

POWDER FOR DRY-CLEANING OF HANDSField of the invention

5 The present invention relates to a dry-cleaning powder of hands or other
body parts like the feet. It furthermore relates to dry-cleaning powder of hands
that has been pelletized to form dry-cleaning powder pellets. In addition, the
invention relates to the production process of making dry-cleaning powder
pellets. The invention also relates to the use of these dry-cleaning powder pellets
10 for dry-cleaning of for example the hands or feet.

Background of the invention

15 Soap bars have been the primary washing method for hands, body and
hair for many years. Nowadays, the liquid form of soap is used more often. Liquid
soap offers formulators the flexibility to create products for specific uses, such as
hand cleaners, facial soaps, body washes and hair shampoos. Both solid and
liquid form soap products are designed to be used multiple times. A disadvantage
of solid form products is that they tend to become slimy and dirty over time.

20 More research is done in the area of solutions for hand hygiene in poorer
countries: it was concluded that it may be necessary to reinvent soap. There are
different developments in this area. One of the developments is a strip of soap
for better hygiene. The soap pieces come from a roll. They are just enough for
one hand wash. The basis of the pieces is a thin fabric on which commercially
25 available soap is applied and then dried. Rolled up in a dispenser - similar to a
container for scotch tape - the pieces can be pulled out individually. After use, the
mini soaps can be thrown into the toilet; they are biodegradable. A disadvantage
of these strips is that water consumption is required for soaping, otherwise the
strips are not working.

30 Another form of soap is described in WO2019147496. It describes a
personal care cleaning composition in tablet form, that comprises a surfactant
and a starch composition formed from starch, alcohol and water. The tablet may
be formed using a method that includes preparing the starch slurry composition

comprising the starch, alcohol and water, preparing a mixture of the starch slurry composition and the surfactant, and pressing the mixture into tablet form. The pellets have the ability to dissolve rapidly in water of any temperature, and are very portable, easy to ship, and convenient to use.

5 US2023/0235249 describes a stable anhydrous cleanser concentrate formulation, including an acidic cleaner, a pH control agent, one or more gelling agents, a drying agent, a water softener, and one or more surfactants. The formulation may further comprise at least one natural and/or synthetic fragrance. The formulation may further comprise a dye, fragrance, or colouring agent. The
10 formulation may be in powder form. The cleanser formulation may be used in personal hygiene, e.g., face wash, shampoo, body wash etc. This disclosed formulation of cleansers in solid form tries to meet the needs of consumers, while also reducing the amount of waste generated in their production and shipping. The majority of household cleaning products on the market are in liquid or gel
15 forms and packaged in a plastic tube, bottle, spray bottle, or pump dispenser. The problem is the packaging as single use plastic is everywhere. Only a small part of all plastic is recycled, and packaging generates the largest portion of municipal waste. Removing water from formulations removes the need for single use plastic packaging and the waste that comes with it, such as packaging waste, product
20 waste, and the waste of resources used to ship water.

A disadvantage of the described formulation is that to be able to use the formulation a bottle filled with water is required, whereto the cleanser formulation is added, and the formulation is dissolved in the water by stirring or shaking, ready to be used.

25 Another application where water is required to prepare the product before it can be used is described in CN-A-112569165. Once water is added a repairing facial mask composition is formed.

The documents that are discussed above disclose products that are complicated to use in areas where water is scarce or even absent.

30 Accordingly, there is a demand for hygiene products that can be used more easily. There is furthermore a demand for a product that requires a minimum to no water to be produced and minimum to no water during usage and still have cleaned for example the hands.

Summary of the invention

It is an objective of the invention to address one or more of the disadvantages faced in the prior art. It is another objective of the invention to provide an alternative to hygienic products that require water for use. A particular
5 objective is to provide an efficient and low-cost fabrication process for the production of dry-cleaning powder pellets whereby the use of water is prevented.

Accordingly, the present invention relates to a dry-cleaning powder for hands, comprising a mixture of at least starch, an oil, a polysaccharide and
10 semolina.

Furthermore, the present invention relates to a process for the preparation of a dry-cleaning powder for hands, wherein a mixture comprising at least starch, an oil, a polysaccharide and semolina is mixed at a temperature between 0°C and 50°C and ambient pressure.

The present invention also relates to the use of a dry powder, comprising a mixture of at least starch, an oil, a polysaccharide and semolina for cleaning the hands without using water.
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The present invention furthermore relates to the use of a cleaning powder, comprising a mixture of at least starch, an oil, a polysaccharide and semolina as first aid food.
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Detailed description of the invention

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the
25 art to which this invention belongs. The terminology used in the description of the invention herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention.

