablet , Improve patient acceptance	Aspartame, Saccharine sodium,sucrose.
plasticizers	To produce or promote plasticity and flexibility and to reduce brittleness.	Oleic and linoleic acids, Sorbitol

III) Excipients used in SYRUP formulation :

Excipient	Function	Examples
Vehicles	Medium in which ingredients of a formulation are dissolve, Suspended or dispersed.	Aqueous vehicle:- Water, aromatic waters, alcohol, glycerine, Propylene Glycol Oily vehicle:-Vegetable oils, Mineral oil, organic oily bases & emulsified bases
Preservatives	These agents are used to prevent the degradation of drug product and to promote the shelf life of the preparation	Methyl & Ethyl parabens, Propyl paraben, Benzoic acid and its salts, Sorbic acid and its salts.
Antioxidants	Agents which inhibits the oxidation	BHT(Butylated Hydroxy Toluene), BHA(Butylated Hydroxy Anisol), Sodium sulfite, Ascorbic acid
Viscosity imparting agents /Thickening agents.	These agents are used when it is desirable to increase or decrease the viscosity of a liquid either to serve as adjacent for palatability or to improve pour ability.	Hydroxy ethylcellulose ,Hydroxypropylmethylcellulose,Methylcellulose Polyvinyl alcohol, Polyvinylpyrrolidone
Suspending agents	These agents impart viscosity and thus retard particle settling.	clays, natural gums, synthetic gums

Flocculating agents	Agents incorporated in the preparation to prevent caking.	Starch, sodium alginate
Buffers	Resists any change in pH when acid or base is added.	Monobasic sodium Acetate, sodium Citrate, Potassium phosphate, Potassium Meta phosphates.
Chelating agents	These are substances that form complexes with metal ion in activating their catalytic activity in oxidation of medicaments.	EDTA: ethylene diamine tetraacetate , EDTAH4: ethylene diamine tetraacetic acid , Calcium Disodium Edetate, Disodium Edetate.
Anti foaming agents	These are agents inhibits the formation of stable foams by lowering surface tension and cohesive binding of the liquid phase.	Simethicone, organic phosphates, alcohols, paraffin oils etc
Emulsifying agents	These agents are used to prevent coalescence of the dispersed globules. Forms barriers at interface, and reduce interfacial tension	sodium lauryl sulphate, cetrimide, macrogols Antifoaming agents: the formation of foams
Wetting agents and surfactants	Agents which reduce the interfacial tension between the solid and liquid medium.	Tween 80 & Span 80

IV) Excipients used in SUSPENSION formulation:

Excipient	Function	Examples
Vehicles	Medium in which ingredients of a formulation are dissolve, Suspended or dispersed.	Aqueous vehicle:- Water, aromatic waters, alcohol, glycerine, Propylene Glycol Oily vehicle:-Vegetable oils, Mineral oil, organic oily bases & emulsified bases
Preservatives	These agents are used to prevent the degradation of drug product and to promote the shelf life of the preparation	Methyl & Ethyl parabens, Propyl paraben, Benzoic acid and its salts, Sorbic acid and its salts.
Antioxidants	Agents which inhibits the oxidation	BHT(Butylated Hydroxy Toluene), BHA(Butylated Hydroxy Anisol), Sodium sulfite, Ascorbic acid

Viscosity imparting agents /Thickening agents.	These agents are used when it is desirable to increase or decrease the viscosity of a liquid either to serve as adjacent for palatability or to improve pour ability.	Hydroxy ethylcellulose ,Hydroxypropylmethylcellulose,Methylcellulose Polyvinyl alcohol, Polyvinylpyrrolidone
Suspending agents	These agents impart viscosity and thus retard particle settling.	clays, natural gums, synthetic gums
Flocculating agents	Agents incorporated in the preparation to prevent caking.	Starch, sodium alginate
Buffers	Resists any change in pH when acid or base is added.	Monobasic sodium Acetate, sodium Citrate, Potassium phosphate, Potassium Meta phosphates.
Chelating agents	These are substances that form complexes with metal ion in activating their catalytic activity in oxidation of medicaments.	EDTA: ethylene diamine tetraacetate , EDTAH4: ethylene diamine tetraacetic acid , Calcium Disodium Edetate, Disodium Edetate.
Anti foaming agents	These are agents inhibits the formation of stable foams by lowering surface tension and cohesive binding of the liquid phase.	Simethicone, organic phosphates, alcohols, paraffin oils etc
Emulsifying agents	These agents are used to prevent coalescence of the dispersed globules. Forms barriers at interface, and reduce interfacial tension	sodium lauryl sulphate, cetrimide, macrogols Antifoaming agents: the formation of foams
Wetting agents and surfactants	Agents which reduce the interfacial tension between the solid and liquid medium.	Tween 80 & Span 80

