Wash Bag Chemistry

Product Pack

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Overview

You are the Research and Development (R&D) team chosen to lead the product design process of a new range of consumer goods products for a company called 'SEB'.

Brief

Your group are a Research and Development (R&D) Team chosen to lead the design of a new consumer product for a company called 'SEB'. There are three products being considered for development by the company, a shampoo, a lip balm and a body moisturising lotion but only one product can be put forward into production. It is your team's responsibility to research which product should be chosen by the company. You will then present your findings to the company president.

Be warned, there are other R&D teams that have also been asked to take on this task and the most successful team stand to win a substantial bonus.

There are a number of steps you will need to undertake in this activity:

1. You will need to do some initial research into what each of the products is and what is involved in its production. The 'products pack' contains a lot of useful information for this.
2. Then you should try out the practical work to make the products. During this stage you should keep a note of any problems and observation you encounter.
3. As a team you will need to consider the costs involved in making each of the products as well as the predicted income from each product and **fill in a business plan form for each product (see business pack).**
4. Individually, you will need to compile a scientific report, outlining the research that you have carried out.
5. Putting all the information together you should decide on the 'winning product' that you think should be taken into production by SEB.
6. Your case will need to be prepared for the **board meeting.** You can choose any method of presentation you like as long as every team member participates.
7. Presenting your winning product to the President of SEB. Remember that you are competing against other R&D teams in this. Good Luck!

The winning formula – blending your product

Shampoos, lip balms and moisturising creams represent the result of thousands of hours of careful research by expert chemists and formulation scientists. Many different parameters must be carefully controlled to ensure the product is fit for purpose and meets market demand.

Each product has a number of different ingredients – each serving a particular purpose in ensuring a quality product is produced. These ingredients are then blended together in varying proportions to create a finished product.

Using this pack

The pack is split into the following sections:

- Team roles
- Extraction of essential oils
- Shampoo product pack
- Lip balm product pack
- Moisturiser product pack

There is a separate pack for the business part of the activity.

The product packs contain information about the main ingredients used to make each product as well as instructions on how to blend the ingredients to make a high quality product.

Team role

Your role as a team is to develop three consumer goods

You must:

1. Think about who your target consumer is i.e. who will buy your products.
2. Define the formulation of the products.
3. Calculate how much the formulations cost.
4. Decide what process you will use to make the products.
5. Calculate a finished product cost.
6. Anticipate any problems you might have in launching the products.
7. Make a prediction of how much profit you're likely to make in the first year.

Individual roles

There are three main roles within the team and the main tasks of each role are shown below. All team members should have an opportunity to play each of the roles and one way to do this would be to assign a role for each member of the team for each product. For example, you may decide on a 'best person' to be the team leader for making a shampoo.

When you are making lip balms and moisturisers different team members should be the team leader.

Team leader

You must:

1. Assign roles to other team members based on their past experience and capability.
2. Give your team direction on what the company strategy is i.e. who is your target consumer and what product you want to sell.
3. Make key casting votes on what the team should produce and market.
4. Write the Final Report for the product design (with input from your team members).

Production Engineer

You must:

1. Take the lead in making the products in the lab with help from your team mates.
2. Ensure that your product meets the specifications required to pass quality control and meet consumer needs.
3. Understand what problems you might have in launching the products.

Financial Director

You must:

1. Perform vital calculations on cost of raw materials and processing to enable your team to decide on what formulation to launch
2. Calculate the finished product cost.
3. Understand your finished product cost as a percentage of shelf price to predict how much profit you're likely to make.

Scent sells – extracting scents from natural products

Natural

Clean

Fresh

Masculine

Invigorating

Whether a product makes millions or proves to be a complete flop can depend on its scent. Your products will be delicately perfumed using scents extracted from fresh herbs and fruit. You will need to blend carefully if you are to create a perfume that is appropriate for the target market you are after. The first stage of production is to extract the scent molecules from their plant sources.

The table below shows common oils used in some products.

Essential oil	Description
Bay Laurel oil	Bay Laurel is one of the many essential oils used in cologne and after shave balm to create a unique fragrance. It has a sweet, fresh scent.
Bergamot oil	Bergamot oil is extracted from the peel of the bergamot orange. It is cooling, refreshing and has a sweet, citrus smell. Its fragrance helps reduce stress and tension.
Clove oil	Clove is a warming oil with a woody, spicy smell. It is an effective antiseptic and antiviral oil.
Eucalyptus oil	Eucalyptus is a warming and drying oil with antiseptic and anti-fungal properties. It is stimulating and so can be used to increase circulation and it can also act as an insect repellent.
Garden mint oil	A popular fragrance and flavouring, garden mint is mildly antiseptic and tonifying. Its uplifting smell stimulates a tired mind and relieves mental strain and fatigue. It is cooling and refreshing.
Ginger oil	Ginger is a warming, stimulating oil that is useful for improving circulation and therefore the tone and appearance of the skin.
Grapefruit oil	Grapefruit has a fresh, citrus scent. It is very cleansing and antiseptic, with mildly astringent properties. This is useful for oily skin, open pores and acne. It will also help to tone and tighten loose skin.
Lavender oil	Lavender oil has a fresh, floral aroma that works well in combination with other oils. It is useful for stress and tension, and it also soothes and restores the skin. It is very gentle and so can safely be used with infants.
Lemon oil	Lemon oil is zesty and uplifting, with antiseptic and toning properties. It is used in many products, particularly where a cleansing action is needed. Lemon is also particularly good for oily or aging skin.
Sweet orange oil	Sweet orange has a sweet, fresh, fruity smell. It is useful for treating a sluggish system and therefore helps detoxify and improve the health of the skin.

