

KROK-2 questions

PHENOLIC COMPOUNDS

- Simple phenols;
- Coumarins, chromones;
- Flavonoids;
- Anthraquinones;
- Tannins



SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Herbal raw material should be collected in appropriate phytocenoses. Indicate where **fern rhizomes** should be collected:
- **A** * **Forest** phytocenosis
- **B** Steppe phytocenosis
- **C** Wasteland phytocenosis
- **D** Meadow plant community
- **E** Plant communities of swamps and water-logged places

A **plant community** (sometimes "**phytocoenosis**" or "phytocenosis") is a collection or association of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighboring patches of different vegetation types (forest, desert, swamp, meadow etc.).

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Harvesting of **Bearberry** and **Cowberry** leaves is held in two stages:
 - A** * **Before flowering** and **after fruiting**
 - B** During flowering and after fruiting
 - C** Before flowering and during the growth of young shoots
 - D** During flowering and during fruiting
 - E** Before flowering and during fruiting



SIMPLE PHENOLICS, LIGNANS, XANTHONES

Bearberry – *Arctostaphylos uva-ursi*; Cowberry – *Vaccinium vitis-idaea*;
Whortleberry or Bilberry – *Vaccinium myrtillus*

- While collecting **bearberry** leaves it is possible to gather the following admixture:
 - **A** * **Whortleberry** leaves
 - **B** Periwinkle leaves
 - **C** Bird cherry leaves
 - **D** Smoke-tree leaves
 - **E** Sicilian sumac
- **Bearberry** leaves are used as a uroseptic drug. A possible admixture for this herbal raw material is:
 - **A** * **Cowberry** leaves
 - **B** Foxglove leaves
 - **C** Smoke-tree leaves
 - **D** Nettle leaves
 - **E** Shepherd's purse leaves

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- A patient appealed to a pharmacy to buy **cowberry** leaves. Which herbal raw material available in pharmacy could be offered as a substitute?
- **A * Folium Uvae ursi**
- **B Rhizoma Calami**
- **C Rhizoma et radix Sanquisorbae officinalis**
- **D Herba Millefolii**
- **E Radix Taraxaci officinalis**

Cowberry leaves contain arbutin and are used as diuretic and uroseptic. At its absence it is possible to recommend:

- A * Folia Uvae ursi**
- B Folia Myrtilli**
- C Folia Padi**
- D Folia Urticae**
- E Folia Menthae**

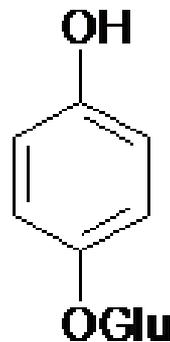
SIMPLE PHENOLICS, LIGNANS, XANTHONES

- From which medicinal plant material containing phenolic glycosides, aqueous extract is **filtered without cooling**?
- **A** * *Arctostaphylos uva-ursi*
- **B** Snowdon rose (rhodiola) rhizomes and roots
- **C** Oak bark
- **D** Fern rhizome
- **E** Willow bark
- A patient came to a drugstore and ordered **cowberry** leaves. Which of the available herbal raw material can be offered as a substitute?
- **A** * *Folium Uvae ursi*
- **B** *Rhizoma Calami*
- **C** *Rhizoma et radix Sanquisorbae officinalis*
- **D** *Herba Achilleae millefolii*
- **E** *Radix Taraxaci*

SIMPLE PHENOLICS, LIGNANS, XANTHONES

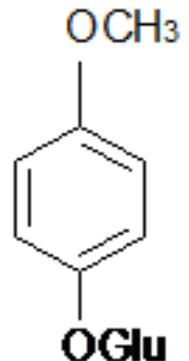
Part of medicinal raw material of **bearberry** leaves was received by pharmacy warehouse. Content of which active agents is the characteristic of quality according to the requirements of Pharmacopoeia?

- **A * Phenolic glycosides**
- **B Tannins**
- **C Flavonoids**
- **D Coumarins**
- **E Extracted matter**



Main active agents of **bearberry** leaves are **arbutin** and **methyларbutin**. Which class of biologically active compounds do they belong to?