V) Excipients used in EMULSION formulation:

Excipient	Function	Examples
Vehicles	Medium in which ingredients of a formulation are dissolve,	Aqueous vehicle:- Water, aromatic waters, alcohol, glycerine, Propylene Glycol

	Suspended or dispersed.	Oily vehicle:-Vegetable oils, Mineral oil, organic oily bases & emulsified bases
Preservatives	These agents are used to prevent the degradation of drug product and to promote the shelf life of the preparation	Methyl & Ethyl parabens, Propyl paraben, Benzoic acid and its salts, Sorbic acid and its salts.
Antioxidants	Agents which inhibits the oxidation	BHT(Butylated Hydroxy Toluene), BHA(Butylated Hydroxy Anisol), Sodium sulfite, Ascorbic acid
Viscosity imparting agents /Thickening agents.	These agents are used when it is desirable to increase or decrease the viscosity of a liquid either to serve as adjacent for palatability or to improve pour ability.	Hydroxy ethylcellulose ,Hydroxypropylmethylcellulose,Methylcellulose Polyvinyl alcohol, Polyvinylpyrrolidone
Suspending agents	These agents impart viscosity and thus retard particle settling.	clays, natural gums, synthetic gums
Flocculating agents	Agents incorporated in the preparation to prevent caking.	Starch, sodium alginate
Buffers	Resists any change in pH when acid or base is added.	Monobasic sodium Acetate, sodium Citrate, Potassium phosphate, Potassium Meta phosphates.
Chelating agents	These are substances that form complexes with metal ion in activating their catalytic activity in oxidation of medicaments.	EDTA: ethylene diamine tetraacetate , EDTAH4: ethylene diamine tetraacetic acid , Calcium Disodium Edetate, Disodium Edetate.
Anti foaming agents	These are agents inhibits the formation of stable foams by lowering surface tension and cohesive binding of the liquid phase.	Simethicone, organic phosphates, alcohols, paraffin oils etc
Emulsifying agents	These agents are used to prevent coalescence of the dispersed globules. Forms barriers at interface, and reduce interfacial tension	sodium lauryl sulphate, cetrimide, macrogols Antifoaming agents: the formation of foams
Wetting agents and surfactants	Agents which reduce the interfacial tension between the solid and liquid medium.	Tween 80 & Span 80

VI) Excipients used in OINTMENTS formulation:

Excipient	Function	Examples
Ointment base	Carrier for medicament	Paraffin wax, Soft paraffin, Lanolin
Paste base	Carrier for medicament	Paraffin wax, Soft paraffin, Liquid paraffin
Penetration enhancer	To enhance penetration activity	Dimethylsulphoxide,(DMSO),pepper oil,oleic acid ,clove oil
Humectants	These agents are used to prevent drying of the product after application to the skin as well as prevent drying of product from the container upon opening.	propylene glycol, glycerol, polyethylene glycol, glycerin, sorbitan
Oil/oleaginous substances	emollient effect and protect against the escape of moisture	Hydrocarbons such as white ointment, yellow ointment, and yellow petrolatum.
Gelling agent	To provide the texture of a gel in gel preparations	**Natural** gelling agents– gum tragacanth, starch, pectin, gelatin,clays, cellulose derivatives, etc., **Synthetic** gelling agents– sodium alginate, carbomer, poly vinyl alcohol, etc.,
Preservatives	These agents are used to prevent the degradation of drug product and to promote the shelf life of the preparation	Methyl & Ethyl parabens, Propyl paraben, Benzoic acid and its salts, Sorbic acid and its salts.
Antioxidants	Agents which inhibits the oxidation	BHT(Butylated Hydroxy Toluene), BHA(Butylated Hydroxy Anisol), Sodium sulfite, Ascorbic acid
Chelating agents	Heavy metals cause degradation of gel bases and medicament.Chelating agents form complex with heavy metals and prevent degradation	EDTA: ethylene diamine tetraacetate , EDTAH4: ethylene diamine tetraacetic acid , Calcium Disodium Edetate, Disodium Edetate.
Emulgents	To prevent the coalescence of the globules of the dispersed phase. They act by reducing the interfacial	egg yolk, sodium phosphates, sodium stearoyl lactylate,

	tension between the two phases and forming a stable interfacial film.	
Co-emulsifiers	Added so as to improve the viscosity and stability of the resultant preparation	diacetyltartaric acid, sodium or calcium stearoyl-2- lactylate , lecithin
Hygroscopic substances	these prevent quick loss of water due to evaporation in gels and prevents drying, flake formation.	glycerol, propylene glycol
perfumes	To impart pleasant fragrance	Lavender oil, Rose oil, Lemon oil