Information gathered from www.nealsyardremedies.com Jan 2010.

Decision time

You will be given the opportunity to extract a scent of your choice and the raw materials for some of these oils will be available in the lab. As the scale of your oil extraction is small compared to that used industrially it will be difficult to extract the oil from the distillate (the mixture of oil and water that is collected). This means that you will need to use all of your distillate as a scent and this limits its use to shampoos and moisturisers only.

Your team will now need to decide which oil to extract and decide whether it will be used in the shampoo or moisturiser.

It will also be possible to 'buy' oils from other teams or use a commercially available oil for scenting the shampoo or other products; although these options will have an obvious cost implication.

Look through the product guides given to your team. Carefully think through your product formulations, the costs and the potential profit and then decide on an appropriate oil to extract.

Steam distillation – extracting your choice of floral or fruit scents

Many of the compounds responsible for floral or fruit type scents are easily degraded at high temperatures. A technique called 'steam distillation' is often used to extract these compounds from their plant source. In this technique, steam passed into the plant matter has the effect of lowering the boiling point of the scented compounds. These valuable substances then volatilize and are carried to the condenser in the flow of steam.

Find out

Distillation (rather than steam distillation) is a common technique to use in chemistry. Try to find out how the technique of 'normal' distillation works. You should note down the names of any special pieces of equipment, how distillation works and examples of substances that are distilled.

Carrying out the steam distillation

You will need:

- Boiling tube
- Delivery tube with rubber bung to fit boiling tube
- Test tube
- 250 cm^3 beaker
- Glass wool
- Anti-bumping granules
- Tissue soaked in cold water to act as a condenser
- Bunsen burners
- Clamp stand, boss and boss head
- Ice
- Source of oil

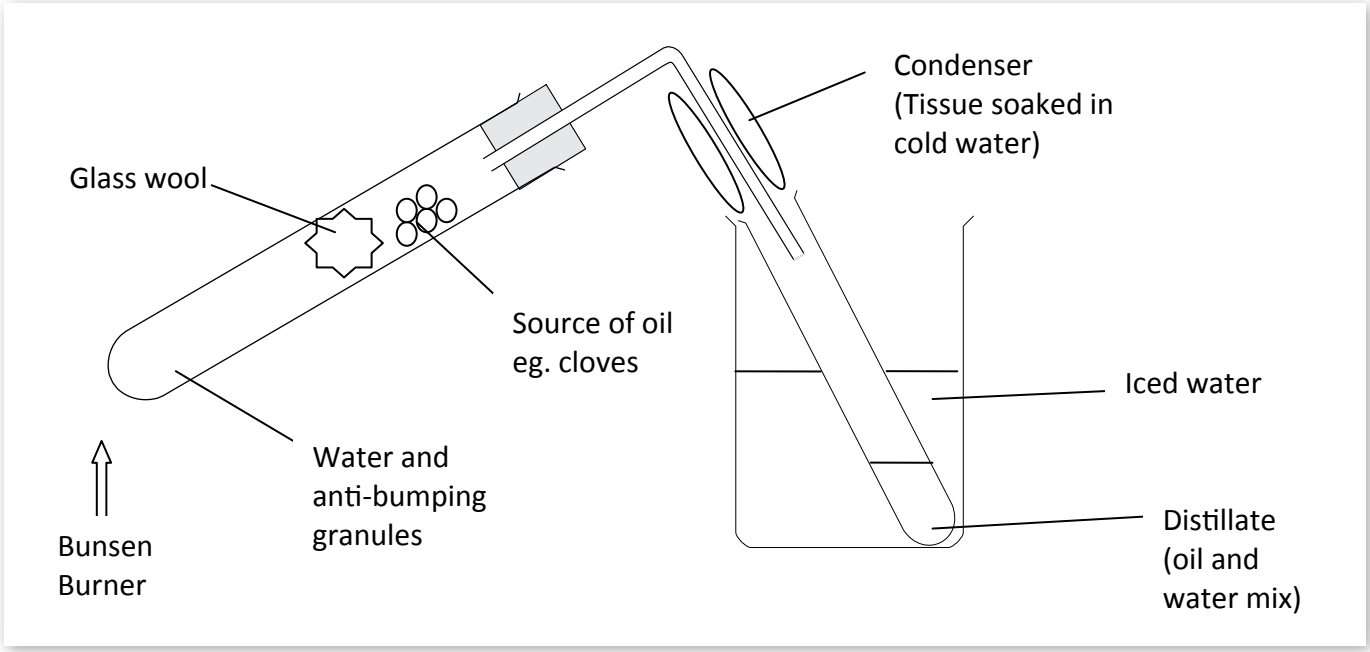
Preparing for the distillation

- Prepare the source of the oil for distillation by cutting it into small pieces if required.
- Set up the apparatus shown below. Make sure you add anti-bumping granules to the boiling tube.
- Place the source of oil above the glass wool in the boiling tube as shown in the diagram.