- A * Phenolic glycosides**
- B Phenol acids**
- C Flavonoids**
- D Iridoids**
- E Thioglycosides**

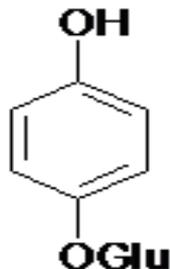


SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Phenolic glycoside **arbutin** is hydrolyzed in the alkaline media of urine and produces the substance that shows urine antiseptic action. Choose this substance:
 - **A** * **Hydroquinone**
 - **B** Phenol
 - **C** Pyrocatechol
 - **D** Resorcinol
 - **E** Pyrogallol
- Phenolic glycoside **arbutin** has antiseptic and anti-inflammatory activity in urinary tract. Point out the qualitative reactions on this compound according to pharmacopoeia:
 - **A** * With ammonia and 10% **sodium phosphomolybdate** solution
 - **B** With Wagner's reagent
 - **C** With cholesterol solution
 - **D** With gelatin solution
 - **E** With tannin solution

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- A consignment of **bearberry** leaves was received by a laboratory for analysis. Choose method for quantitative analysis of **arbutin**:
- **A * Iodometry**
- **B Photocolorimetry**
- **C Permanganatometry**
- **D Gravimetry**
- **E Spectrophotometry**



Bearberry (*Arctostaphylos uva-ursi*) leaves were received at an analytical laboratory. Which method is used to determine the **arbutin** content?

- A * Iodometry**
- B Permanganatometry**
- C Photoelectrocolorimetry**
- D Gravimetry**
- E Spectrophotometry**

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- A pharmaceutical network carries out determination of **fern rhizomes** reserve. How often should this medicinal plant material be collected?
- **A** * Once in **20** years
- **B** Yearly
- **C** Once in 5 years
- **D** Once in 2 years
- **E** Once in 10 years



SIMPLE PHENOLICS, LIGNANS, XANTHONES



Viola tricolor;
Viola arvensis

- What species of wild-growing pansy is officinal and is collected along with **wild pansy** (heartsease)?
- **A** * **Field pansy**
- **B** Sweet violet
- **C** Sweet white violet
- **D** Scented violet
- **E** Pleasant violet
- Field **pansy** herb is used as expectorant, sudorific and diuretic drug. During its collection it is possible to confuse it with a similar plant:
- **A** * **Blue cow-wheat**
- **B** Primrose
- **C** Spring Adonis
- **D** Shepherd's purse
- **E** Solomon's seal

SIMPLE PHENOLICS, LIGNANS, XANTHONES

Holy thistle, or Mary thistle – *Sylibum marianum*

- A number of Ukrainian and foreign remedies of the **Holy thistle** fruits with hepatoprotective activity is produced. The quality of the raw material is characterized by the presence of:
 - **A * Flavolignans**
 - **B Coumarins**
 - **C Alkaloids**
 - **D Vitamins**
 - **E Terpenes**



SIMPLE PHENOLICS, LIGNANS, XANTHONES

Holy thistle, or Mary thistle – *Sylibum marianum*

- Phytomedicines “**Sylibor**” and “**Carsyl**” are used as **hepatoprotectives**. The source of these phytomedicines is:
 - **A** * **Milk thistle** seed
 - **B** Cornflower flower
 - **C** Tansy flower
 - **D** Hawthorn flower
 - **E** Equisetum herb

SIMPLE PHENOLICS, LIGNANS, XANTHONES

Snowdon rose, or Golden root – *Rhodiola rosea*

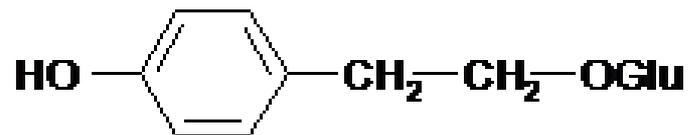
- Rhizomes and roots of **snowdon rose** are used for liquid extract obtaining. The quality of the MRM is regulated by the content of:
- **A * Salidroside (or rhodioloside)**
- **B** Panaxoside
- **C** Salycin
- **D** Eleutheroside
- **E** Echinacoside

Rhizomes and roots of **snowdon rose** are used for **tonic** and stimulant drugs production. Standardization of raw material is carried out according to the content of:

- A * Rhodioloside**
- B** Araloside
- C** Isoflavonoids
- D** Arbutin
- E** Hyperoside

Snowdon rose rhizomes contain salidroside. This biologically active substance is a:

- A * Phenolic glycoside**
- B** Alkaloid
- C** Coumarin
- D** Flavonoid
- E** Hydrocarbons



SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Tincture of which medicinal plant can be applied as a **tonic**?
- **A** * **Rhodiola rosea**
- **B** Achillea millefolium
- **C** Orthosiphon stamineus
- **D** Digitalis purpurea
- **E** Robinia pseudacacia



A doctor prescribed a student a **tonic** medicine. Specify which medicinal plant-derived tincture a pharmacist can propose the student in this case?