VII) Excipients used in CREAMS formulation:

Excipient	Function	Examples
Ointment base	Carrier for medicament	Paraffin wax, Soft paraffin, Lanolin
Paste base	Carrier for medicament	Paraffin wax, Soft paraffin, Liquid paraffin
Penetration enhancer	To enhance penetration activity	Dimethylsulphoxide,(DMSO),pepper oil,oleic acid ,clove oil
Humectants	These agents are used to prevent drying of the product after application to the skin as well as prevent drying of product from the container upon opening.	propylene glycol, glycerol, polyethylene glycol, glycerin, sorbitan
Oil/oleaginous substances	emollient effect and protect against the escape of moisture	Hydrocarbons such as white ointment, yellow ointment, and yellow petrolatum.
Gelling agent	To provide the texture of a gel in gel preparations	**Natural** gelling agents– gum tragacanth, starch, pectin, gelatin,clays, cellulose derivatives, etc., **Synthetic** gelling agents– sodium alginate, carbomer, poly vinyl alcohol, etc.,
Preservatives	These agents are used to prevent the degradation of drug product and to promote the shelf life of the preparation	Methyl & Ethyl parabens, Propyl paraben, Benzoic acid and its salts, Sorbic acid and its salts.

Antioxidants	Agents which inhibits the oxidation	BHT(Butylated Hydroxy Toluene), BHA(Butylated Hydroxy Anisol), Sodium sulfite, Ascorbic acid
Chelating agents	Heavy metals cause degradation of gel bases and medicament.Chelating agents form complex with heavy metals and prevent degradation	EDTA: ethylene diamine tetraacetate , EDTAH4: ethylene diamine tetraacetic acid , Calcium Disodium Edetate, Disodium Edetate.
Emulgents	To prevent the coalescence of the globules of the dispersed phase. They act by reducing the interfacial tension between the two phases and forming a stable interfacial film.	egg yolk, sodium phosphates, sodium stearoyl lactylate,
Co-emulsifiers	Added so as to improve the viscosity and stability of the resultant preparation	diacetyltartaric acid, sodium or calcium stearoyl-2- lactylate , lecithin
Hygroscopic substances	These prevent quick loss of water due to evaporation in gels and prevents drying, flake formation.	glycerol, propylene glycol
perfumes	To impart pleasant fragrance	Lavender oil, Rose oil, Lemon oil

VIII) Excipients used in GELS formulation:

Excipient	Function	Examples
Ointment base	Carrier for medicament	Paraffin wax, Soft paraffin, Lanolin
Paste base	Carrier for medicament	Paraffin wax, Soft paraffin, Liquid paraffin
Penetration enhancer	To enhance penetration activity	Dimethylsulphoxide,(DMSO),pepper oil,oleic acid ,clove oil
Humectants	These agents are used to prevent drying of the product after application to the skin as well as prevent drying of product from the container upon opening.	propylene glycol, glycerol, polyethylene glycol, glycerin, sorbitan
Oil/oleaginous substances	emollient effect and protect against the escape of moisture	Hydrocarbons such as white ointment, yellow ointment, and yellow petrolatum.

Gelling agent	To provide the texture of a gel in gel preparations	**Natural** gelling agents– gum tragacanth, starch, pectin, gelatin,clays, cellulose derivatives, etc., **Synthetic** gelling agents– sodium alginate, carbomer, poly vinyl alcohol, etc.,
Preservatives	These agents are used to prevent the degradation of drug product and to promote the shelf life of the preparation	Methyl & Ethyl parabens, Propyl paraben, Benzoic acid and its salts, Sorbic acid and its salts.
Antioxidants	Agents which inhibits the oxidation	BHT(Butylated Hydroxy Toluene), BHA(Butylated Hydroxy Anisol), Sodium sulfite, Ascorbic acid
Chelating agents	Heavy metals cause degradation of gel bases and medicament.Chelating agents form complex with heavy metals and prevent degradation	EDTA: ethylene diamine tetraacetate , EDTAH4: ethylene diamine tetraacetic acid , Calcium Disodium Edetate, Disodium Edetate.
Emulgents	To prevent the coalescence of the globules of the dispersed phase. They act by reducing the interfacial tension between the two phases and forming a stable interfacial film.	egg yolk, sodium phosphates, sodium stearoyl lactylate,
Co-emulsifiers	Added so as to improve the viscosity and stability of the resultant preparation	diacetyltartaric acid, sodium or calcium stearoyl-2- lactylate , lecithin
Hygroscopic substances	These prevent quick loss of water due to evaporation in gels and prevents drying, flake formation.	glycerol, propylene glycol
perfumes	To impart pleasant fragrance	Lavender oil, Rose oil, Lemon oil