Health and safety

- Wear safety glasses.
- Ensure that the delivery tube coming from the boiling tube used as a condenser is unobstructed. In the event that water is rising close to the top of the boiling tube, reduce the heat under the flask.
- Avoid touching the delivery tube and the test tube during distillation as the condensing steam will cause the equipment to get very hot.

Diagram of steam distillation apparatus



Carrying out the distillation

- Very gently heat the boiling tube until the water begins to boil (the Bunsen flame should be only just blue).
- As the water starts to boil you will see condensation forming in the boiling tube. If the water level in the boiling tube rises as high as the glass wool, remove the heat from the boiling tube for a minute or so to allow the water to cool down a little.
- Continue heating until around half of the water from the boiling tube has been distilled.
- Once the apparatus is cool, carefully smell the distillate.

Find out

In the steam distillation above anti bumping granules are used; try to find out why they are essential when carrying out a distillation.

Shampoo product pack

The winning formula – blending your shampoo

When making a shampoo, many different parameters must be carefully controlled including the viscosity, colour, quantity of lather produced, behaviour in hard and soft water areas, perfume, effect on hair structure and scalp.

The ingredient list for a shampoo provides the opportunity to explore many areas of chemistry.

The appendix at the back of this booklet contains an extensive list of the chemicals to be found on shampoo bottles, with an explanation of what each ingredient does. Some examples are shown below.

Sodium Laureth Sulphate
Surfactant and Skin cleanser

Aloe Barbadensis
Softens skin, soothes burns and injuries but may not be active if used at low concentrations in products of this type.

Parabens (Preservatives)
Most commonly used ingredient other than water. Used in low concentrations so will be found at the ends of ingredient lists. These compounds stop bacteria growing in the product and are not irritating or toxic if used at the recommended concentrations.

Most shampoo formulations will contain the following five ingredients:

Aqua

This is the name for water used in European cosmetic products. Water is the main ingredient of many cosmetic products so is found first in the ingredients list. Sterile water must be used – this means the water must be boiled to ensure no bacteria or other microorganisms are present.

Ammonium lauryl sulphate (surfactant)

This compound is made from saponified coconut oils. It is good at breaking up oils, so effective in shampoos. It is a good cleansing agent and foam maker.

Lauryl betaine

This is a compound used in shampoos to lower the irritation potential of surfactants and to give 'creamier' foam.

Polysorbate-20 (emulsifier)

This is a compound used in shampoos to lower the irritation potential of surfactants and to give 'creamier' foam.

Find out

Try to find out the meaning of:

- Surfactant
- Emulsion
- Emulsifier

Blending the shampoo

Shampoo making

You will need:

- Glass rod
- 250 cm^3 beaker
- 10 cm^3, 50 cm^3 and 100 cm^3 measuring cylinders
- Disposable droppers
- 2 x 60ml plastic dropper bottles and labels

Ingredients:

- 50 cm^3 steam distillate / distilled water
- 50 cm^3 castile soap (if using bar soap – grate into flakes)
- 3 cm^3 olive oil
- 20 cm^3 glycerine
- 5 drops essential oils (you may want to research which ones you would like to use)

Health and safety

- The greatest risk during this preparation is that the shampoo produced is contaminated by chemicals left on dirty glassware. Make sure the equipment used to prepare the shampoo is scrupulously clean.
- Ammonium lauryl sulfate is a mild irritant. Avoid prolonged contact of the undiluted liquid with the skin.
- Lauryl betaine has no known toxicity, however avoid prolonged contact of the undiluted liquid with the skin.
- Undiluted polysorbate-20 can be a mild irritant. Avoid prolonged contact of the undiluted liquid with the skin.

Blending your shampoo using bar soap

- Warm the steam distillate or water using a Bunsen burner or an electric hot plate.
- Add the grated soap to the warm water and continue to heat gently until the soap has dissolved.
- Stir in the olive oil.
- Add the glycerine and essential oils of your choice.
- Pour into the bottle and label the bottle with your ingredients.

Using liquid soap

- Add the liquid soap to the water / distillate.
- Stir in the olive oil.
- Add the glycerine and essential oils of your choice.
- Pour into the bottle and label the bottle with your ingredients.