A * **Snowdon rose (Rhodiola)**

B Common yarrow

C Java tea

D Foxglove purple

E False acacia

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Specify medicinal plant material with **tonic** and **stimulative** activity which contains **lignans**:
- **A * Fructus Schizandrae chinensis**
- **B Radix Araliae mandshuricae - saponins**
- **C Radix Ginseng - saponins**
- **D Radix Gentianae - iridoids**
- **E Rhizomata cum radicibus Echi - saponins**



SIMPLE PHENOLICS, LIGNANS, XANTHONES

- **Eleutero** rhizome and roots are used as an **adaptogenic** agent. What active compounds does this raw material contain?
- **A * Lignans**
- **B** Cardosteroids
- **C** Polysaccharides
- **D** Sesquiterpenes
- **E** Flavonoids

If **adaptogenic** medicines from **Ginseng** roots are absent in the pharmacy it is possible to **replace** it by medicines from:

- A * Eleutherococcus senticosus**
- B** Orthosiphon stamineus
- C** Glycyrrhiza glabra
- D** Polygala senega
- E** Astragalus dasyanthus

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Preparations made of ginseng roots have tonic and **adaptogenic** properties, improve mental and physical performance. If the **ginseng** tincture cannot be found in a pharmacy, it can be **substituted** by the analogous preparations made of the following plant material:
 - **A** * **Radices Eleutherococci**
 - **B** Radices Valerianae
 - **C** Radices Inulae
 - **D** Radices Ononidis
 - **E** Radices Rhei
- Preparations produced from **eleutherococcus** roots and rhizomes are administered as a tonic and **adaptogenic** drug. If these preparations cannot be found in a pharmacy, they can be **substituted** by the analogous preparations produced from the following plant material:
 - **A** * **Ginseng roots**
 - **B** Elecampane roots
 - **C** Rhizomes and roots of valerian
 - **D** Polemonium roots
 - **E** Calamus roots

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Preparation “**Alpizarin**” is used in the form of ointment and pills for herpes and other viral diseases treatment. It is obtained on the basis of xanthones of **tick trefoil** (**Hedysarum**), the main of which is:
 - **A * Mangiferin**
 - **B Yacareubin**
 - **C Tovofelin**
 - **D Tovoltezin**
 - **E Visnadin**



SIMPLE PHENOLICS, LIGNANS, XANTHONES

Coneflower – *Echinacea purpurea*

- A pharmaceutical enterprise received **coneflower** rhizomes for tincture production. What effect does this medicine have?
- **A** * **Immune modulation**
- **B** Expectorant
- **C** Purgative
- **D** Cardiotonic
- **E** Enterosorbic



SIMPLE PHENOLICS, LIGNANS, XANTHONES

St. John's wort – *Hypericum maculatum*; *Hypericum perforatum*

- Phytomedicine «**Novoimanin**» is used as antibacterial remedy. Which medicinal plant material is this medicine obtained from?
- **A * Herba Hyperici**
- **B Herba Leonuri**
- **C Herba Polygoni hydropiperis**
- **D Herba Solidaginis canadensis**
- **E Herba Equiseti arvensis**

The officinal species of **St-john's-wort** herb is:

- A * Hypericum maculatum**
- B Hypericum hirsutum**
- C Hypericum elegans**
- D Hypericum montanum**
- E Hypericum linariodes**

SIMPLE PHENOLICS, LIGNANS, XANTHONES

- Suggest the method of determination the **Male fern** (**Rhizoma** *Dryopteridis filicis-maris*) productivity:
 - **A** * Method of **model specimens**
 - **B** Method of record plot
 - **C** Method of key plot
 - **D** Method of projecting cover
 - **E** Any of these methods
- The pharmacy has a plan for the **Cowberry** leaves collection. The productivity of this raw material is possible to determine by:
 - **A** * Method of **projective cover**
 - **B** Method of record plot
 - **C** Method of model specimen
 - **D** By sight
 - **E** By the Geodesic method
- A pharmacy received a plan of **bearberry** leaves collection. To determine productivity of this raw material the following method is used:
 - **A** * Method of **projective cover**
 - **B** Method of permanent quadrat
 - **C** Method of model specimen
 - **D** by sight
 - **E** By a geodesic method

GLYCOSIDES

- The pharmacological action of **mustard** shows up due to the glycosides present in seeds. Specify the basic one from the list below:
 - **A * Sinigrin**
 - **B Alliin**
 - **C Amygdalin**
 - **D Sambunigrin**
 - **E Linamarin**
- The irritating action of **thioglycosides** on mucous membranes and skin is due to their aglycones. Specify medicinal plant material containing such glycoside - **sinigrin**:
 - **A * Mustard seeds**
 - **B Garlic bulbs**
 - **C Onion bulbs**
 - **D Bitter almond seeds**
 - **E Pumpkin seeds**