IDENTIFICATION TESTS OF EXCIPIENTS OF NATURAL ORIGIN

S.No	Synonyms & Biological Source	Identification Test
1	**Phytochemical Tests --- Acacia :-**	
	Synonym:- Indian gum, babul **Biological Source** :- gum arabica which is obtained from the dried , gummy exudation from the stem and branches of ***Acacia Arabica*** belongs to the family **Leguminosae.**	A. Aqueous solution +lead subacetate solution →gelatinized form **B.**With ruthenium red →no pink colour **C.**Aqueous solution of gum + 0.5ml of solution of benzidine in alcohol (1%) →blue colour **D.A**queous solution of gum +dil.Hcl,boil,+ fehlings A&Bsolution & heat it→red ppt **E.**Aqueous solution +iodine solution →no blue/brown colouration
2	**Phytochemical Tests --- Tragacanth**	
	Synonym : -Gum tragacanth **Biological Source :-** dried gummy exudation obtained by incision from stems and branches of ***astragalus gummiferlabill*** and other species of astragalus belongs to the family **leguminosae**	**A .**Boil with freshly prepared 10% Aq. ferric chloride solution →deep yellow ppt **B.** Dissolve tragacanth & precipitated copper oxide in conc. Ammonium hydroxide→a stringy ppt **C.** Fehlings solution test→red ppt (reducing sugar) **D.**Drug solution +lead acetate→white ppt **E.**Powder+5% aqu.caustic potash→canary yellow colour
3	**Phytochemical Tests --- Kaolin**	
	Synonym : China clay	A. Heat the kaolin on charcoal black with cobalt nitrate→ blued mass[alumina]

	,kaolinumproderesum **Biological Source :** A hydrated aluminiumsilicate , powdered and freed from gritty particles and other impurities by elutriation	
4	**Phytochemical Tests --- Sodium Alginate**	
	Synonym :- Algin,sodiumpolymannuronate **Biological Source: -** It is purified carbohydrate extracted from brown sea weed [algae]by treatment of dilute alkali. The common species are ***acrocystspyritera,laminaria,hyperborea,lidigitata*** belongs the family **Phaeophyceae**	**A.**1% solution in water with dil.sulphuric acid →heavy gelatinous ppt **B.**Aqueous solution with calcium chloride solution →copious ppt
5	**Phytochemical Tests --- Starch**	

	Synonym :- Amylum **Biological Source: -** Starch consists of polysaccharide granules obtained from the grains of Maize Zea mays L. or of rice Oryza sativa L or of wheat Triticum aestivum L. (Family- Graminae) or from the tubers of the potato Solarium tuberosum L. (family- Solanaceae).	**A. Iodine test: -** Mount a few starch granules in water, add a drop of iodine .Starch granules show bluish colouration when examined microscopically. **B. Starch mucilage**: - Make a suspension of 0.5g of starch with about 5 ml of water and then boil it gently with 20ml of water for 2-3 minutes and cool. i) Starch mucilage + Fehling's solution +heat →No red colouration ii) Starch mucilage +0.5ml HCL + heat (30 min) .After 30 min ,add sodium hydroixide until the mixture is alkaline to litmus and warm for few minutes.perform the test (iii) → Reduction takes place iii) 5ml of starch mucilage + 4drops of iodine water → Deep blue colouration is produced which disappear on heating.
6	**Phytochemical Tests --- Turmeric**	
	Synonym: - Curcuma, Curcum, Haridra, and Indian Saffron. **Biological Source: -** Turmeric is the dried rhizome of *Curcuma longa* L., also known as *C. domestica* Val., (Fam. Zingiberaceae).	**A.** Aqueous test solution with conc. H_2SO_4 or a mixture of H_2SO_4 with alcohol (90%) → deep crimson colour **B.** Aqueous test solution + boric acid colours to reddish brown which on addition of alkalies becomes greenish blue
7	**Phytochemical Tests --- Bees Wax**	
	Synonym :-Yellow bees wax, white (or)bleached	**A.**Heat wax aq.sodium hydroxide,cool and acidify→no turbidity **B.** 1g of wax +10ml alcoholic KOH solution +10ml alcohol,reflux for 1hour,stir →cloudy liquid

	yellow bees wax **Biological Source :-** The purified wax obtained from the honey comb of the bees ***apisdorsatalinn***and others species of apis belong to the family **Apidae**	
8	**Phytochemical Tests --- Honey**	
	Synonym :- madhu, honey purified ,mel **Biological Source :-**A sugar secretion deposited in honey comb by the bee, ***apisdorsata,*** and other species of apise.g : ***A.indica, A.florea***etc belongs to family **Apidae**	A. Fehlings solution test→red ppt
9	**Phytochemical Tests --- Lanolin**	
	Synonym :- Wool fat **Biological Source: -** Purified fat like substance from the wool of the sheep **Ovis aries** family **Bovidae**	0.5gm of Lanolin is dissolved in 5ml of chloroform. Addition of 1ml acetic anhydride and 2 drops of conc. H_2 SO_4 → Deep green colour