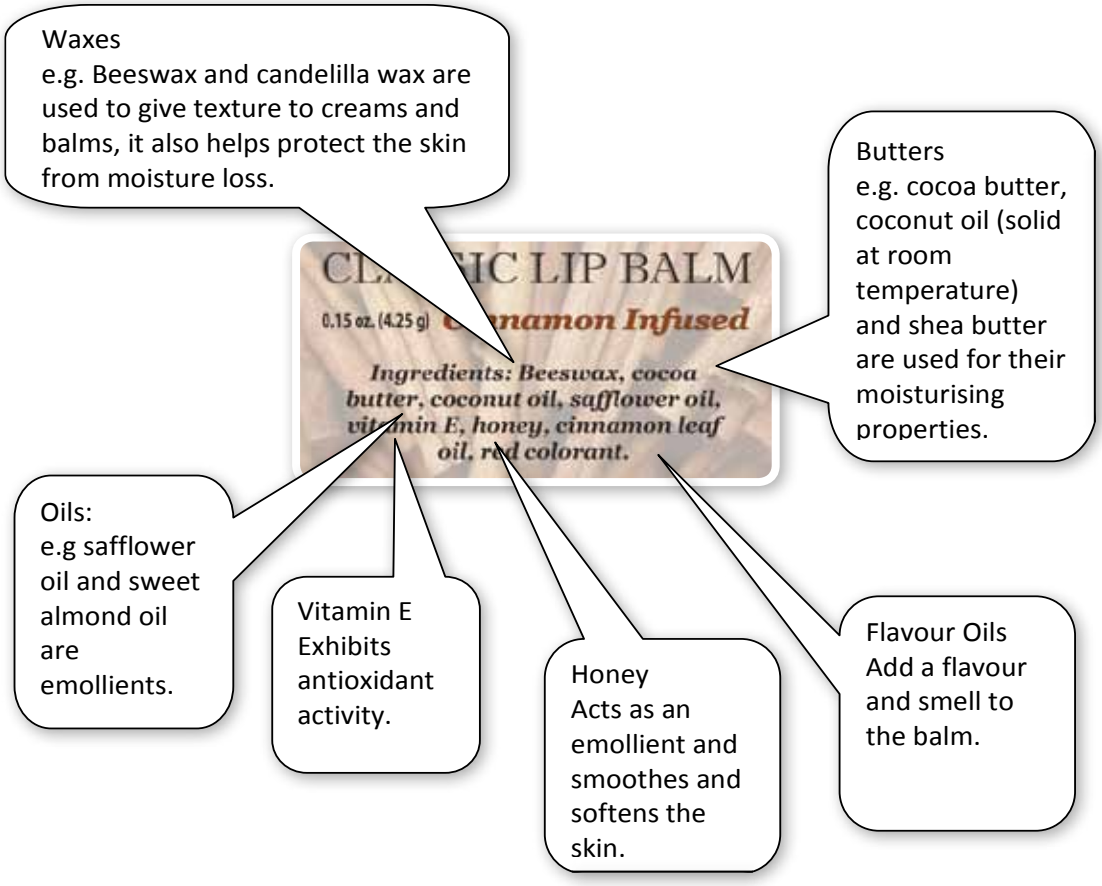
Lip balm product pack

The winning formula – blending your lip balm

When making a lip balm, many different parameters must be carefully controlled including the smoothness, perfume, softness, moisturising effect on lips.

The ingredient list for a lip balm provides the opportunity to explore many areas of chemistry.

The appendix at the back of this booklet contains an extensive list of the chemicals to be found on cosmetic products, with an explanation of what each ingredient does. Some examples are shown below.



Find out:

The ingredients list for lip balm contains:

- Emollient
- Anti - oxidant

Try to find out what these words mean and what their purpose is in lip balm formulations.

Blending the lip balm

Lip balm making

There are many recipes you could use to make lip balm and you will find many on the internet. The one shown below has reliably produced a quality lip balm. You could choose to blend your own but be careful, too much wax will cause the balm to be too solid too spread on your lips, too much butter or oil will make the balm too runny. Never use more than 2 drops of flavour oil. Why not experiment and make a lip balm for every member of your group?

You will need

- 15 cm^3 metal lip balm pot
- 3 new plastic dropping pipettes
- Spatula (one that has not been used with chemicals)
- Tea light and stand (food warming plate)
- Label

Ingredients

- 1.5 g cocoa butter
- 1.5 g shea butter
- 1.0 g beeswax
- 3 cm^3 sweet almond oil
- 3 cm^3 olive oil
- 1-2 drops flavour oil

Health and safety

- The greatest risk during this preparation is that the lip balm produced is contaminated by chemicals left on dirty spatulas or dropping pipettes. Make sure the equipment used to prepare the lip balm is scrupulously clean. There are no preservatives in this lip balm recipe and so do not keep the lip balm.
- The molten mixture is very hot – do not touch!

Blending your lip balm

- Weigh the cocoa butter, shea butter and beeswax directly into the lip balm pot.
- Using a clean plastic pipette measure carefully 3 cm^3 of sweet almond oil and add it to the lip balm pot.
- Using a clean plastic pipette measure carefully 3 cm^3 of olive oil and add it to the lip balm pot.
- Place the pot onto the tea light stand and light the candle.
- Allow the mixture to melt. There is no need to stir the mixture.
- Once it is molten use a plastic pipette to carefully add 1 – 2 drops of your chosen flavour oil.
- Allow the mixture to cool to room temperature and remove it from the tea light stand.
- Like any other manufacturer, your lip balm pots must be labelled. Attach a sticker to each pot of lip balm you have made.