COUMARINS, CHROMONES

- The MRM received by a pharmacy's storehouse is oval seeds up to 3-5cm in diameter, covered with reddish brown, very **shiny skin** with a **large pale-brown scar** where it has been attached to the inside of the seed-vessel. The taste is bitterly astringent, a bit oily, odourless. Specify the MRM:
 - **A** * **Horse chestnut** seeds
 - **B** Nux vomica seeds
 - **C** Holy thistle seeds
 - **D** Schizandra seeds
 - **E** Flax seeds



COUMARINS, CHROMONES

Horse-chestnut – *Aesculus hippocastanum*

- Hydroxy- and methoxy coumarins show **venous tonic activity**. Medicine from which raw material may a pharmacist recommend as a venotonic?
- **A * Fructus Aesculi hippocastani**
- **B Fructus Rhamni catharticae**
- **C Fructus Rosae**
- **D Fructus Myrtilli**
- **E Fructus Sorbi aucupariae**

Medicines from **Common horse-chestnut** leaves and seeds are used in case of **venous insufficiency**. The quality of Common horse-chestnut seed is characterized by the content of:

- A * Aescin**
- B Aesculetin**
- C Glycyrrhizine**
- D Erihrozide**
- E Erysimosid**

COUMARINS, CHROMONES

Horse-chestnut – *Aesculus hippocastanum*

- Plant medicine «**Aescusan**» has **venous tonic action**, decreases capillary permeability and improves microcirculation in vessels. Choose the medicinal raw material for this medicine's production:
- **A * Common horse-chestnut**
- **B Yellow melilot**
- **C Common horstail (*Equisetum*)**
- **D Buckwheat**
- **E Tillet**

What kind of medicinal raw material is used to obtain medicine «**Aescusan**» with **venous tonic** activity?

- A * *Semina Hippocastani***
- B *Herba Meliloti***
- C *Fructus Ammi majoris***
- D *Fructus Pastinacae sativae***
- E *Fructus Dauci carotae***

COUMARINS, CHROMONES

- **Parsnip** fruits like other fruits of the *Apiaceae* family plants are **harvested** in a certain phase of vegetation:
A * **After 60-80% of inflorescences (umbels) get brown**
B At the beginning of fruiting
C During ripe fruiting
D Dying of the aerial part
E Phase of the partial fruit ripening
- **Fig tree** leaves are used for the **photosensitizing** drugs production, that's why this plant material should be collected:
A * **In the morning, in a cloudy weather**
 - **B** In the daytime
 - **C** In the evening
 - **D** In the nighttime
 - **E** In the morning

COUMARINS, CHROMONES

Furocoumarins – parsnip (*Pastinaca sativa*), fig (*Ficus carica*), greater ammi (*Ammi majus*)

- A certain kind of medicinal plant material may cause **burns** during collection, because it contains:
 - **A** * **Furocoumarins**
 - **B** Lignans
 - **C** Flavonoids
 - **D** Polysaccharides
 - **E** Iridoids

A certain kind of medicinal plant material may cause **burns** during collection. This is:

A* **Pastinaca sativa**

B Adonis vernalis

C Convallaria majalis

D Panax ginseng

E Polygonum bistorta

COUMARINS, CHROMONES

Furocoumarins – parsnip (*Pastinaca sativa*), fig (*Ficus carica*), greater ammi (*Ammi majus*); angelica (*Angelica archangelica*), scurfy pea (*Psoralea drupacea*)

- Medicine «**Beroxan**», a mixture of bergapten and xanthotoxin, is used as a **photosensitizing** remedy. Which medicinal plant material is this medicine obtained from?
- **A * Fructus Pastinacae sativae**
- **B Fructus Ribis nigri**
- **C Fructus Aroniae melanocarpae**
- **D Fructus Rosae caninae**
- **E Fructus Alni**

Medicinal drugs “**Pastinacin**” and “**Beroxan**” contain **furocoumarins**. Which plant material is used for these drugs obtaining?

