NALSAR PROXIMATE EDUCATION
NALSAR UNIVERSITY OF LAW, HYDERABAD
P.G.DIPLOMA IN PATENTS LAW

2013-14
Supplementary Exams (November, 2014)

Paper II – Practical

(Exploitation of Patents – Drafting, Specification & Patent Writing)

Time: 2 ½ hours. **TOTAL MARKS: 90**

INSTRUCTIONS TO CANDIDATES

1. **The questions to be interpreted as given and no clarification can be sought from the invigilator.**
2. **Do not draw or attach figures**
3. **Do not write detailed description or figure no.s**
4. **The claim drafting will carry 50 marks and rest of the specification will carry 40 marks**
5. **Attempt only one choice – either A or B**

Draft a Patent Specification based on the information given by the inventor as below:

Option A

Kannagi a mechanical engineer is also a avid cooking expert always had problems with grinding herbs. She tried various grinding equipments for grinding herbs and had a plethora of issues making it inconvenient as well cumbersome for grinding purposes. She thought she should invent a convenient grinding equipment and came out with a prototype. As advised by her well-wishers, she wanted to file a patent and approaches you with this inventor disclosure

There are currently two types of grinders. One is the electric grinder, which is motor-driven and cuts and grinds in rotation. Although efficient, it is usually large and not easy to carry. It also needs to be self-powered or requires connection to an external power source. The second type of grinder is a manual grinder. These types of grinders are smaller with many cutting blades, and the user needs to hold both the grinder and the material being ground while grinding. The sharp cutting blades, and the need for the user to grind the material back and forth manually, can pose a safety hazard and may be dangerous to the user.

A need exists for a new type of grinder which solves the safety issue, and is easier and safer to use for grinding herbs. The present invention fulfills those needs.

When a herb grinder made in accordance with the present invention is used as a manual grinder, it is safer to use because it does not require cutting blades on the surface that could cut the user's fingers during use. The grinding area is formed by the special grooved sheet described, which

makes the grinding safer and easier.

A grinder made in accordance with the present invention is particularly suitable for use in grinding soft herbs, spices, fruits, nuts, and tobacco, etc. The grinder is easy to carry, and can easily fit in a briefcase, business card holder, or even a wallet. The user also can carry it in a book. In a preferred form, the grinder is about the size of a credit card. Its shape can be rectangular, round, oval, or other regular or irregular polygonal shapes.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and in particular to FIGS. 1 and 2, the invention is embodied in a grinder of a type especially adapted for grinding herbs. In accordance with the present invention, the grinder includes a sheet 1 with a plurality of grooves 2 forming a grinding area which does not require cutting blades that could easily cut a user's fingers. As shown in FIG. 2, the grooves in this particular embodiment comprise a series of spaced-apart parallel notches of elongated rectangular shape formed into at least the top surface of the sheet and extending horizontally across a portion of the surface. However, the size, shape and arrangement of the grooves can vary, as will be later explained, and are selected so as to provide a suitable grinding area on the surface of the sheet.

The grinder shown in FIGS. 1 and 2 is particularly suitable for grinding softer herbs, spices, fruits, nuts, and tobacco, etc. The grinding and cutting occurs as a result of reciprocal two-way movement of the material to be ground across the surface of the sheet. This makes the grinder very efficient to use. It is also easy to carry. In a preferred form, the grinder is the size of a credit card, and can easily fit in a briefcase, business card holder or wallet. It can also be put in a book or notebook, and even in a pocket.

FIG. 3 shows an alternative embodiment of the grinder. The difference from the grinder shown in FIGS. 1 and 2 is that each of the grooves 2a has a square shape, and the grooves are neatly arranged into rows and columns of alternating grooves and square spaces forming a checkerboard pattern within the grinding space. In order to better illustrate the difference between the grooves and the adjacent surface of the sheet in the spaces between the grooves, the grooves have been illustrated with a hatching pattern in FIG. 3 (and in subsequent Figs.) to distinguish between the grooves and the adjacent spaces. Compared with the embodiment shown in FIGS. 1 and 2, the grinding resistance of the embodiment shown in FIG. 3 is less, which results in a smoother and more delicate grind.