Do not worry if it looks like it is not solidifying – it can sometimes take several hours for the mixture to solidify properly!

Moisturiser product pack

The winning formula – blending your moisturiser

When making a moisturiser, many different parameters must be carefully controlled including the smoothness, perfume, softness, moisturising effect.

The ingredient list for a moisturiser provides the opportunity to explore many areas of chemistry.

The appendix at the back of this booklet contains an extensive list of the chemicals to be found on cosmetic products, with an explanation of what each ingredient does. Some examples are shown below.

Your moisturiser formulation will contain five ingredients

Aqua

This is the name for water used in European cosmetic products. Water is the main ingredient of many cosmetic products so is found first in the ingredients list. Sterile water must be used - this means the water must be boiled to ensure no bacteria or other microorganisms are present.

Glycerin

This is a sugar alcohol that can be found naturally or synthesised. It acts as a humectant, increasing the water content of the top layers of skin.

Olive oil

Oils in moisturisers act as occlusive agents. This means they provide a protective barrier to the surface of the skin. The layer of oil prevents water loss from the surface of the skin.

Xantham Gum (sepigel) (emulsifier)

This is a substance which is added to help make an emulsion. The olive oil and water do not mix but on addition of xanthan gum and heat an emulsion forms.

Parfum

This is the general name given to 'fragrance'. This could mean one or more compounds added to give the product an attractive smell. Exactly what these compounds are is up to you.

Blending the moisturiser

Moisturiser making

You will need:

- 250 cm^3 beaker
- 100 cm^3, 10 cm^3 measuring cylinder
- Plastic dropping pipette
- 15 cm^3 Lip Balm Pot or recloseable bag
- Stirring rod

Ingredients:

- 10 cm^3 of distillate from steam distillation (or 10 cm^3 distilled water)
- 35 cm^3 distilled water
- 2 cm^3 glycerin
- 3 cm^3 olive oil
- 2 g xanthan gum (or 2 cm^3 sepigel if available)
- 1-2 drops essential oil
- 1 drop food colouring

Health and safety

- The greatest risk during this preparation is that the moisturiser produced is contaminated by chemicals left on dirty spatulas or dropping pipettes. Make sure the equipment used to prepare the moisturiser is scrupulously clean. There are no preservatives in this moisturiser and the risk of infection is high.

Blending your moisturiser

- Add the distillate, distilled water, olive oil, glycerine and essential oil to the beaker.

Then either

- Add a drop of food colouring and a drop of essential oil.
- Add 2 g of xanthan gum.
- Gently heat the mixture whilst stirring.

After a few minutes the mixture will emulsify and form a smooth paste.

If using sepigel there is no need to heat the mixture.

- Add 2 cm^3 sepigel and stir well.

Name	Chemical Type	Other information
Acid		Compound which dissolves in water to make a solution with a pH less than 7
Alkali		Compound which dissolves in water to make a solution with a pH above 7.
Aloe barbadensis	Skin softener	Softens skin, soothes burns and injuries. Name not used in cosmetics.
Aloe vera (Latin)	Skin softener	See Aloe barbadensis.
Ammonium laureth sulfate	Surfactant	See Surfactants. Compound made from saponified coconut oils. Good at breaking up oils and soil, so effective in shampoos. Good cleansing agent and foam maker.
Ammonium lauryl sulfate	Surfactant	See Surfactants. Compound made from coconut oils. Mild cleansing properties when used at pH 5-6. Non-toxic and not irritating when used in 'rinse off' products. This material can be irritating even from shampoo. Laureth is milder.
Ammonium xylenesulfonate	Solvent	Flammable liquid which does not mix with water. It acts as a viscosity modifier.
Antiseptic		Compound which prevents infection of the skin by bacteria. Small cuts can be treated with an antiseptic.
Aqua	Neutral	This is the name used in European cosmetic products for water. Water is the main ingredient of many cosmetic products so is found first in the ingredients list. The water must have a low, controlled microbial count.
Arginine	Alkali	Alkaline amino acid.
Behenyl alcohol	Emulsifier Thickener	Fatty alcohol used to thicken and give body to emulsions
Benzophenone	Preservative	These compounds help prevent the product from reacting with UV light.
Benzyl alcohol	Solvent Preservative Antiseptic	
Betaines		Compounds used in shampoos to lower the irritation potential of surfactants, to modify foam performance and to thicken shampoos.
2-bromo-2-nitropane-1,3-diol	Preservative	Safe when used up to 0.1% concentration.
Binder		A substance which absorbs water, swells and helps to hold other ingredients together.
BHT - Butylated hydroxytoluene	Preservative Anti-oxidant	
Butylparaben	Preservative	See Parabens.
Camellia sinesis	Oil Perfume	Oil from the camellia plant. The same plant produces greentea, which may have positive effects including reducing blood pressure. Cannot be used as an active in cosmetics as the product would then be a medicine.
Carbomer	Emulsifier Thickener	White powder. This is a cross linked polyacrylates polymer used to thick and stabilise emulsions.