10	**Phytochemical Tests --- Arachis Oil**	
	Synonym :- Groundnut oil ,peanut oil, mungphali-ka-tel sweet oil **Biological Source :-** A fixed oil expressed from of ***arachis hypogaealinn***belongs to family **leguminosae**	A.1 ml of oil + alc.KOH → heat it for few minutes → crystals of arachidic acid on the wall of containers are deposited
11	**Phytochemical Tests --- Sesame Oil**	
	Synonym : - Teel oil, Gingelly oil, Benne oil **Biological Source :-** Fixed oil obtained by extraction from the seeds of ***sesamum indicumlinn,***belongs to the family **Pedaliaceae**	**A .Badouins test:** 2ml sesame oil+ 1ml of 1% solution of sucrose in hydrochloric acid → pink or red colour
12	**Phytochemical Tests --- Castor Oil**	
	Synonym :- Ricinus oil **Biological Source:-** The fixed oil obtained by cold compression from the kernels of seed of ***ricinuscommunislinn***	**A.**Completely miscible with half of its volume of light petroleum ether **B.** Oil+ equal volume of alcohol cool at 0^0c → clear liquid for three hours **C.** Acidified pet.ether +oil → shake , add a drop of ammolybdate→ white turbidity

	belongs to the family **Euphorbiaceae.**	

Preparation and evaluation of almond oil cold cream

Aim: To prepare and evaluate almond oil cold cream.

Apparatus: mortar &pestle, china dish, beaker, glass rod

Principle:

Creams are semi-solid emulsions of oil and water. They are of two types.

Oil-in-water (O/W) and water-in-oil (W/O) creams

Oil-in-water (O/W) creams are composed of small droplets of oil dispersed in a continuous water phase whereas are composed of small droplets of water dispersed in a continuous oily phase. Oil-in-water creams are more comfortable and cosmetically acceptable as they are less greasy and more easily washed off using water.

Generally cold creams contain

Antioxidants: a substance that inhibits oxidation, especially one used to counter act the deterioration of stored products.

Ex: Beta-carotene, lycopene

Emulsifying agents: An emulsifier or emulsifying agent is a compound or substance that acts as a stabilizer for emulsions, preventing liquids that ordinarily don't mix from separating.

Ex: Acacia, tragacanth, agar, pectin, carrageenan

Humectants: a substance which retaining or preserving moisture.

Ex: Aloe Vera gel, Egg yolk and egg white, Honey.

Permeation enhancer: Permeation enhancers are those substances which promote the absorption of drug through the skin.

Ex: Menthol, neem oil, basil oil.

Thickening agents: these are used to increase viscosity of the formulations, and modifying their consistency from viscous liquids to thick gels.

Ex; Xanthan Gum and Gelatin

Fragrance: these are incorporated in cosmetic formulations to give them a distinctive agreeable smell thus enhancing the acceptance of the consumers.

Ex: rose water

Use of cold creams: They are good emollients and skin protectants

Procedure

Formula

S.No	Ingredients	Official formula
1.	**Almond oil**	**20ml**
2.	**White wax**	**15gms**
3.	**Borax**	**1gm**
4.	**water**	**q.s upto 100ml**
5.	**Rose water**	**q.s**

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PREPARATION METHOD:

1. Weigh all the ingredients accurately.

2. Separately transfer almond oil & bees wax into china dish and heat at 70^0 C. Allow it to melt and mix (Oil phase)

3. Transfer borax into glass beaker & add required quantity of water and heat 70^0 C (aqueous Phase)

4. After complete melting add aqueous phase to oil phase with continuous stirring until both phases are miscible with each other.

6 Now add rose water and mix well.

6. Finally pack the cream in suitable container and dispense.

Uses:

- The provision of a barrier to protect the skin
- This may be a physical barrier or a chemical barrier as with sunscreens
- To aid in the retention of moisture (especially water-in-oil creams) with cleansing and emollient effects
- As a vehicle for drug substances such as local anaesthetics, anti-inflammatories (NSAIDs or corticosteroids), hormones, antibiotics, antifungals or counter-irritants.

Evaluation of cream

pH of the Cream: calibrate the pH meter using standard buffer solution.