The alternative embodiment shown in FIG. 4 is similar to the embodiment shown in FIG. 3, except that there are through holes 3 provided in the grooves 2a and on the adjacent surface of the sheet 1 in the spaces between the grooves. The holes extend completely through the sheet. The holes perform an additional grinding and cutting function. They add new cutting edges to the grinder, making it even more efficient than the previous embodiment. The holes also have the added feature of eliminating waste bits from the grooves and the adjacent surfaces of the grinder, thereby preventing waste accumulation that could adversely affect the grinding.

In the alternative embodiment shown in FIG. 5, the difference is that the grooves 2b have a circular shape. There are spaces between the grooves, and these circular grooves form the grinding area.

In addition, in order to make the grinder more convenient, a hanging hole 4 is provided on the corner of the sheet 1. The hole can be used to hang the grinder on a keychain so that it can be carried around easily by the user. In addition, the grinder also has been provided with a ***bottle opener*** 5 in the form of a large oval opening near the edge of the sheet 1. The many possible functions of the ***bottle opener*** add convenience and versatility to the grinder.

The alternative embodiment shown in FIG. 6 is similar to the grinder shown in FIG. 5, but with the addition of through holes 3 within the circular grooves 2b. The diameters of the holes 3 are preferably smaller than the diameters of the circular grooves, so that each hole is surrounded by an individual groove. The holes 3 have the same function as the holes in the embodiment of FIG. 4. However, in this particular embodiment, the holes are only formed in the grooves and are not distributed on the surfaces of the sheet.

The grooves can take on different shapes other than those shown in FIGS. 1-6, such as triangles, ovals, stars, polygons, and can also be hearts or even other irregular shapes, and combinations thereof. The size and shape of the grooves also can differ from groove to groove, and the grooves can be evenly or unevenly aligned.

In the alternative embodiment shown in FIG. 7, the grooves 2c are formed as a series of concentric rings spaced apart at specific radial intervals. The sidewalls of the ring-like grooves 2c are not straight lines in the grinding area. Instead they form an arc, and this has the effect of pushing material being ground inward when grinding. This makes it much easier to crush and grind the material, and more efficient than if the sidewalls of the grooves were straight.

FIG. 8 shows an alternative embodiment similar to FIG. 7, the difference being that there are through holes 3 distributed both in the grooves 2c and on the adjacent surfaces of the sheet 1. The holes 3 vary in size and spacing in different regions of the grinding area. Some regions have larger holes, while others have smaller holes. There are higher concentration of holes in some regions and lower concentration of holes in other regions. The holes 3 have the same function as the holes in the previous embodiments.

The embodiment shown in FIG. 9 is similar to the embodiment shown in FIG. 7, except that the grooves 2d form concentric star shaped patterns which are distributed at specific radial intervals.

The embodiment shown in FIG. 10 is similar to the embodiment shown in FIG. 9, but with through holes similar to the holes in FIG. 8. Like the embodiment shown in FIG. 8, the through holes 3 are again distributed both in the grooves 2d and on the adjacent surfaces of the sheet 1. And, similar to FIG. 8, the size and spacing of the holes 3 vary in different regions of the grinding area. The holes 3 have the same function as the holes in the previous embodiments.

In addition to stars, the grooved areas can take the shape of ovals, hearts, gems, and many other irregular shapes.

FIG. 11 shows an alternative embodiment in which the grooved areas 2e are V-shaped or arrowhead shaped and spaced apart at parallel intervals. Again, the grooved areas 2e and the sheet 1 form the grinding surface. Like the embodiment shown in FIG. 10 and previous embodiments, holes 3 are distributed both in the grooved areas and on the adjacent surfaces of sheet 1 in the spaces between the grooved areas. Like the previous embodiment of FIGS. 7 and 8, the angles between the sidewall segments which intersect to form the V-shape grooves also provides an inward pushing effect on the material being ground, resulting in easier crushing and grinding of the material.

The embodiment shown in FIG. 12 is similar to the embodiment shown in FIG. 4, the difference being that both the shape of the sheet la and the shape of the grinding area is an oval. A ***bottle opener*** 5 also is provided. The ***bottle opener*** 5 also can be used as a hanging hole for the grinder, if desired.

The embodiment shown in FIG. 13 has grinding areas similar to the ones shown in FIG. 8 except that there are two different grinding areas of two different sizes provided. These two grinding areas can be used for different functions. For example, one can be used as a rough grinding area while the other can be used as a fine grinding area. This provides different selections of grinding within

the same sheet.