Name	Chemical Type	Other information
Carboxylic acids	Acid	Molecules which are based on carbon atoms. The acidity is due to the -COOH (caboxylate) group. The substance dissolves in water making an acidic solution. Used to lower pH of cosmetics. E.g citric acid. Also the active end of soap.
Castor oil	Oil	Oil from the seed of the castor oil plant. Soothing to skin.
Cellulose gums	Emulsifier Film former	See Film formers. Compounds from plant cell walls which are resistant to decomposition by bacteria. Non-toxic.
Cetearyl alcohol	Emulsifier	Very widely used in hair and skin products. A waxy substance. Non-toxic and not irritating to the skin or scalp. As behenyl alcohol.
Cetyl alcohol	Emulsifier	Widely used ingredient which used to be extraxted from the heads of sperm whales. Added as a solid, waxy substance.
Chamomila recutita (Latin)	Oil	Oil from the camomile plant. Soothing to skin.
Chlorhexidine digluconate	Antiseptic Alkali	Cleans bacteria from skin. Can cause dermatitis, which is severe irritation of the skin, in concentrated solution. Safe up to 0.2% concentration.
Citric acid	Acid Sequestering agent Preservative	Compound obtained from citrus fruit; lemons, oranges, grapefruit.
Citrus limonium (Latin)	Oil	Lemon oil obtained from the skin of lemons.
Citrus paradisi (Latin)	Oil	Grapefruit oil obtained from the skin of grapefruit.
Citrus sinensis (Latin)	Oil	Sweet orange oil obtained from the skin of oranges.
Cocoglucoside		See Glucosides. Mild surfactant
Cocoamide DEA /MEA	Solvent Emulsifier Surfactant	See DEA.
Cocoamidopropyl betaine	Emulsifier Surfactant Thickener	Compound based on coconut oil and beets, eg sugar beet.
Coconut acid	Surfactant Skin cleanser	Compound made from by saponifying coconut oil. Used widely to make materials used in soaps and shampoos. Very good skin cleanser. It is not used directly due to irritation.
CI number	Colouring pigment	There are many colouring pigments which can be used. Each is registered and given a number
Colophonium		This is a resin obtained from pine trees. Used to give colour - usually yellow-orange.
Cucumis melo (Latin)		Melon extract - usually juice. Used in products for dry hair and to improve skin condition.
Dandruff		Human skin flakes produced most often on the scalp. Skin and allergy specialists disagree about its cause - could be an allergic reaction. Shampoos to treat this use zinc pyrithione and a surfactant.
DEA - Diethanolamine	an alkali	This compound formed from coconut and soybean oils. Has useful properties but may cause skin irritation.
DMDM hydantoin	Preservative	'DMDM' stands for 'Dimethylol dimethyl'.

Name	Chemical Type	Other information
Dimethicone	Oil	Protects skin forming a barrier to other liquids. Materials based on silicone
Dipropylene glycol		See Glycols.
Disodium dityrylbiphenyl	Colouring agent	This gives colour to the product.
Disodium EDTA	Chelating agent	'EDTA' stands for 'ethylenediaminetetraacetic acid'.
Disodium laureth sulfosuccinate	Mild Surfactant	See Surfactants.
Disodium PEG-4-Cocoamido MIPA sulfosuccinate	Surfactant	See Surfactants. 'PEG' stands for' polyethylene glycol' and 'MIPA' stands for 'monoisopropanolamine'.
Disodium phosphate	Salt	See sodium phosphate.
Distearyl ether	Skin softener	This is made from stearic acid. See Stearic acid and Skin softeners.
Elaesis guineensis (Latin)	Oil	This is the Latin name for palm kernel oil, which is obtained from the African palm tree.
Emulsifier		Substance which is added to help make an emulsion. An emulsion is the mixture of two liquids which do not usually mix together, such as oil and water. The emulsifier helps to keep the two liquids mixed, stopping layers forming.
Ethyoxydiglycol	Solvent	
Film former		Compounds which give cosmetic products a film-like appearance - shiny, glossy and with a silky feel.
Formaldehyde	Preservative Disinfectant	Use in cosmetics is banned in Japan and Sweden. Concentration must be less than 0.2%. See Preservatives.
Glucosides	Thickening agent	Compounds made in reactions between sugars and alcohol.
Glycerin	Solvent Humectant Skin softener	Also called 'glycerol'. A compound made during soap manufacture. Very widely used. Non-toxic and not irritating to skin.
Glyceryl cocoate		See Coconut oil and Glycerin.
Glycols	Humectants	Name is from 'Glycerin' and 'Alcohol'. See Humectants. May cause skin irritation.
Glycol distearate/stearate	Pearliser	A compound made from stearic acid but with very different properties.
Guar hydroxypropyltrimonium chloride	Hair conditioner	
Hammamelis virginiana (Latin)	Skin anaesthetic Skin freshener	Common name is 'witch hazel'. Obtained from a plant. Makes the skin feel 'tight' and fresh as it dries up grease and moisture.
Hexylene glycol	Solvent	See Glycols.
Helianthus annus (Latin)	Oil	Sunflower seed oil. Contains Vitamin E which is thought to help keep skin looking young. Used in anti-aging products. No known toxicity.
Humectant		A substance used to preserve moisture content.
Humulus lupulus (Latin)	Perfume	From the hops plant. Hops are also used in brewing beer. Can cause skin irritation.