The dry-cleaning powder for hands according to the invention can be used as sustainable solution in order to promote health and life quality (foster hygiene and/or smell removal) having a positive impact on people and planet by saving
30 water and eliminate contamination impacts. The invention can be applied particularly as first help aid in crisis areas such as refugee camps or regions affected by natural disasters like earthquakes. As in these regions drinking water

is already scarce or not available, either acute or chronic, it is less available for hygiene purposes. Providing dry-cleaning powder for hands according to the invention would help at least the hygienic situation. Integrating the dry-cleaning powder for hands with for example emergency relief supplies, such as i.e. the commonly known "shelter boxes," might enable the provision of a dual-purpose product: "first aid" food for emergency calorie intake and a water-free cleaning agent for hygienic purposes. The powder might thus serve as a water-free cleaning agent and skin care solution, providing hygiene benefits. In addition it might also serve as nutritional value. Further applications are "on the go" travel hygiene and refreshment aid (i.e. removes for example unpleasant smoke smell on hands) as a modern lifestyle product. The dry-cleaning powder for hands could also be used – after approval – for medical care (people with specific diseases (i.e. dermatological challenges requiring a water-free solution) or refreshment for patients in hospitals and nursing homes especially for bedridden patients. Another application might be in military environment: soldiers in isolated areas might choose between using the powder or tablets for hygiene purposes, or, when rations have run out, it might serve as nutritional value.

Nowadays many personal care products comprise additional ingredients, like emulsifiers, microplastics, scent molecules, dyes, etcetera that are washed off from the hands and or body and end up in the environment via the sewer systems. It is questionable whether all these compounds decompose within an acceptable time in nature. The dry-cleaning powder for hands according to the invention attributes positively on people and planet by elimination of the contamination impacts in that preferably no redundant ingredients are present that are not broken down when they end up in the environment. As the ingredients are suitably of biological origin and easily broken down by natural forces, they do not accumulate in the environment.

The dry-cleaning powder for hands according to the invention, comprises a mixture of at least starch, an oil, a polysaccharide and semolina. It can be regarded as a surprising and unexpected novel formulation comprising bio-based ingredients that exhibit beneficial properties for both food and hygiene applications. A further advantage of these materials is that they are mainly based on renewable raw materials. The formulation moreover aims to replace talcum, a substance with cancer-suspect characteristics, with renewable raw materials

while ensuring the safety and functionality of the product. The main objective of the dry-cleaning powder for hands is to provide a sustainable solution that contributes to improved health and quality of life, achieved through sustainably sourced and produced ingredients. The positive impacts can be measured by water conservation, its potential to save lives in emergency situations and reduced contamination impacts.

By addressing the urgent needs of individuals in crisis areas, the current invention furthermore aims to contribute positively to both people and the planet. The formulation's sustainable sourcing and production methods align with this mission, ensuring that the current invention achieves significant positive impacts, such as water conservation and saving lives in emergency situations.

The term "starch" as used herein, includes but is not limited to a polymeric carbohydrate consisting of numerous glucose units joined by glycosidic bonds. Another term for it is amylum. It is produced by most green plants for energy storage. Worldwide, it is the most common carbohydrate in human diets and is contained in large amounts in staple foods such as wheat, potatoes, maize (corn), rice, and cassava (manioc). Pure starch is a white, tasteless and odorless powder that is insoluble in cold water or alcohol. It consists of two types of molecules: linear and helical amylose and the branched amylopectin. Depending on the plant, starch generally contains 20 to 25% amylose and 75 to 80% amylopectin by weight.

The term "mineral powder" as used herein, includes but is not limited to the oxides of metals, like silica, alumina, titania, magnesia and zirconia and mixtures thereof. These oxides may comprise contaminants, up to 25 wt%.

The term "oil" as used herein, includes but is not limited to vegetable and animal oils and fats. Vegetable oil is any oil derived from plants, such as canola, maize, soybean, olive oil and sunflower oils. Meanwhile, animal fats and oils are derived mostly from lard, tallow, and butterfat, whereas fish oils are derived from cod liver oil, whale oil, and salmon oil. Furthermore, wax esters, like jojoba oil and beeswax are included in the definition of oil according to this invention.

The term "polysaccharide" as used herein, includes but is not limited to long-chain polymeric carbohydrates composed of monosaccharide units bound together by glycosidic linkages. The polysaccharide differs from the starch as defined above in that the polysaccharides according to the invention are soluble

in cold water and have excellent wettability which is favourable to remove sweat from the skin.

The term "semolina" as used herein, includes but is not limited to coarsely milled durum wheat mainly used in making pasta and sweet puddings. Semolina
5 can be made from hard durum wheat or from common wheat. The color might differ depending on the source.