FIG. 14 shows an alternate way of providing two different grinding areas on the same sheet. While the embodiment shown in FIG. 13 had two spatially separated grinding areas on the same sheet, the embodiment shown in FIG. 14 uses two different but adjacent grinding patterns within the same grinding area. The grinding patterns are a combination of the patterns shown in FIG. 3 and FIG. 4. The pattern without the through holes serves as a normal grinding area, while the pattern with the through holes serves as a more highly-efficient grinding zone.

In all of the embodiments mentioned above, the notches or grooves are generally (but not necessarily) rectangular in cross-sectional shape with sidewalls that are preferably but not necessarily perpendicular to the flat surface of the sheet. The angle between the sidewall and the flat surface of the sheet can be either acute or obtuse. When the angle is acute, the grinding edge protrudes more. The cutting effect is enhanced, and the grinding effect is reduced. When the angle is obtuse, the cutting edge is more blunt. As a result, the grinding effect is enhanced, while the cutting effect is reduced.

In order to prevent the ground bits from adhering to the surface of the grinder and thereby reducing the effectiveness and service life of the grinder, and in order to make it easier to clean the grinder after each use, the grinder is preferably coated with a non-stick material on the surface of the sheet, such as Teflon, so that the grinder can be easily washed and quickly cleaned. A frosted or brushed finish also may be applied to the surface of the grinder, if desired

In all of the foregoing embodiments, the sheet can be made out of plastic, metal, wood or glass, and combinations thereof. The thickness of the sheet is preferably between about 0.15 mm and 5 mm. When the grinder includes the ***bottle opener*** option, the sheet material normally needs to be a little thicker. The depth of the notches or grooves is preferably between 0.005-2 mm. A shallow depth notch or groove generally results in a grinder which can grind to a more fine texture. The size of the holes is preferably between about 0.5 mm and 15 mm, with 4 mm being typical.

In all of the foregoing embodiments, the shape of the sheet is preferably flat, but if desired, the sheet may also be bent or curved. When it is curved in a concave manner, the sheet can be placed on a surface and the ground bits can be allowed to fall under the sheet, which is useful when grinding large amount of materials, without the need to move the grinder.

In all of the foregoing embodiments, there are many ways of forming the notches or grooves. For example, the notches or grooves can be formed using a CNC machine, mold stamping, laser cutting, or water jetting to process the sheets. Another option is to use mask chemical corrosion which when processing, causes the bottom of the notches or grooves to be corroded and rough, which can enhance the grinding efficiency. The surface of the sheet itself also can be either smooth or rough, as desired. The holes can be formed by stamping or punching or by any other suitable means, and they can be formed in the sheet before or after the grooves have been formed.

It will be appreciated that each of the grinders described above may be used individually to grind a herb, or they may be used in pairs for a dual grinding action. When used in pairs, it is desirable that both grinders be identical and have the grinding area disposed along a longitudinal edge of the card with a series of horizontal grooves extending away from the edge. In use, the user holds one grinder in each hand, and with a back and forth motion, grinds herb placed between the two grinders. This dual grinding action is particularly useful for quickly grinding large amounts of herb without touching the herb with one's fingers