- A * Parsnip fruits**
- B Scurfy pea fruits**
- C Ammee fruits**
- D Khella (visnaga)fruits**
- E Garden angelica rhizomes with roots**

FLAVONOIDS

Black chokeberry – *Aronia melanocarpa*

- Which of the following plants could be named **Aronia**?
- **A * Black chokeberry**
- **B** Immortelle
- **C** Common tansy
- **D** Pansy
- **E** Hawthorn
- What plant containing lipophilic substances is used for medicine «**Aromelin**» production?
- **A * Black chokeberry**
- **B** Wild pansy
- **C** Cornflower
- **D** Arnica
- **E** Gnaphalium



FLAVONOIDS

Cornflower – *Centaurea cyanus*

- A doctor advised to take **cornflower** flowers extract for kidney diseases treatment. Specify the part of the plant which should be **collected**:
- **A * Regional florets (partly taking internal - up to 40 %)**
- **B** Receptacle and wrapping
- **C** Floral baskets without a peduncule
- **D** Floral baskets with tailings of peduncules (not longer than 3 cm)
- **E** Flower with remains of stem (not longer than 1 cm)

According to the Pharmacopoeia, **cornflower** is used as **diuretic**. Choose the plant material which is collected as a crude drug:

- A * Regional flowers**
- B** Inflorescences
- C** Receptacle and wrapper
- D** Leaves
- E** Herb



FLAVONOIDS

Cornflower – *Centaurea cyanus*

- The MRM was received for analysis: flowers in baskets up to 4 cm in diameter. **Regional florets** are sexless, bright blue, funnelform; the inner disk florets – bisexual, of a **violet colour**, tubular. What plant has these signs?
- **A * *Centaurea cyanus***
- **B *Solidago virgaurea***
- **C *Polygonum persicaria***
- **D *Scutellaria baicalensis***
- **E *Viola tricolour***

The cornflower flowers (***Flores Cyani***) are used as a diuretic. The quantitative determination of this raw material is carried out in calculation on:

- A * *Cyanin***
- B Lanatoside**
- C Gallic acid**
- D Dioscin**
- E Ononin**

FLAVONOIDS

Immortelle – *Helichrysum arenarium*

- **Immortelle** flowers are collected at the beginning of blossoming. Specify the **phytocenosis** for the medicinal plant material collection:
- **A** * **Steppe**
- **B** Forestry
- **C** Meadow
- **D** Wasteland
- **E** Ponds

Immortelle flowers should be dried:

A * **Only in shade**

B In the sunshine

C In dryers at 50 – 60°C

D Using the convection method

E On air



FLAVONOIDS

Immortelle – *Helichrysum arenarium*

- During the commodity research analysis of the raw material it was discovered that it consists of flowers gathered in capituli which form a thick **corymb**. Regional middle flowers – tubular of **bright golden yellow** colour. Wrappings of baskets are tiled, leaves are **lemon-yellow**. It can be concluded that the raw material is the flowers of:
 - **A * Immortelle**
 - **B Chamomile**
 - **C Hawthorn**
 - **D Lily of the Valley**
 - **E Small-leaved linden**

While analyzing **immortelle** flowers a positive result of the **cyanidin formation** test was received. This reaction evidence the presence of:

- A * Flavonoids**
- B Antocyan**
- C Coumarins**
- D Saponins**
- E Alkaloids**



FLAVONOIDS

Hawthorn – *Crataegus spp.*

- Hawthorn flowers are the plant material for various cardiac drugs production. During hawthorn flowers **collection** it is possible to get the following admixture:
 - **A * Sloe (blackthorn) flower**
 - **B** Alder buckthorn flower
 - **C** Bird cherry flower
 - **D** Cinnamon rose flower
 - **E** European elder flower

Hawthorn flowers are used for **cardiotonic** drugs production. During this crude drug **collection** the flowers of the following plant can appear in it:

- A * Blackthorn**
- B** Buckthorn
- C** Bird-cherry
- D** Brier
- E** Elder



FLAVONOIDS

Hawthorn – *Crataegus spp.*

- **Flavonoids** are the main active substances of **hawthorn** fruits. What pharmacological effects do they provide?
- **A * Hypotensive and sedative**
- **B Laxative and sedative**
- **C Tonic and anticonvulsive**
- **D Diuretic and antihemorrhagic**
- **E Antispasmodic and anti-inflammatory**

Flavonoids of what medicinal raw material have **cardiotonic** activity?