The term "dry" as used herein, includes but is not limited to that no water is required for the preparation of the dry-cleaning powder and that no water is required when used for cleaning. The separate ingredients of the dry-cleaning
10 powder might contain moisture for stability purposes. For example, a standard starch might comprise up to 20 wt%, more preferably up to 15 wt% of moisture to maintain its stability and prevent microbial growth. Maltodextrin generally has a lower moisture content, preferably less than 10 wt%, more preferably less than 6 wt% and its stability is generally higher at lower moisture levels. Suitably,
15 semolina has a moisture content similar to most cereal grains and flours, preferably less than 15 wt%, more preferably less than 12 wt%. Keeping the moisture content low is important to prevent mold growth and maintain quality. Thus, depending on the ratio of the ingredients and the quality of the oil used, the moisture content of the dry-cleaning powder is preferably below 15 wt%, more
20 preferably below 10 wt%, even more preferably below 8 wt%.

Semolina is essential in the composition of the invention. The semolina functions as a rubbing agent for physical cleaning of the hands, in addition to the other ingredients of the dry-cleaning powder. So, it is used as a mechanical cleaning agent and it is preferred to rub it until the grid is gone. This requires
25 some time, for example in between 15 to 60 seconds. It is also a kind of automatism: a person continues to rub until the material between the hands has vanished and then the hands (or feet) are clean. Furthermore, it is advantageous, as the recommendation for a 30-second hand disinfection process is based on extensive research and guidelines provided by health organizations such as the
30 World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC). The WHO and the CDC have studied that with the better hand hygiene major outbreaks of infectious diseases might be reduced by 80 percent or even further. In view of the current threat of cholera epidemic and monkey

disease the use of dry-cleaning powder for hands according to the invention might attribute positively on prevention of the spreading of these diseases.

Some key reasons for this specific duration are: (1.) Effective Microbial Kill: the 30-second duration ensures that the hand sanitizer has sufficient contact
5 time with the skin to effectively kill a wide range of pathogens, including bacteria, viruses, and fungi; (2.) Complete Coverage: proper hand disinfection involves covering all surfaces of the hands, including the back of the hands, between the fingers, and under the nails. This thorough coverage takes time, and 30 seconds is considered an adequate period to ensure that all areas are properly disinfected;
10 (3.) consistency in practice: setting a standard duration for hand disinfection helps ensure consistency in practice across different settings, such as healthcare facilities, food preparation areas, and public spaces. This consistency is crucial for maintaining high hygiene standards and preventing the spread of infections.

In summary, the 30-second hand disinfection recommendation is a result
15 of scientific research and practical considerations aimed at maximizing the effectiveness of hand hygiene practices.

The use of semolina as a cleansing agent is not as widely documented in scientific literature as other more conventional agents. However, semolina (coarse durum wheat flour) is sometimes mentioned in the context of traditional
20 and anecdotal practices, especially in natural or home-based cleaning and exfoliation routines. It is then used combined with water, while according to this invention it is used as a dry substance with a different purpose.

Suitably, the dry-cleaning powder for hand comprises furthermore at least one mineral powder. The added mineral powder is important for making tablets
25 from the powder, without changing the cleaning properties thereof. Filling a tablet machine with the dry-cleaning powder requires that it has good flow properties. Those flow properties are ensured by for example amorphous silica. Furthermore, if dry-cleaning powder is used directly as powder for cleaning the hands the added mineral powder helps with the flow out of for example a
30 packaging box. However, for the cleaning effectiveness the mineral powder is not required.

In a preferred embodiment, the dry-cleaning powder for hands comprises an amount of starch in the range of from 25 up to 80 wt%, more preferably in the range of from 40 up to 80 wt%, more preferably in the range of from 50 up to 70

wt%, even more preferably in the range of from 50 up to 60 wt%. The starch functions in this application as an absorbing agent with a viscosity control function. Starch is also known for its high content of good carbohydrates and supports a well-functioning gastrointestinal tract. In this application, it furthermore
5 functions as a matrix for the other components in the tablet. Other materials produced pellets that were too hard for the purpose or were poor binding materials. Starch in these amounts were superior to other materials with respect to these properties.

In a further preferred embodiment, the dry-cleaning powder comprises an
10 amount of mineral powder in the range of from 0.1 up to 5 wt%, more preferably in the range of from 0.2 up to 3 wt%, even more preferably in the range of from 0.3 up to 2 wt%. The mineral powder, like for example silicon dioxide (silica) or aluminum dioxide (alumina) reduces interarticular friction covering the particle
15 surfaces with a thin layer, and as a result helping in better powder and granule flow. This is particularly helpful when the powder is being pelletized to form dry-cleaning powder pellets. Furthermore, in terms of the food application is silicon dioxide one of the preferred minerals, as the amorphous form of silicon dioxide, a synthetic amorphous silica (SAS), is authorized as a food additive (E551) in many countries including the European Union and U.S.