Weigh about 0.5g of the cream and dissolve in 50.0ml of distilled water and measure its pH

Viscosity: determine viscosity of the formulation by Brookfield Viscometer at 100rpm.

Dye test: mix the scarlet red dye with the cream. Place drops of the cream on a microscopic slide cover it with a cover slip, and examine it under a microscope. If the disperse globules appeared the ground colorless. The cream is o/w type. The reverse condition occurs in w/o type cream i.e. the disperse globules appear colorless in their ground.

Homogeneity: test the formulation for the homogeneity by visual appearance and by touch.

Appearance: judge the appearance of the cream its color, pearlscence and roughness were graded.

After feel: check Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream.

Type of smear: After application of cream, check the type of film or smear formed on the skin.

Removal: examine the ease of removal of the cream applied was d by washing the applied part with tap water.

Acid value: Take accurately weighed 10gm of substance and dissolve in 50ml mixture of equal volume of alcohol and solvent ether and connect the flask to reflux condenser and slowly heated, until sample is dissolved completely. Add 1ml of phenolphthalein and titrate with 0.1N NaOH, until faintly pink color appears after shaking for 30 seconds.

Acid value=n*5.61/w

n=the number of ml of NaOH required.

w=the weight of substance.

Saponification value: reflux accurately weighed sample (about 2gm) with 25ml of 0.5N alcoholic KOH for 30minutes, to this add 1mlof phenolphthalein and titrate immediately, with 0.5N HCl.

Saponification value=(b-a)*28.05/w

She volume in ml of titrant = a

The volume in ml of titrant = b

The weight of substance in gm=w

Irritancy test: Mark an area (1sq.cm) on the left hand dorsal surface. Apply The cream on the specified area and check for irritancy, erythema, edema, if any at regular intervals upto 24hrs and report.

S.No	Evaluation test	Observations
1	PH of cream	

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2	**viscosity**	
3	**Dye test**	
4	**Homogeneity**	
5	**Appearance**	
6	**After feel**	
7	**Type of smear**	
8	**Removal**	
9	**Acid value**	
10	**Saponification value**	
11.	**Irritation test**	

PREPARATION OF ALOE-VERA HERBAL LOTIONS

AIM: To Prepare & Evaluate aloe-Vera herbal lotions.

APPARATUS: soxhlet apparatus, round bottom flask, beaker, china dish, glass rod, mixer, strainer, hot air oven.

PRINCIPLE:

The appearance and function of the skin are maintained by an important balance between the water content of the stratum corneum and skin surface lipids. The skin represents the most superficial layer of the body and so it is constantly exposed to different environmental stimuli. Exposure to external factors as well as endogenous factors may disrupt this balance. In addition, frequent use of soaps, detergents and topical irritants such as alcohol and hot water can remove the skin surface lipids. Disruption of skin barrier led to various types of skin problems most common condition is loss of water content which lead to dryness of skin such as roughness, scaling, cracks, redness and an uncomfortable feeling of tightness, sometimes with itching and stinging. Treatment with moisturizers aims at maintaining skin integrity and the well-being by providing a healthy appearance of the individual.

Most of the available moisturizers use synthetic adhesives, emulsifiers, perfuming agents, pigments, surfactants and thickeners to form the base. There is extensive need to replace toxic synthetic agent from base using natural agents.

For example like

Aloe barbadensis (Aloe vera) as an Humectant

Triple distill water, Cocos Nucifera oil as an Emollient and occlusive agent

Cucumis sativus (Cucumber) as an Adhesives or emollient

Acacia as an Emulsifiers

Azadirachta indica (Neem) as a Preservative

Santalum Alba (Sandal oil) for fragrance

Rose water for Cooling effect and fragrance

PREPARATION OF HERBAL EXTRACTS:

Plant materials were cleaned to remove the dirt and extra genus material and dried under the shade.

1. The dried barks of G. glabra, E. officinale and leaves of A. indica were ground using a laboratory mill and their coarse powders [particle size ~0.25mm] were passed through a sieve number 20.

2. Exactly 250 grams of coarse powder of each herb were extracted with a hydroalcoholic mixture [1000ml, 90:10v/v ethanol:water] at 60–70°C for 24h by a continual hot extraction method until complete exhaustion of the drug using a soxhlet apparatus.

3. The obtained extracts were evaporated under reduced pressure [AU 5 psi] at 50 ± 5°C for 5–15 min and concentrated extracts were dried to obtain actual yields. Fruits of C. sativus were chopped, weighed [300gm] and grounded through blender and juice was filtered through proper sieves.

4. Obtained juice was kept at refrigerator. Fresh A. barbadensis transparent gel was collected from its fresh leaves after the complete removal of epidermis using a stainless steel knife.