- A * Fructus Crataegi**
- B Herba Hyperici**
- C Herba Polygoni avicularis**
- D Herba Bidentis**
- E Fructus Sophorae japonicae**



FLAVONOIDS

Hawthorn – *Crataegus spp.*

- The medicines of **hawthorn** flowers are prescribed as **cardiotonics**. The quality of the raw material is characterized by the **presence** of:
 - **A * Hyperoside**
 - **B Purpureaglycoside**
 - **C Lanatoside**
 - **D Strophanthidin**
 - **E Adonitoxin**

Hawthorn infusion and liquid extract are used as **cardiotonic** drugs. The quality of this raw material is determined according to the **flavonoids** composition by the means of:

- A * Spectrophotometry**
- B Biological standardization**
- C Steam distillation**
- D Gravimetry**
- E Permanganatometry**

FLAVONOIDS

Hawthorn – *Crataegus spp.*

- Determination of the **flavonoids' content** in medicinal plant material – **hawthorn** fruit – according to the analytical normative documentation is carried out by the following method:
 - **A * Spectrophotometry**
 - **B Gravimetry**
 - **C Gas-liquid chromatography**
 - **D Iodometry**
 - **E Permanganatometry**

What phytotherapy can be recommended to the patient with **cardiac insufficiency**, related to the long violation of cardiac activity of coronary vessels:

- A * Hawthorn fruit**
- B Calendula flower**
- C Ginseng root**
- D Aralia root**
- E Barberry root**

FLAVONOIDS

Japanese Pagoda tree – *Sophora japonica*

- To determine the identity of the **Japanese pagoda tree** fruit **hydrochloric acid and metallic magnesium** powder were added to the extract. The pink-red color observed indicates the presence of:
 - **A * Flavonoids**
 - **B Tannins**
 - **C Coumarins**
 - **D Anthracene derivatives**
 - **E Saponins**

Quercetin has P-vitamin activity. What medicinal raw material should be used for quercetin production?

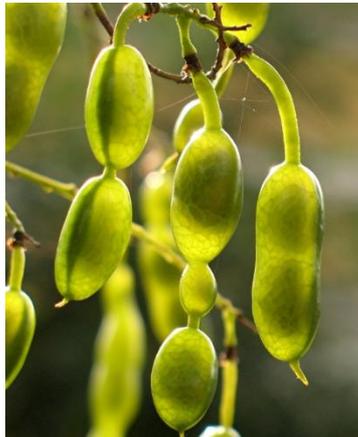
A * Fructus Sophorae japonicae

B Fructus Hippophaës

C Flores Helichrysi arenarii

D Herba Bidentis

E Herba Polygoni avicularis



FLAVONOIDS

Japanese Pagoda tree – *Sophora japonica*

- **Rutin** containing drugs have P-vitamin activity. Which herbal raw material contains the **highest quantity** of rutin?
- **A** * Japanese pagoda tree buds
- **B** Black chokeberry (aronia) fruits
- **C** Buckwheat herb
- **D** Common motherwort herb
- **E** European elder (bourtree) flowers

Rutin exhibits P-vitamin activity. What medicinal plant is used as starting materials for the **industrial production of rutin**?

- A** * *Fructus Sophorae japonicae*
- B** *Fructus Hippophaes rhamnoides*
- C** *Flores Helichrysi arenarii*
- D** *Herba Bidentis tripartitae*
- E** *Herba Polygoni avicularis*



FLAVONOIDS

Japanese Pagoda tree – *Sophora japonica*

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- C** *Flores Helichrysi arenarii*
- D** *Herba Bidentis tripartitae*
- E** *Herba Polygoni avicularis*



FLAVONOIDS

Japanese Pagoda tree – *Sophora japonica*

- Japanese pagoda tree buds are an industrial source of rutin. What qualitative reaction can be carried out to confirm that rutin is a flavonoid:
- **A** * With metallic magnesium and concentrated hydrochloric acid
- **B** With iron alum solution
- **C** With picric acid
- **D** With solution of phosphorus-molybdic acid
- **E** With iodine solution in potassium iodide

Designing the analytic normative documentation on the new plant material containing flavonols pharmacist has to choose an appropriate qualitative test for these substances:

A * Reaction of cyanidin formation

B The test with lactones

C The reaction of sublimation

D The reaction with quinine hydrochloride

E With Wagner's reagent

FLAVONOIDS

Japanese Pagoda tree – *Sophora japonica*

- Japanese pagoda tree buds are an industrial source of rutin. What qualitative reaction can be carried out to confirm that rutin is a flavonoid:
- **A** * With metallic magnesium and concentrated hydrochloric acid
- **B** With iron alum solution
- **C** With picric acid
- **D** With solution of phosphorus-molybdic acid
- **E** With iodine solution in potassium iodide

Designing the analytic normative documentation on the new plant material containing flavonols pharmacist has to choose an appropriate qualitative test for these substances:

A * Reaction of cyanidin formation

B The test with lactones

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D The reaction with quinine hydrochloride

E With Wagner's reagent

FLAVONOIDS

St. John's wort – *Hypericum maculatum*; *Hypericum perforatum*

- Determination of **flavonoids'** content in **St. John's wort** herb is carried out by **spectrophotometric** method. Which reaction is the basis for this method?
- **A** * Reaction with **aluminium chloride solution**
- **B** Reaction with Dragendorff's reagent
- **C** Reaction with Wagner's reagent
- **D** Reaction with Mayer's reagent
- **E** Reaction with vanillin in concentrated hydrochloric acid

Phytomedicine «**Novoimanin**» is used as antibacterial remedy. Which medicinal plant material is this medicine obtained from?

- A** * **Herba Hyperici**
- B** Herba Leonuri
- C** Herba Polygoni hydropiperis
- D** Herba Solidaginis canadensis
- E** Herba Equiseti arvensis

FLAVONOIDS

St. John's wort – *Hypericum maculatum*; *Hypericum perforatum*

- **St. John's wort** herb is received by a pharmacy and is processed for antibacterial drugs. Quality of this medicinal plant material is determined according to **flavonoids content** by:
 - **A * Spectrophotometry**
 - **B Chromatography**
 - **C Method of acid-basic titration**
 - **D Permanganatometry**
 - **E Steam distillation method**

Quality of **St. John's wort** herb is defined according to the **flavonoids content** using:

- A * Spectrophotometry**
- B Chromatography**
- C Method of acid-basic titration**
- D Permanganatometry**
- E Steam distillation method**

FLAVONOIDS

- Under the SPhU (appendix 2), leaves of **ginkgo** are **standardized** by the content of:
 - **A *Flavonoids**
 - **B Saponins**
 - **C Alkaloids**
 - **D Coumarins**
 - **E Chromones**

Which **medicine** contains the extract of fresh **Ginkgo biloba** leaves?

- A *Tanakan**
- B Phytolit**
- C Marelin**
- D Flamin**
- E Phytolysin**



FLAVONOIDS

- **Motherwort** herb is the source of **hypotensive** and **sedative** drugs. **Collection** of this medicinal plant material should be carried out, taking into account the period of this plant recovery:
 - **A** * Once in **5** years
 - **B** Once in 2 years
 - **C** Once in 3 years
 - **D** Once in 10 years
 - **E** Every year



- Motherwort** phytomedicines are popular **hypotensive** and **sedative** drugs. What time should the herbal raw material be **collected** at?
- A** * At the **blossoming** period
 - B** At the beginning of blossoming
 - C** At the end blossoming
 - D** In the stage of buds formation
 - E** In the stage of fruiting

FLAVONOIDS

- A few medicines with various action are produced from the **Licorice** roots. Offer a patient the medicine based on Licorice **flavonoids** with **antiulcer** action:
- **A * Liquiriton**
- **B Glycerine**
- **C Glyceram**
- **D Licorice root syrup**
- **E Convaflavin**

Phytomedicine «**Flacarbin**» has spasmolytic, anti-inflammatory and **antiulcer** properties. The herbal source of this medicine is:

A * Licorice

B Jacob's ladder (Great valerian)

C Common horse-chestnut

D Japanese angelica tree (Aralia)

E Calendula

FLAVONOIDS

- A pharmacy received a plan for **horsetail** herb collection. Which horsetail species is **official**, used in medicine and should be collected?
- **A * Herba Equiseti arven**
- **B Herba Equiseti hy**
- **C Herba Equiseti syl**
- **D Herba Equiseti pra**
- **E Herba Equiseti palus**



A patient appealed to the pharmacy's phytodepartment with a request to give him **diuretic** medicine. Which medicinal plant material is it better to use?

- A * Herba Equiseti arvensis**
- B Fructus Sophorae japonicae**
- C Herba Leonuri quinquelobati**
- D Cormus Ledi palustris**
- E Radix Araliae**

FLAVONOIDS

- The Common **horsetail** herb is recommended as a diuretic. Specify medicinal plant material which can **replace** it:
- **A** * Herba **Aer**vae
lanatae
- **B** Herba Leonuri
- **C** Herba Menthae
piperitae
- **D** Herba Convallariae
- **E** Herba Adonidis



FLAVONOIDS

Black Elder – *Sambucus nigra*

- In the black elder raw material the admissible admixture is:
- **A** * Elder grass – *Sambucus ebulus*
- **B** Whortleberry – *Vaccinium myrtillus*
- **C** Bird cherry – *Padus racemosa*
- **D** Blackcurrant – *Ribes nigrum*
- **E** Common buckthorn – *Rhamnus catharica*