20 Preferably, the dry-cleaning powder comprises an amount of oil in the range of from 1 up to 10 wt%, more preferably in the range of from 2 up to 8 wt%, even more preferably in the range of from 3 up to 6 wt%. The oil as skin care contributes to cleaning the skin: the oil can be used to dissolve oily residue on the skin. The oil furthermore reduces interarticular friction, as it is known for its
25 abrasive, absorbent, anticaking, bulking, opacifying and viscosity controlling properties, covering the particle surfaces with a thin layer, and as a result helping in better powder and granule flow. Another advantage is that fatty acids in the oil used have i.e. anti-inflammatory effects, and it even might stabilize the heart rhythm. More oil leads to disintegration and leaking of oil out of the tablet.

30 Advantageously, the dry-cleaning powder according to the invention comprises an amount of polysaccharide in the range of from 2 up to 50 wt%, more preferably in the range of from 10 up to 40 wt%, even more preferably in the range of from 15 up to 30 wt%. The polysaccharide acts in our invention as an absorbing agent and forms a film on the skin. The polysaccharide differs from the starch in

that it is completely soluble in cold water and has excellent wettability which is favourable to remove sweat from the skin. It has a further advantage if being used as first aid food: it is a rapidly digestible sugar. It provides several hundred (more than 380) kilocalories (kcal) per 100 gram and therefore gives a quick energy boost. Advantageously, the polysaccharide is one or more selected from the group of maltodextrin and inulin.

In a preferred embodiment, the dry-cleaning powder according to the invention comprises an amount of semolina in the range of from 2 up to 30 wt%, more preferably in the range of from 5 up to 25 wt%, even more preferably in the range of from 10 up to 20 wt%. Semolina is coarsely milled durum wheat normally used in making couscous, pasta, and sweet puddings. The term semolina is also used to designate coarse millings of other varieties of wheat, and sometimes other grains (such as rice or corn) as well. For the purpose of this invention, semolina functions as a rubbing agent for physical cleaning of the hands and ensuring the disintegration of the tablet. There is no need to use a towel or other drying methodology after hand cleansing. It has a further advantage if being used as first aid food: it is a good source of energy, as semolina comprises a lot of carbohydrates that provide energy for day-to-day activities. Advantageously, the semolina is one or more selected from the group of durum wheat and common wheat.

Advantageously, the dry-cleaning powder furthermore comprises panthenol, preferably Dex panthenol, in the range more preferably of from 0.5 up to 8 wt%, even more preferably in the range of from 1 up to 5 wt%. Panthenol, or pantothenol is the alcohol analogue of pantothenic acid (vitamin B5), and is thus a provitamin of B5. In organisms, it is quickly oxidized to pantothenic acid. It is a viscous transparent liquid at room temperature. Panthenol comes in two enantiomers: D, and L. Only D-panthenol (Dex panthenol) is biologically active, however both forms have moisturizing properties. For cosmetic use, panthenol comes either in D form, or as a racemic mixture of D and L (DL-panthenol). Panthenol, or preferably Dex panthenol is used according to the current invention as a moisturizer and to improve wound healing, if one would have such. It improves hydration, reduces itching and inflammation of the skin, improves skin elasticity, and accelerates epidermal wounds' rate of healing. In a preferred embodiment, Dex panthenol is combined with allantoin. It has a further advantage

if being used as first aid food: it might function as precursor of vitamin B5 in case of chronically inflammation of gastrointestinal tract.

Advantageously, the dry-cleaning powder furthermore comprises sodium hydrogen carbonate, more preferably in the range of from 0.5 up to 8 wt%, even
5 more preferably in the range of from 1 up to 5 wt% sodium hydrogen carbonate. The sodium hydrogen carbonate is added to the dry-cleaning powder for hands of the current invention to reduce unpleasant odour on the hands from for example cigarettes smoke. It has a further advantage if being used as first aid food: sodium hydrogen carbonate is known as sodium bicarbonate or baking
10 soda and is used in baking as a leavening agent to help dough rise. It is furthermore used as a food preservative and pH regulator in the food industry. In addition, it can be used to relieve heartburn and acid indigestion or as a more pharmaceutical application as antacids or mouthwashes

Advantageously, also farnesol can be added to the dry-cleaning powder,
15 preferably in a concentration of 0.3 up to 0.8 wt%, more preferably in a concentration of 0.3 up to 0.5 wt%. Farnesol is a natural 15-carbon organic compound which is an acyclic sesquiterpene alcohol. Under standard conditions, it is a colourless liquid. It is hydrophobic, and thus insoluble in water, but miscible with oils. The farnesol in the powder has an antifungal activity associated with
20 inhibition of fungal dimorphism. It does this by affecting the pH level on the skin's surface, creating an environment that is less conducive to bacterial growth. It might also be used to emphasize the odours of something present in the powder, as it enhances perfume scent by acting as a co-solvent that regulates the volatility of the odorants. It has a further advantage if being used as first aid food: farnesol
25 is found naturally in herbs and berries and other fruits. It has been reported to i.e. prevent and reverse brain damage linked to Parkinson's disease in mouse studies. It can also help settle the bacteria within the digestive tract and inhibit the growth of harmful bacteria.