FIGURES – Option A

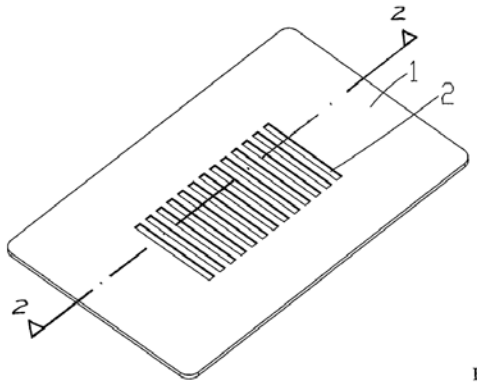

FIG. 1

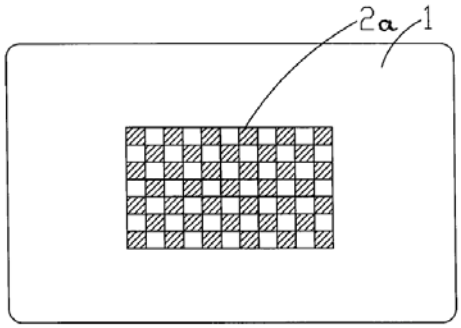

FIG. 3

FIG. 2

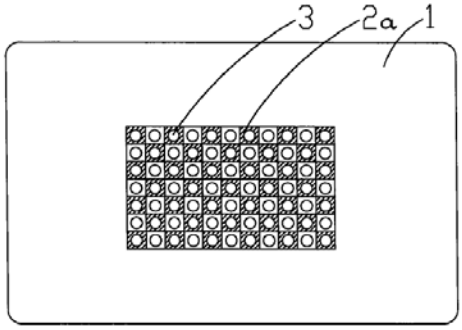

FIG. 4

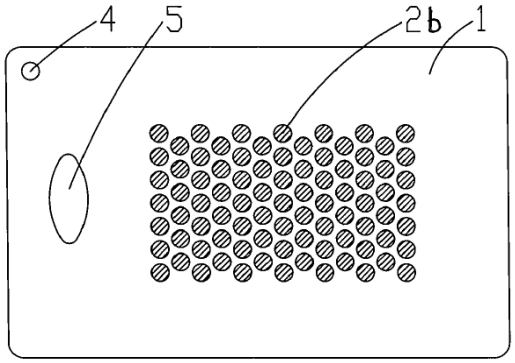

FIG. 5

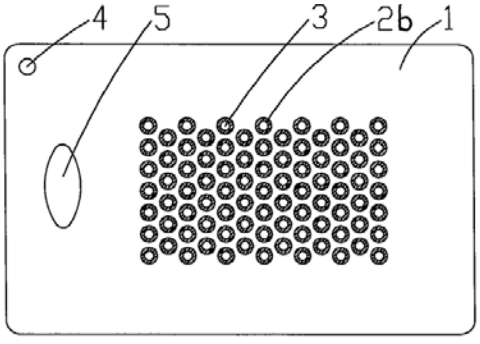

FIG. 6

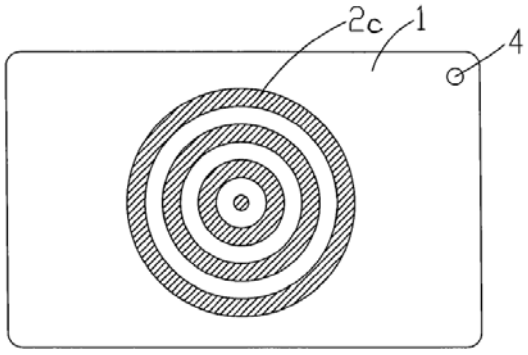

FIG. 7

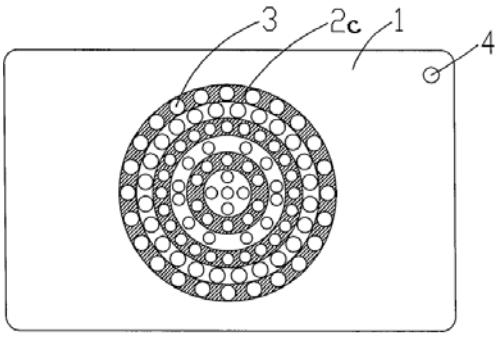

FIG. 8

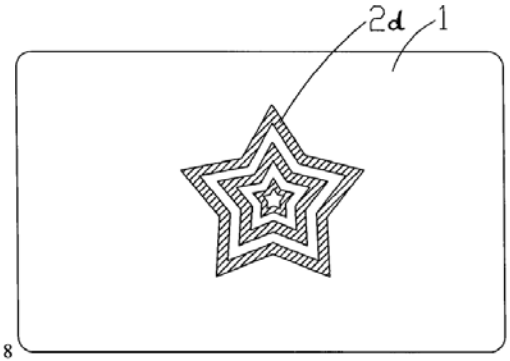

FIG. 9

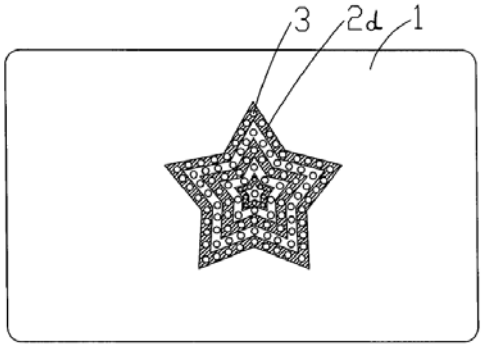

FIG. 10

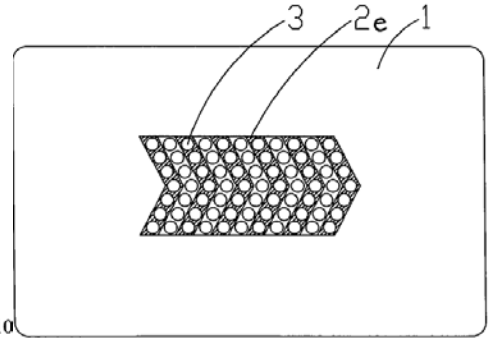

FIG. 11

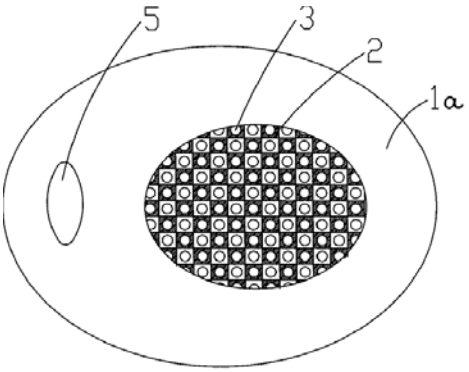

FIG. 12

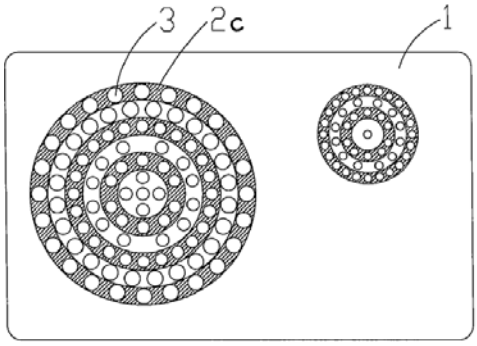

FIG. 13

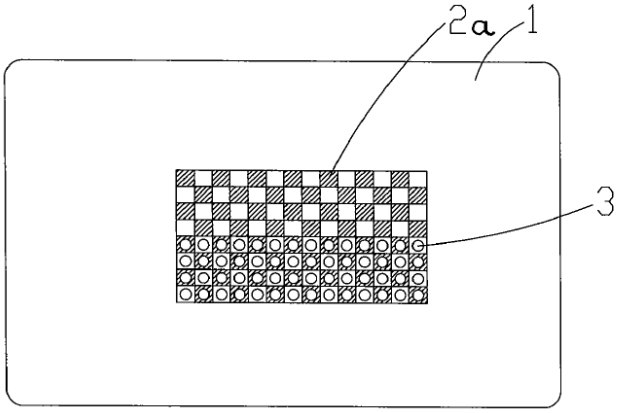

FIG. 14

Option B

An object of the present invention is to provide two plant-derived high molecular weight substances which have potent anti-HIV activity. Another object of the present invention is to provide anti-HIV agents having as active components the above-mentioned high molecular weight substances. Still another object of the present invention is to provide a method for obtaining the high molecular weight anti-HIV substances from pine cones.

The anti-HIV agents in the present invention are characterized in that said agents which contain alkaline-water extracts of various pine cones such as Pinus parviflora Sieb. et Zucc., especially high molecular weight anti-HIV substances of this extract. The high molecular weight anti-HIV substances described above can be obtained by extraction of the pine cone with alkaline water.