Name	Chemical Type	Other information
Hydroxypropylmethylcellulose		See Cellulose gums.
Isopropyl myristate		A compound made in a reaction between an acid and an alcohol. Causes blackheads and is being removed from cosmetics.
Lactic acid	Skin freshener	See Carboxylic acids.
Lanolin		Greasy substance from wool which absorbs water and holds it on to the skin.
Laureth number 1-23	Surfactant	See Surfactants.
Laureth 11 carboxylic acid	Acid	See Carboxylic acids.
Lauric acid	Foam maker Acid	Compound which reacts with water to make a foam. The molecules are made from 10 carbon atoms joined in a line, with hydrogen atoms and oxygen atoms. See also Carboxylic acids.
Lauryl glucoside	Surfactant	See Surfactants.
Magnesium nitrate	Salt	See Nitrates.
Magnolia biondii (Latin)	Perfume	Non-toxic perfume from the magnolia tree.
Maleated soybean oil	Preservative Oil	Soybean oil from the soya bean plant which has been partially changed to Maleic acid. Maleic acid is a carboxylic acid (see Carboxylic acids). The change is made to reduce the effects of soybean oil on the skin - these include skin irritation, hair damage and acne-like pimples.
Menthol	Skin anaesthetic Skin freshener	Gives a 'cool' feeling to the skin. Acts as an anaesthetic when in 100% concentration. Non-toxic below 3%.
Methyl lactate	Skin freshener	See Menthol and Lactic acid. This is a compound made from these two substances.
Methylchloroisothiazolinone (MCT) and Methylisothiazolinone (MIT)	Preservative	Usually used with methylisothiazolinone. Safe in very low concentrations in products which rinse off the skin.
Methyldibromo glutaronitrile	Preservative	Safe to use in rinse off products.
Methylparaben	Preservative	See Parabens.
Mica	Solid powder Lubricant	Used to give a glow or colour. Not irritating to skin.
Niacinamide	Vitamin B	Used to treat skin diseases.
Nitrates	Salt	Used to help keep colour compounds (see CI number) the correct shade.
Olea europea (Latin)	Oil	This is the Latin name for olive oil, which is obtained from olives. The same oil can be used in cooking.
Parfum		This is the general name given to 'fragrance'. This could mean one or more compounds added to give the product an attractive smell.
Palm kernel acid	Acid Oil Surfactant Emulsifier Opacifier	This is the oil from the palm nut producted by the palm tree. See Surfactants, Emulsifiers, Opacifiers.
Palmitic acid	Acid Oil	Compound which occurs naturally in many animal fats and plant oils including cow's milk, palm nuts and butter. Each molecule has 16 carbon atoms arranged in a long chain, with hydrogen and oxygen atoms. See Carboxylic acid.

Name	Chemical Type	Other information
Panthenol	Skin softener Vitamin B complex	Widely used in hair products. Also known as Vitamin B complex factor. Is good for the body so is non-toxic.
Panthenyl ethylether		This is made from panthenol (see above).
Parabens	Preservatives	Most commonly used ingredient other than water. Used in low concentrations so will be found at the ends of ingredients lists. These compounds stop bacteria growing in the product and are not irritating or toxic.
Paraffinium liquidium (Latin)	Skin softener	Liquid paraffin obtained from wood, coal and petroleum. Non-toxic and not irritating to skin.
PEG polyethyleneglycol	Binder Skin softener Solvent Humectant	See Binders, Surfactants, Skin softeners, Solvents, Humectants.
PEG 6 caprylic /capric glycerides	Skin softener	See Skin softeners.
PEG 7 glycerylcocoate	Skin cleanser	
PEG 40 hydrogenated castor oil		See PEG and castor oil.
PEG 150 distearate	Skin cleanser	Compound made from stearic acid and PEG.
PEG 200 hydroxyglycerylpalmitate	Skin cleanser	
Petrolatum	Skin softener	This is the main ingredient in Vaseline and other petroleum jelly products. Used as skin softener, and protects skin from irritation.
Phenoxyethanol	Antiseptic	Not irritating to skin, but can irritate eyes above 2.2% concentration.
Polyquaternium 1-14	Antiseptic Surfactant Preservative	
Polysorbates 1-85	Emuslifier	See Emulsifiers.
PPG 9 laurate		PPG stands for 'Polypropylglycol'. A compound made from a glycol and lauric acid.
Preservative		Compound used to stop bacteria and other microorganisms like yeasts growing in the product. This is essential to keep the product safe for use. Some preservatives are added to help keep the product colour, appearance and texture. All cosmetics include preservatives. Most used today are non-toxic.
Propylene glycol	Humectant Solvent Wetting agent	Also called 1,2-propanediol. This is a widely used cosmetic ingredient with similar properties to glycerin.
PVP/dimethylaminoethyl-methylacrylate copolymer	Film former Thickener	See Film former and Thickener. A polymer is a compound made from many smaller molecules joined together. Many copies of small molecules called polyvinylpyrrolidone (PVP) and dimethylaminoethylmethacrylate are joined in an alternating line to make one long molecule.
Saccharum officinarium (Latin)		Sugar cane extract. Also called 'Black strap molasses'. No use in cosmetics identified.