The starch used for this invention is preferably one or more selected from
30 the group of rice starches, wheat starches, potato starches and maize starches. The starch functions serve as an excellent filler/diluent as well as a disintegrant, and as a binder. Various starches were tested in an attempt to optimize the desired characteristics of minimizing disruption of tablet binding. Testing revealed that (un-modified) starches provide superior results.

The mineral powder used for this invention is preferably one or more selected from the group of silica, magnesia, alumina and titania, more preferably selected from the group of silica and alumina, even more preferably the mineral powder is silica, most preferably the mineral is amorphous silica. The silica
5 chosen reduces interarticular friction by covering the particle surfaces with a thin layer, and as a result helping in better powder and granule flow. Furthermore, it is particularly helpful when the powder is being pelletized to form dry-cleaning powder pellets.

According to a further embodiment of the invention, the dry-cleaning
10 powder comprises as the oil one or more selected from the group of olive oil, sunflower oil, maize oil, rice oil and essential oil, more preferably selected from the group of olive oil and essential oil. The oil as skin care contributes to cleanse the skin: the oil can be used to dissolve oily residue on the skin. Preferably, the essential oil is one or more selected from the group of melissa oil, lavender oil,
15 mint oil, moringa oil, tea tree oil, bergamot oil, chamomile oil, jasmine oil, eucalyptus oil, rose oil, patchouli oil, clary sage oil, lemongrass oil, orange oil, cedarwood oil, coconut oil and sandalwood oil. Some of these oils have specific properties, like melissa oil is known for its cleansing, circulation-promoting and anti-inflammatory properties, the skin regeneration processes are optimized, and
20 it comprises antiviral properties against herpes viruses. Lavender oil is known to be stimulating the growth of skin cells, it prevents skin aging, it supports healing processes (e.g. after sunburn), it has antiseptic properties, it is anti-inflammatory (e.g. insect bites subside faster) and it soothes irritated skin. Rose oil promotes blood circulation, it is slightly antibacterial, it promotes skin metabolism, and acts
25 as an antioxidant.

According to another embodiment of the invention, the dry-cleaning powder may comprise as the oil, substances that also comprise naturally occurring wax esters, like for example jojoba oil and shea butter.

According to a further embodiment of the invention, the dry-cleaning
30 powder may comprise as the oil, substances that come from an animal source, like tallow. If tallow is used, it is preferred to also have a more liquid oil in the composition of the dry-cleaning powder as well, like for example sunflower seed oil or olive oil.

According to the invention, it is preferred that the powder is being pelletized to form dry-cleaning powder pellets. The advantages of pellets are that they are easy in dosing and the capability of stable multiple blends, low hygroscopicity, meaning that the pellets do not absorb much moisture from the air. Pellets are also used to avoid excessive dust and reduces segregation. A disadvantage of the solid soap has been overcome namely that the solid products are becoming slimy and dirty over time. Another disadvantage has been overcome, namely of the alternative liquid form products and that is that they require non-renewable (e.g. plastic) packaging, which increases manufacturing cost and shipping weight of the liquid and is environmentally unfriendly. Liquid form products also tend to be bulkier than solid form products and may not be as convenient as solid form products for travellers or in rural areas. Solid form products may be superior from this standpoint, but they do not store well after initial use and do not offer the benefits of liquid formulations. This has all been solved by producing dry-cleaning powder pellets. The dry-cleaning powder pellets have preferably a diameter in the range of from 0.2 up to 20 mm, more preferably in the range of from 0.3 up to 10 mm, even more preferably in the range of from 0.3 up to 8 mm.

The current invention is furthermore directed to the process for the preparation of a dry-cleaning powder for hands, wherein a mixture comprising at least starch, an oil, a polysaccharide and semolina is mixed at a temperature between 0°C and 50°C and ambient pressure.

Suitably, furthermore a mineral powder is added to the mixture before mixing. The mineral powder chosen, for example silica, reduces interarticular friction by covering the particle surfaces with a thin layer, and as a result helping in better powder and granule flow. Furthermore, it is particularly helpful when the powder is being pelletized to form dry-cleaning powder pellets.

The current invention is also directed to the use of a cleaning powder, comprising a mixture of at least starch, an oil, a polysaccharide and semolina for cleaning the hands without using any water.