Other objects and characteristics of the invention will become apparent from further disclosure of the invention to be made in the following detailed description of preferred embodiment, with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows dose-dependent inhibition by KS-7 of viral production in CEM cells chronically infected with HIV.

FIG. 2 shows time course of inhibition by KS-7 of viral replication in CEM cells chronically infected with HIV.

FIG. 3 shows effect of KS-6 added just after the HIV infection.

FIG. 4 shows effect of pretreatment wIth KS-6 or KS-7 on HIV replication.

Pine cones of various Pine trees such as Pinus parviflora Sieb. et Zucc., Pinus densiflora Sieb. et Zucc., and Pinus thunbergii Parl., can be used for the preparation of anti-HIV substances. It is preferable to use Pinus parviflora Sieb. et Zucc. due to an of active substances. Pine cones collected at summer season are enriched in floating fatty materials, which might disturb further purification. Therefore the pine cones should be collected in October when active substances accumulate in abundance.

The substances with a certain extent of activity can be extracted from pine cone by hot water extraction. However alkaline water extraction is more effective than hot water extraction to obtain larger amounts of the active substances the pine cone. Either alkaline extracts or further fractionated materials can be used as effective anti-HIV substances. The present inventors presumed that substances which are contained in this extract and used as active ingredients are high molecular weight substances. The most potent substances were named as KS-6 and KS-7.