PREPARATION OF NATURAL BASE:

1. Phase inversion technique was used to prepare natural base.

2. The internal phase was prepared using ingredients emulsification was carried out in the mortar pastel.

3. Initially, grated and melted bees wax, natural oil of C. nucifera, other ingredients acacia, glycerin were mixed using a homogenizer at 200±25rpm at 65°-75°C.

3. After the complete homogenous mixing, a 50ml portion of triple distill water [70±2°C] was added at a rate of 45ml/min at increased speed [250±25rpm].

4. When the temperature of the internal phase was reduced to 50°C, phase inversion took place and the solution became viscous; half of the total amount of aloe gel and cucumber juice was added. When the temperature was reduced to 40°C, honey [2% w/w] was added to this mixture.

FORMULATION OF HERBAL MOISTURIZER:

1. Different extracts, juice and gel were prepared in ethanol and incorporated into the natural base at 70^0 c with continuous stirring in uniform direction until an homogenous preparation is formed.
2. Now adjust the required volume with distilled water.

FORMULAE:

S.No	INGREDIENTS	OFFICIAL FORMULAE
1.	Acacia	3.0g
2.	Bees wax(melted)	2.0g
3.	Cocos Nucifera oil	4.55ml
4.	Honey	2.0ml
5.	Cucumis sativus	5ml
6.	Glycerriza glabra	4.0g
7.	Emblica officinale	2.0g
8.	Azadirachta indica	2.0g
9.	Aloe barbadensis	2.0g
10	Triple distill water	q.s

http://phcogfirst.com/sites/default/files/PJ_2_11_9.pdf

EVALUATION TESTS:

VISCOSITY: determine viscosity of the formulation by Brookfield Viscometer at 30rpm.

HOMOGENEITY: test the formulation for the homogeneity by visual appearance and by touch.

APPEARANCE: judge the appearance of the lotion its color, pearlscence and roughness were graded.

AFTER FEEL: check Emolliency, slipperiness and amount of residue left after the application of fixed amount of lotion.

IRRITANCY TEST: Mark an area (1sq.cm) on the left hand dorsal surface. Apply The lotion on the specified area and check for irritancy, erythema, edema, if any at regular intervals upto 24hrs and report.

SPREADABILITY: The spreadability and layer thickness was evaluated by the % area covered by a fixed amount of lotion sample after the uniform spread of sample and layer thickness refers to the thickness of the prepared sample [in microns].

OBSERVATION:

S.No	Evaluation test	Observations
1.	viscosity	
2.	Homogeneity	
3.	Appearance	
4.	After feel	
5.	Removal	
6.	Irritation test	
7.	Spreadability	

Herbal shampoo formulation and evaluation

AIM:-To prepare and evaluate herbal shampoo with safe natural ingredients

Principle

Shampoos are an important hair care products**.** In the early days, a shampoo was considered as an effective cleansing agent for hair and scalp, but today the shampoo must do much more. It must leave the hair easy to comb, lustrous (shining) and controllable apart from being convenient and easy to use.

Requirements of a shampoo

1. To remove sebum (the secretion of the sebaceous glands) and atmospheric pollutants from the hair and scalp.
2. To remove the residues of previously applied hair treatments, e.g. polymeric constituents from styling lotions and hair sprays.
3. To deliver an optimum level of foam to satisfy the expectation of the user.
4. To leave the hair in a satisfactory condition after rinsing so that it can be combed easily both in the wet and dry state.
5. To perform as a vehicle for the deposition of beneficial materials onto the hair and scalp.
6. To be non-toxic and non-irritating to the hair and the scalp.
7. To be non-damaging to the tissues of the eye if inadvertently splashed.

Shampoo Ingredients

Almost without exception, shampoos consist of an aqueous solution, emulsion, or dispersion of one or more surfactants together with some additives to enhance performance and aesthetic properties of the product. Additives are used to provide fragrance and color, thicken, opacify, and convey specific tactile attributes. They include stabilizers, foam modifiers, preservatives, conditioners, and antidandruff agents.

Surfactants

Surfactants are long-chain electrolytes and are usually classified according to the nature of their hydrophilic group, which may be anionic, nonionic, amphoteric, or cationic.

Anionic: ex:

Non-ionic: Ex: ,

Cationic:

Amphoteric:

Shampoo Additives

Thickeners: these **are** used to increase viscosity of the formulations, modifying their consistency from viscous liquids to thick gels.

Opacifiers: These impart a pearlescent or opaque appearance to shampoo.

Other additives

Fragrance

Clarity enhancers

Sequestering agents like EDTA prevents the formation of insoluble calcium or magnesium soaps when the shampoo is rinsed off the hair.

Dyes: FD&C and D&C approved are commonly added to enhance the aesthetics of shampoo formulations.