The current invention is furthermore directed to the use of a cleaning powder, comprising a mixture of at least starch, an oil, a polysaccharide and semolina as first aid food. Preferably, the cleaning powder is mixed at a temperature between 70°C and 80°C and ambient pressure until a porridge mass

is reached. When being used as a first aid food, it provides the so-called good carbon hydrates in food, supporting a good functioning gastrointestinal tract and it gives a quick energy boost. The oil comprising more than 80% unsaturated fatty acid can improve blood cholesterol levels, it is known to ease inflammation, and
5 to stabilise heart rhythm. The first aid food might also comprise a precursor of vitamin B5 which helps to overcome chronically inflammation of gastrointestinal tract.

Suitably, for the above usages the cleaning powder furthermore comprises a mineral powder. The mineral powder chosen, for example silica, reduces
10 interarticular friction by covering the particle surfaces with a thin layer, and as a result helping in better powder and granule flow. Furthermore, it is particularly helpful when the powder is being pelletized to form dry-cleaning powder pellets.

The following, non-limiting examples are provided to illustrate the
15 invention.

Examples

Example 1: comparative example

20 A standard soap was prepared by mixing the following ingredients: 225 g coconut oil, 150 g castor oil, 100 g olive oil, 25 g lanolin, 125 g water, 70 g NaOH, 10 g lemon balm oil (degreasing), and a few dashes of perfume. The ingredients were processed at a temperature of around 40°C. The saponification succeeded well and the soap was stored to dry for several months.

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Example 2: comparative example

A soap was prepared by mixing 20 g starch, 30 g olive oil, 7 g healing clay, 3 g lanolin, 50 drops of lavender oil and 4 drops of perfume and it was filled up with 5 g water. The result was that a homogeneous solution could not be
30 obtained. The mixture of the ingredients with water is not suitable as a soap.

Example 3:

In the following experiments a mixture was prepared by mixing the following ingredients at room temperature: 56 wt% starch, 4 wt% olive oil, 2 wt%

lavender oil, 1.4 wt% melissa oil, 0.5 wt% silica, 20 wt% maltodextrin, 15 wt% semolina and 1 wt% Dex panthenol.

5 A) The mixture was processed in a laboratory tablet press to produce pellets in a reproducible way simulation a continuous and commercial production of pellets. The tablet press machine (press machine single punch, ISO 9001 certified) consists of iron and stainless steel. It has a production capacity of 5400 pellets per hour. The tablet force (as tablet pressure indicator) is adjustable and around 15 kN. The pressure diameter is 5-10 mm. The adjustable pellet thickness is 2-6 mm. The machine has been modified with a motor drive from Getriebebau
10 NORD in order to simulate a continuous operation. The powder is manually fed to the table press. The cleaning effect of the pellets was tested by dirt removal tests and visual assessment with machine oil, sugar or ketchup on two hands. The contaminants were removed from the hands by using three pellets. The cleaning effect was remarkable.

15 B) To improve the cleaning effect further, not only for dirt removal but also for 'heavy smell' 3 parts of the above mixture, 1.5 parts of maltodextrin and 2 parts of sodium hydrogen carbonate were processed in a laboratory tablet press. The pellets were tested – together with pellets without any hydrogen carbonate (placebo) - by 3 persons in order to assess smell removal of i.e. "cigarettes smell
20 on hands". The smell of cigarettes on their hands had disappeared after using the pellets only where hydrogen carbonate was added, and this functionality was rated as excellent. To improve even further, peppermint oil was also added in a further experiment (less than 0.5%) resulting in that the skin became smooth and supple, combined with a fresh smell.

25 C) A long-term stability test (over a year) was performed: powder of the mixture was stored in a closed plastic container for more than a year and then tested: the functionality of the cleaning was still given, and the smell was still pleasant.

30 Example 4:

A basic mixture of starch, olive oil, maltodextrin, semolina and Dex panthenol, lavender oil, lemon balm and peppermint oil were mixed with water and heated up to a temperature of 75°C. The result was a slight yellowish

porridge which can be used as a first aid food. Peppermint oil had a refreshing, cooling and slightly pungent taste.

The nutritional values are given in the table below.

5 **Table 1: nutritional values of the dry-cleaning powder when used as a first aid food per ingredient per 100 g**

Ingredient	Energy (kJ)	Energy (kcal)	Fat	Carbohydrates	Protein
Starch	1577	381	0.1	91.3	0.3
Maltodextrin	1610	389	-	98	-
Semolina	1490	360	-	72.8	12.7
Oils average (olive, lavender, peppermint)	3660	884	98	-	-
Lemon balm	182	44	0.6	8	3.7

Example 5:

10 Tests were performed to understand what kind of oils could be used depending on the worlds region where the dry-cleaning powder are going to be fabricated.