Alkaline water extracts used in this invention can be prepared by directly extracting a pine cone with aqueous alkaline solution such as aqueous NaOH. It is preferable, however, to obtain alkaline water extracts from a pine cone in which oils and hot-water extractable materials have been removed by extensive alcohol and boiling water washing before alkaline water extraction.

Either organic bases or inorganic bases can be used as alkaline substances for extraction media. The pH in aqueous alkaline solution is preferable to be more than 8.0; most preferably pH being 9.0 to 13.0.

The extracted solution should be concentrated to desired concentration, if needed, neutralized with appropriate acid and then lyophilized to give appropriate concentrated solution or solid. These can be used as active components without further fractionation. Alternatively, the concentrate can be

separated into precipitate and supernatant by some appropriate methods such as centrifugation. KS-6 can be obtained from precipitate by re-extraction with alkaline water, and KS-7 from supernatant by ethanol precipitation.

PURIFICATION PROCEDURE OF KS-6 AND KS-7

500g of pine cones was washed successively, twice with about 5 liters of methanol, and twice with 85% ethanol for 4 hours with reflux, and then extracted for 6 hours, 3 times with boiling water. The residue was extracted twice with 5 liters of 1% sodium hydroxide aqueous solution for 6 hours at room temperature. After removal of insoluble materials by filtration through gauze, the pH of the filtrate was adjusted to 5.0 with acetic acid. The precipitate was collected by centrifugation for 20 minutes at 10000 xg at 4.degree. C., dissolved in a small volume of 1% sodium hydroxide aqueous solution, centrifuged to remove insoluble materials and the supernatant was neutralized with acetic acid. The obtained substance is KS-6. The remaining supernatant was precipitated with one volume of ethanol to obtain KS-7. both KS-6 and KS-7 were dialyzed against distilled water and lyophilized. Yield of these substances KS-6 and KS-7 was about 0.5% and 1%, respectively.

ANALYTICAL PROCEDURES

Neutral sugar composition was analyzed by gas-liquid chromatography of trimethylsilyl derivatives of methyl glucosides obtained by methanalysis in methanolic HC1 for 16 hours at 65.degree. C. Neutral sugar content was also determined by the phenol-sulfuric acid method. Uronic acids were analyzed by gas-liquid chromatography of trimethylsilyl derivatives after their conversion to aldonolactone. Uronic acids content was determined by the carbazoIe method. Carbon, hydrogen, nitrogen and sulfur content was determined by element analyzer.

ENDOTOXIN ASSAY

The presence of endotoxin was determined by the Endospecy (Endotoxin Specific Test, Seikagaku Kogyo, Ltd., Japan) with Escherichia coli 0111:B4 endotoxin as a standard.

HIV INFECTION TO T CELL

The CEM cell used was a T cell line derived from human leukemia patient. The virus used was HIV N.Y. strain.

CEM cells were infected by addition with HIV-carrying culture medium. Infectivity of the virus released into the culture medium was assayed with reverse transcriptase (RT) activity and p24 antigen capture method.

KS-6 has a dark brownIsh color, with an absorption shoulder at 260-280 nm. It easily dissolves in water, and mixtures of water and alcohol, or acetone. It contains carbon (43.2wt %), hydrogen (4.0wt %), nitrogen (2.6wt %) and no sulfur. KS-6 contains also neutral sugars (11.0wt %) consisting of fucose (9.4mol %), mannnose (19.0mol %), galactose (44.7mol %) and glucose (26.9mol %), and a negligible amount of uronic acid (1.7wt %). The molecular weight determined by gel filtration under alkaline condition was 10 kD.

KS-7 also has brownish color, with an absorption shoulder at 260-280 nm. It easily dissolves in water, but tends to precipitate in physiological saline and the mixtures of water and alcohol, or acetone. It has carbon (33.55wt %), hydrogen (4.23wt %), and undetectable amount of nitrogen and sulfur. KS-7 contains also neutral sugars (39.5wt %) consisting of arabinose (16.5mol %), mannose (16.2mol %), galactose (39.3mol %) and glucose (26.0 mol %), and abundant uronic acid (58.2wt %). The contamination of endotoxin was around 0.0025%. The molecular weight determined by gel filtration under alkaline condition was 10-200 kD.