Conditioning additives: these additives are substantive to hair remaining adsorbed on the surface after rinsing.

Specialty Shampoos

Baby shampoos

Medicated dandruff shampoos

Product Forms

1. In general, the shampoo formulations are relatively simple aqueous systems with superior rinsing qualities
2. Opaque formulations with conditioning qualities.
3. Clear gels are usually sold in compact flexible tubes that are convenient for storage and travel
4. aerosol dry shampoos

Herbal shampoos

In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing and foaming property, but the continuous use of these surfactants leads to serious effects such as eye irritation, scalp irritation, loss of hair, and dryness of hairs.

Alternative to synthetic shampoo, natural herbals can also be used in the shampoos formulations.

Some of the herbs used in herbal shampoos are

- The pericarp of Soapnut (Rita, Sapindus trifoliatus) and Shikakai (Acacia conccinna) are rich source of saponins and when shaken with water they produce foam and therefore they are excellent foaming and cleaning agents.
- Amla fruit(Phyallanthus emblica) and province senna (Cassia auriculata) are used to promote hair growth, anti-dandruff agent, strengthen hairs, and prevent hair fall.
- Bhringraj leaves (Eclipta prostrate) used to promote hair growth and prevent graying of hair.
- Flowers of China rose (Hibiscus rosa-sinensis) and Aloe barbadensis are used as conditioning agents.
- Gelatin is used for strengthening hair and to increase the protein content and also add texture to thin hair.
- L**emon** is rich in citric acid it acts as a natural clarifying agent which helps to clear build up from hair care products.

- Rose oil or any other volatile oil is added to impart good aroma to the preparation

Procedure:

a. Preparation of the extracts:

Homoginize about 100 g of each powdered plant material, namely Hibiscus. rosa-sinensis, Emblica officinalis , Acacia conccinna, Sapindus trifoliatus, Eclipta prostrate , and Cassia auriculata and extract with distilled water by boiling for 4 h. Filter, collect the filtrate, evaporate and dry the extract of each plant material.

b. Prepare the herbal shampoo as per the formula.

S.No	Ingredients	Quantity
1	Soap nut extract	0.5 g
2	Shikakai extract	0.5 g
3	Amla extract	0.5 g
4	Hibiscus extract	0.5 g
5	Bhringraj extract	0.5 g
6	Provence Senna extract	0.5 g
7	Aloe vera gel	**1g**
8	Gelatin 10% (W/V)	**q.s**
9	Lemon juice	**q.s**
10	Rose oil	**q.s**

To the gelatin solution (10% w/v), add all herbal extracts and mix by shaking continuously for 20 mins. Add 1 ml of lemon juice with constant stirring. To improve aroma of the formulation, add sufficient quantity of essential oil (rose oil) and finally adjust the volume to 100 ml with gelatin.

Evaluation of herbal shampoo:-

1. **Visual assessment**
   Subject the prepared formulation to visual assessment of colour, clarity, odour, and froth content.

2. **pH determination**
   Determine the pH of the prepared herbal shampoo with the help of pH analyzer at room temperature.

3. **Determination of solid content percentage**

Place accurately weighed portion of the shampoo (about 4 g) in a dish and evaporate by placing it on hot plate. Dry completely and weigh the residue. Calculate the percentage of the solid contents present in the shampoo. To confirm the result, Repeat the procedure.

4. **Surface tension measurement**
   Determine the surface tension of the prepared shampoo in distilled water (10% w/v) by using stalagmometer at room temperature.

5. **Testing of wetting**
   Calculate the wetting time by noting the time required by the canvas paper to sink completely. Cut a canvas paper weighing 0.44 g into a disc of diameter measuring 1-inch. Keep the canvas paper disc over the shampoo (1% v/v) surface and note the time taken for the paper to sink using stopwatch.

6. **Foam stability test**
   Determine the stability of the foam using cylinder shake method. Take about 50 ml of formulated shampoo (1%) solution in a graduated cylinder of 250 ml capacity and shake for 10 times vigorously.

   Measure the Foam stability by recording the foam volume of shake test after 1 min and 4 min, respectively.

7. **Dirt dispersion test**
   Add two drops of cleanser to 10 ml of refined water in a wide-mouthed test tube. To this, add one drop of Indian ink and shake for 10 min after closing the test tube with a stopper. Measure the volume of ink in the froth and the result is graded in terms of none, slight, medium, or heavy.

Observations:-

S.No	Evaluation test	Observations
1	colour	
2	Transparency	
3	odour	
4	pH of 10% solution	
5	Solid contents (%)	
6	Foam volume (ml)	
7	Foam type	
8	Surface tension (dynes/cm)	
9	Wetting time	

Report:-