 The basic recipe was as follows:

- 15 **Solid carrier:**
7,839 g (corn) starch
11,047 g maltodextrin 6
6,535 g semolina

- 20 **Basis oil II:**
0,616 g lavender oil
3,509 g jojoba oil
0,555 g peppermint oil
0,620 g farnesol

- 25 0,373 g lemon balm

No mineral powder was added to the basic recipe for these tests, as the mineral powder is more relevant for making the tablets and it helps with the flow out of the packaging box and is not essential for cleaning effectiveness.

5 The standard cleaning test was designed as follows: 3 stripes with black, red and blue color crayons (Faber) and circle lipstick (330, Astor) was put on the inside of the hands. Then the hands were cleaned using the different dry-cleaning powders. The time to obtain clean hands was measured in seconds. Visual inspection was done to measure the results.

10 The following compositions were tested:

Table 2: compositions and test results of different oils and wax esters

Amount of solid carrier (g)	Amount of basis oil II (g)	Additional type of oil	Amount of additional oil (g)	Cleaning time in seconds	Results	Remarks
5.0	0.4	-	-	24	-	
5.0	0.4	Grapeseed oil	0.3	37	Slightly worse cleaning	Less good replacement
5.0	0.4	Sunflower seed oil	0.4	26	Same as standard	Good replacement
4.7	0.9	Shea butter	0.2	19	Better cleaning	Good replacement
4.7	0.4	Coconut oil	0.2	18	Better cleaning	Good replacement
4.0	0.4	Baobab oil	0.2	19	Better cleaning	Good replacement

15 The test and the results above show that depending on the world region the oils can be selected carefully having similar cleaning effectiveness especially coconut oil and shea butter have good cleaning properties.

Example 6:

20 The replacement of as much as possible oils by tallow balm was also tested. Tallow is rich in saturated fatty acids and triglycerides that help moisturize and protect the skin. It has a similar composition to the natural fats in human skin,

which makes it particularly well tolerated. The standard cleaning test described in example 5 was followed. A composition was prepared by using 1.7 g starch, 2.2 g maltodextrin 6, 1.2 g semolina, 0.7 g farnesol and 0.6 g tallow balm. Due to the properties of the tallow balm, an addition of 0.6 g sunflower seed oil was done to make a good composition for testing. A cleaning time of 24 seconds was required to obtain cleaned hands. The results are good, so tallow can serve as one of the oils in the dry-cleaning powder of the invention.

Example 7:

It was verified what the impact was of dry semolina in a waterless hand hygiene procedure. Therefore, comparative tests were done with a dry-cleaning powder with and without semolina and tested on the hands. Furthermore, comparative tests were done with wet semolina.

The starting material comprised:

Oil basis:

3.7g olive oil

0.63 g lavender oil

3.8 g jojoba oil

0.47 g peppermint oil

1.0 g farnesol

0.33 lemon balm

Sample 1: according to the invention

3.7 g starch (from corn)

5.6 maltodextrin 6

3.1 g semolina

1.2 g oil basis

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Sample 2: without semolina

3.5 g starch (from corn)

5.5 g maltodextrin 6

0.89 g oil basis

Sample 3: wet semolina

4.2 g starch (from corn)

5.9 g maltodextrin 5

1.8 g wet semolina pretreated with a few milliliters cold water (semolina
5 concentration about 11%, 3 ml water), soaked for 10 minutes

1.2 g oil basis

Besides the dry powder before this mixture in sample 3 is a yellowish,
homogeneous cream, but not a slurry. It remains stable and viscous after one
10 day.

Testing was done according to the standard test: 3 stripes with black, red
and blue color crayons (Faber) and circle lipstick (330, Astor) was put on the
inside of the hands. Then the hands were cleaned using the different dry-cleaning
15 powders. The time to obtain clean hands was measured in seconds. Visual
inspection was done to measure the results. To determine whether there is a
significant difference between two series of measurements, we have small
samples (three values per series) and we use an independent samples t-test to
test the difference in means.

20

The following results were obtained:

Table 3: cleaning effectiveness: test results of sample 1, 2 and 3

Sample	Cleaning time in seconds test 1	Cleaning time in seconds test 2	Cleaning time in seconds test 3	Mean time
1	21	20	19	20
2	32	29	27	29.3
3	Not possible	Not possible	Not possible	-

25

From the test results it can be concluded that semolina is an essential part of the
dry-cleaning powder for hands as the cleaning results are far better.