ANTI-HIV ACTIVITY OF KS-6AND KS-7

1. Effect of KS-7 on chronic HIV infection -- A clone of the CEM T cell line was cultured for long period with HIV at low virus infection ratio. The chronically infected cells were incubated for 1 week with various concentration of KS-7 (0-350 .mu.g/ml). At various time points thereafter HIV production in culture supernatants was measured by RT method. As shown in FIG. 1, HIV replication was reduced by 66% by addition of KS-7 at concentration of as low as 7 .mu.g/ml. KS-7, at concentration of more than 70 .mu.g/ml, inhihIt HIV replication by more than 85%. Viability of CEM cells was not affected by treatment with 70 .mu.g/ml of KS-7. A similar degree of inhibition of HIV replication was observed in cells treated with 200 .mu.g/ml suramine, a potent inhibitor of retrovial RT. However, this concentration of suramine reduced the viability of CEM cells to 78%. The time course of the inhibition of HIV replication by KS-7 was next investigated. The chronically infected CEM cells were treated with 50 pg/ml or 100 .mu.g/ml KS-7 for 5, 7, 10, or 17 days and the viral RT activity recovered from the culture supernatant was determined as shown in FIG. 2. RT activity found in supernatants of the treated cells was at any time points inhibited by about 90%. This indicates that KS-7 inhibit viral production. It should be noted that the cells were diluted 1:5 and supplemented with fresh medium containing KS-7 at the time indicated by arrows, and the RT activity (ordinate) was plotted in log scale in FIG. 2.

2. Effect of KS-6 on acute HIV infection -- Next, the ability of KS-6 to inhibit virus replication in acute infection with HIV was investigated. The CEM cells were infected with HIV at high virus concentration. After viral adsorption, the cells were washed 3 times with medium and maintained at 5.times.10.sup.5 cells/ml in medium supplemented with various concentrations of KS-6 (ranged from 0-30.mu.g/ml). After incubation for 3 to 7 days, concentration of HIV p24 antigen in the culture supernatants was determined by a commercially available p24 antigen capture assay (Abbot's Lab.). As shown in FIG. 3, the antiviral activity was induced by KS-6 at more than 0.3 .mu.g/ml. Higher concentration of KS-6 ("3 pg/ml" or "30 .mu.g/ml") inhibited HIV replication by 50% and 88%, respectively. The viability of CEM cells was not significantly affected at any of these concentrations.

3. Effect of CEM cell pretreatment by KS- 6 or KS-7 -- It was Investigated whether pretreatment of CEM cells with KS-6 or KS-7 could enhance the inhibition of HIV replication. CEM cells were Pretreated for 1 or 7 days with various concentrations of KS-6 (0.3-30 .mu.g/ml) or KS-7 (3-100 .mu.g/ml). After washing, the cells were infected with HIV virus at high virus concentration, and maintained in medium containing the same concentrations of KS-6 or KS-7 used in pretreatment. After 5 days incubation, the concentratIon of p24 in culture supernatant was determined by p24 antigen capture method. As seen in FIG. 4, a reduction of viral titer was observed in CEM cell cultures pretreated with 0.3 .mu.g/ml of KS-6. An 80-95% reduction of HIV replication was attained by KS-6 at the concentrations of 3 and 30 .mu.g/ml, respectively. 1n contrast, antiviral activity of KS-7 was slightly weaker than that of KS-6. The anti-HIV activity of KS-7 was detected at more than 10 .mu.g/ml, and 95% inhibition of HIV replication was achieved by KS-7 at 30-100 .mu.g/ml.

The present data demonstrate that antitumor substances KS-6 and KS-7, prepared from alkaline water extracts of pine cone effectively inhibit HIV replication, and the antivial activity of these agents is augumented by pretreatment of the target cells with these agents before HIV infection. A distinguishing feature of human immunodeficiency virus (HIV) is its selective cytotoxicity for helper T lymphocytes. Infection in vivo is manifested by severe and diverse abberations of immune system and causes death. As descrived above, KS-6 and KS-7 of the present invention have potent anti-HIV activity, as well as their immunopotentiating activity manifested by activation of human peripheral blood monocytes and polymorphonuclear cells. Therefore, it is highly probable that these agents might improve the condition of AIDS patients and its effect might be augumented by combinational treatment with other chemotherapeutic agents (e.g. azido-thymidine, dideoxycytidine, suramine).