Name	Chemical Type	Other information
Salt		The general name for a compound produced in a reaction between an acid and an alkali. The other product is water. We use 'salt' to mean 'sodium chloride', but this is not the chemical meaning.
Sequestering agent		Preservative preventing changes in colour, texture or appearance.
Skin anaesthetic		Compound which is absorbed into the skin and reduces the nervous system's ability to detect sensation. 'Local' anaesthetics are used to stop pain for dental operations, wart removal, stitching up cuts and other small skin-based problems.
Skin cleanser		Compound which removes grease from the skin.
Skin freshener		Compound which creates a 'tight' feeling to the skin. Usually evaporates quickly from the skin, giving a cooling effect.
Skin softener		Compound which is absorbed into the skin and replaces moisture. Helps to remove dry patches. Also called 'emollients'.
Sodium benzoate	Preservative	
Sodium C12-13 pareth sulfate	Salt Skin softener Humectant	Compound based on PEG.
Sodium citrate	Sequestering agent	
Sodium chloride Salt	Salt Antiseptic	May cause drying of the skin.
Sodium cocoyl isethionate	Skin cleanser	Safe in concentration up to 50% in rinse off products.
Sodium isethionate	Alkali Emulsifier	This is the name cosmetic producers use for sodium hydroxide.
Sodium lauroamphoacetate	Surfactant	See Surfactants.
Sodium laureth sulfate	Water softener Surfactant Skin cleanser	See Surfactants, Water softeners, Skin cleansers.
Sodium lauryl sulfate	Emulsifier Surfactant	See Surfactants and Emulsifiers. May cause drying of skin by removing grease.
Sodium methyl paraben	Preservative	See Parabens.
Sodium palm kernelate	Salt Soap	Compound produced by reacting palm kernel acid with sodium hydroxide. Acts as a soap.
Sodium palmitate	Salt Soap	Compound produced by reacting sodium hydroxide with palmitic acid. Acts as a soap.
Sodium peanutate		Peanut oil.
Sodium phosphate	Salt	Compound used to keep pH constant.
Sodium stearate	Salt Soap	Compound produced by reacting sodium hydroxide with palmitic acid. Acts as a soap.
Sodium styrene/ acrylates copoly-mer	Binder Film former	
Sodium tallowate	Salt	Compound formed from tallow, a mixture of animal fats.
Solvent		Liquid used to make solutions. Solid substances are added to the solvent. These dissolve making the solution.

Name	Chemical Type	Other information
Sorbic acid	Preservative Humectant	Produces velvet-like feel on the skin. Non-toxic, but may cause irritation to senstive skins.
Stearic acid	Acid	Naturally occurring compound found in butter, animal fats and oils. Molecules have 18 carbon atoms arranged in a long chain, bonded to hydrogen and oxygen atoms. Widely used cosmetic ingredient.
Sulfonated oils	Emulsifier Wetting agent	Remove colour from natural and dyed hair. May cause drying of the skin.
Surfactants		Compounds which lower the surface tension of water. The name 'surfactant' comes from 'surface active'. There are four types called anionic, cationic, amphoteric and nonionic. The type depends on whether the surfactant molecule breaks up into charged particles called 'ions' in water. Found in all substances used for washing.
TEA dodecylbenzenesulfonate	Emulsifier	See Sulfonated oils.
Tetrasodium EDT	Preservative	Prevents colour, texture and appearance changes. See EDTA.
Tetrasodium etidronate	Thickener	Compound added to make the product less 'runny'. Has no other cosmetic purpose.
Titanium dioxide	Pigment	White compound used to make an opaque product. Not irritating to skin.
Tocophenylacetate	Antioxidant	Prevents oxygen from the air reacting with compounds in the product.
Trideceth - 7		See PEG and Glycols.
Triclocarban	Antiseptic	Used to kill bacteria in 'medicated' products.
Triclosan	Antiseptic	Used to kill bacteria in 'medicated' products.
Trimethylopropane tricaprylate/tricaprate	Perfume	Used to help make product smell attractive. Occurs naturally in sweat, cow and goat milks, coconut oil and palm oil.
Water softener		Compound added to remove calcium and magnesium ions which cause 'hard' water and prevent a lather forming with soap.
Wetting agent		A compound which dissolves in water and helps to make water spread across a surface by lowering surface tension. This means the same as surfactant, but in cosmetics seems to be used to describe different compounds.
Zinc pyrithione / pyridinethione	Antidandruff substance	Added to shampoos to treat dandruff (see dandruff). Some evidence this can damage nerves.
Zinc sulfate	SaltSkin freshener	Compound made in the reaction between sulfuric acid and zinc metal. May cause skin irritation.

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