The cleaning with wet semolina could not be assessed. The reason was that a sticky, wet, but transparent cream (like an adhesive) immediately covered the hand. The wet cream could only be removed with plenty of water, but a complete removal could not be achieved. A second trial was made to remove the
5 transparent, wet, sticky cream with the dry-cleaning powder. This cleaning was partly achieved and plenty of water had to be added subsequently. After 3 hours a film remained on the surface of the hand. The film did not dry at all.

CLAIMS

1. A dry-cleaning powder for hands, comprising a mixture of at least starch,
an oil, a polysaccharide and semolina.
- 5
2. Dry-cleaning powder according to claim 1, furthermore comprising at least
one mineral powder.
3. Dry-cleaning powder according to claim 1 or 2, wherein the amount of
10 starch is in the range of from 25 up to 80 wt%, preferably in the range of from 50
up to 70 wt%, more preferably in the range of from 50 up to 60 wt%.
4. Dry-cleaning powder according to any of the previous claims, wherein the
amount of oil is in the range of from 1 up to 10 wt%, preferably in the range of
15 from 2 up to 8 wt%, more preferably in the range of from 3 up to 6 wt%.
5. Dry-cleaning powder according to any of the previous claims, wherein the
amount of polysaccharide is in the range of from 2 up to 50 wt%, preferably in the
range of from 10 up to 40 wt%, more preferably in the range of from 15 up to 30
20 wt%.
6. Dry-cleaning powder according to any of the previous claims, wherein the
amount of semolina is in the range of from 2 up to 30 wt%, preferably in the range
of from 5 up to 25 wt%, more preferably in the range of from 10 up to 20 wt%.
- 25
7. Dry-cleaning powder according to claim 2 to 6, wherein
the amount of mineral powder is in the range of from 0.1 up to 5 wt%, preferably
in the range of from 0.2 up to 3 wt%, more preferably in the range of from 0.3 up
to 2 wt%.
- 30
8. Dry-cleaning powder according to any of the previous claims, furthermore,
comprising panthenol, preferably Dex panthenol, in the range preferably of from
0.5 up to 8 wt%, more preferably in the range of from 1 up to 5 wt%.

- 9.** Dry-cleaning powder according to any of the previous claims, furthermore comprising sodium hydrogen carbonate, preferably in the range of from 0.5 up to 8 wt%, more preferably in the range of from 1 up to 5 wt%.
- 5 **10.** Dry-cleaning powder according to any of the previous claims, wherein the starch is one or more selected from the group of rice starches, wheat starches, potato starches and maize starches.
- 10 **11.** Dry-cleaning powder according to any of the previous claims, wherein the mineral powder is one or more selected from the group of silica, magnesia, alumina and titania, preferably selected from the group of silica and alumina, more preferably the mineral powder is silica, even more preferably the mineral is amorphous silica.
- 15 **12.** Dry-cleaning powder according to any of the previous claims, wherein the oil is one or more selected from the group of olive oil, sunflower oil, maize oil, rice oil, coconut oil, wax esters and essential oil, preferably selected from the group of olive oil and essential oil.
- 20 **13.** Dry-cleaning powder according to claim 12, wherein the essential oil is one or more selected from the group of melissa oil, lavender oil, mint oil, moringa oil, tea tree oil, bergamot oil, chamomile oil, jasmine oil, eucalyptus oil, rose oil, patchouli oil, clary sage oil, lemongrass oil, orange oil, cedarwood oil and sandalwood oil.
- 25 **14.** Dry-cleaning powder according to any of the previous claims, wherein the polysaccharide is one or more selected from the group of maltodextrin and inulin.
- 30 **15.** Dry-cleaning powder according to any of the previous claims, wherein the semolina is one or more selected from the group of durum wheat and common wheat.
- 16.** Dry-cleaning powder according to any of claims 2 to 15, wherein the powder is being pelletized to form dry-cleaning powder pellets.

17. Dry-cleaning powder according to claim 16, wherein the dry-cleaning powder pellets have a diameter in the range of from 0.2 up to 20 mm, preferably in the range of from 0.3 up to 10 mm, more preferably in the range of from 0.3 up to 8 mm.

18. Process for the preparation of a dry-cleaning powder for hands, wherein a mixture comprising at least starch, an oil, a polysaccharide and semolina is mixed at a temperature between 0°C and 50°C and ambient pressure.

19. Process according to claim 18, wherein furthermore a mineral powder is added to the mixture before mixing.

20. Use of a cleaning powder, comprising a mixture of at least starch, an oil, a polysaccharide and semolina for cleaning the hands without using water.

21. Use of a cleaning powder, comprising a mixture of at least starch, an oil, a polysaccharide and semolina as first aid food.

22. Use according to claim 21, wherein the cleaning powder is mixed at a temperature between 70°C and 80°C and ambient pressure until a porridge mass is reached.

23. Use according to claims 20 to 22, wherein the cleaning powder furthermore comprises a mineral powder.