The present invention relates to plant-derived high molecular weight substances which have potent anti-HIV activity. The human immunodeficiency virus (HIV) is the causative agent associated with AIDS (acquired immune deficiency syndrome), ARC (AIDS-related complex) and related diseases. A distinguishing feature of HIV is its selective cytotoxicity for helper T lymphocytes. Severe and diverse aberrations of the immune system significantly reduce the host defense against various opportunistic infections, resulting finally in a host death.

Nowadays, many anti-HIV agents including Krestin and Lentinan have been isolated from plants and chemically synthesized. However, the effect of most of these agents are generally weak and they have severe side effects.

In order to explore new type of anti-HIV substance, the present inventors have compared the anti-HIV activity of various plant components. The present inventors have found potent anti-HIV activity in the antitumor substances obtained from aqueous alkaline extract of pine cone. The substances with the most potent anti-HIV activity was named as KS-6 and KS-7.

FIGURES – Option B

FIG. 1

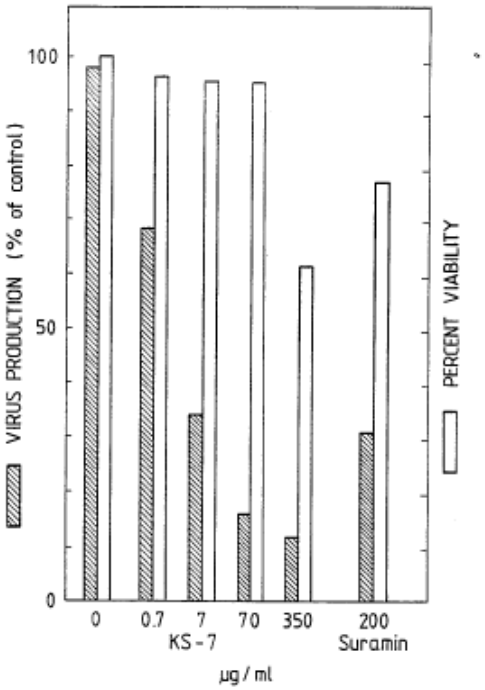

FIG. 2

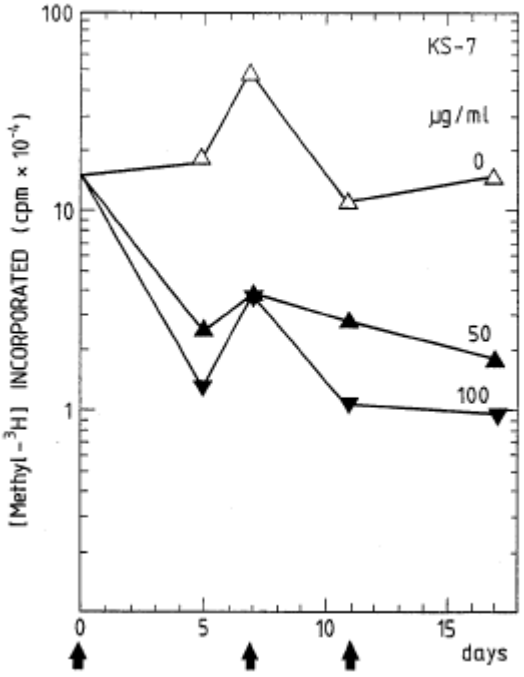

FIG. 3

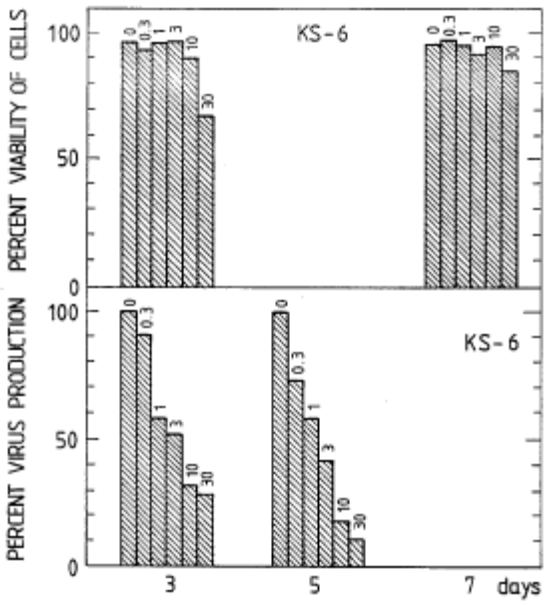

FIG. 4