FLAVONOIDS

Cudweed – *Gnaphalium uliginosum*

- A party of medicinal raw material of **cudweed** was received by a pharmacy warehouse. Content of what active agents is the characteristic of quality according to the requirements of Pharmacopoeia:
 - **A** * **Flavonoids**
 - **B** Essential oils
 - **C** Saponins
 - **D** Anthracene derivatives
 - **E** Coumarins



FLAVONOIDS

Water pepper – *Polygonum hydropiper*

- Quality of **water pepper** herb is defined according to **flavonoids content** by the following method:
- **A ***
Spectrophotometry
- **B** Chromatography
- **C** Titration
- **D** Photocolorimetry
- **E** Biological standardization



FLAVONOIDS

Tansy – *Tanacetum vulgare*

- Which purpose are **Tansy** flowers used in pediatric practice for?
- **A** * Antihelminthic
- **B** Vasodilatory
- **C** Wound healing
- **D** Sedative
- **E** Cholagogue



FLAVONOIDS

Restharrow – *Ononis arvensis*, *Ononis spinosa*

- Pharmacy has a plan of **restharrow** collection. Choose its plant material:
- **A * Roots**
- **B Leaves**
- **C Tubers**
- **D Seeds**
- **E Flowers**



FLAVONOIDS

Restharrow – *Ononis arvensis*, *Ononis spinosa*

- A party of *Radix Ononidis* raw material was delivered to a factory. It is used for tincture production. **Quantitative standardization** of this raw material is carried out in calculation on:
 - **A * Ononin**
 - **B Hyperoside**
 - **C Quercetin**
 - **D Rutin**
 - **E Alizarin**

Medicines from spotted knotweed are used to stop **uterine and hemorrhoidal bleedings**. At its absence it is possible to recommend:

A * Tinctura Ononidis

B Tinctura Sophorae japonicae

C Tinctura Crataegi

D Tinctura Leonuri

E Tinctura Valerianae

FLAVONOIDS

Restharrow – *Ononis arvensis*, *Ononis spinosa*

- **Restharrow** root is used for a tincture production applied for haemorrhoidal haemorrhages treatment. **Isoflavonoids** can be **identified** in the raw material by the means of:
 - **A * Chromatographic method**
 - **B Cyanidin test**
 - **C Hemolytic index**
 - **D Biological standardization**
 - **E Foam number**

Restharrow roots are used as haemostatics and laxatives. Quality of this medicinal plant material is determined according to **isoflavonoids content** using:

- A * Spectrophotometry**
- B Polarography**
- C Chromatography**
- D Gravimetry**
- E Iodometry**

FLAVONOIDS

Beggar-ticks, or bur-marigold – *Bidens tripartita*

- **Beggar-ticks** (bur-marigold) herb is used as a diuretic and sudorific agent. The **official** species is:
- **A** * **Bidens tripartita**
- **B** *Bidens cernua*
- **C** *Bidens radiata*
- **D** *Bidens frondosa*
- **E** *Bidens orientalis*



FLAVONOIDS

Beggar-ticks, or bur-marigold, or tickseed – *Bidens tripartita*

- The herbs are collected during blossoming of plants. Exception is **beggar ticks** (bur marigold) herb, which is collected in a phase:
- **A * Budding**
- **B Stems formation**
- **C Green fruiting**
- **D Growing of stems**
- **E Ripe fruiting**

Pharmacy has got a plan of **Tickseed** (beggar-ticks) herb collection. Which phase of vegetation the plant material should be collected in?

A * In the **bud formation** period

B In the period of flowering

C In the period of fruiting

D Early spring

E Late autumn

ANTHRACENE DERIVATIVES

- Horse sorrel **roots** are **collected** in a certain vegetation period. Choose it:
- **A** * After ripening of seeds and disappearing of the aerial part
- **B** In the phase of blossoming
- **C** At the period of unripe fruit
- **D** In the phase of bud formation
- **E** In the phase of stem formation

Medicines of **horse sorrel** roots have both **purgative and astringent** effects. It is conditioned by the presence of such biologically active agents:

A * Anthracene derivatives and tannins

B Flavonoids and essential oils

C Essential and fatty oils

D Coumarins and phenolic glycosides

E Iridoids and vitamins

ANTHRACENE DERIVATIVES

- **Horse sorrel** roots contain **anthraquinones and tannins**.
Decoction of Horse sorrel roots is used in medicine :
- **A** * In small doses as astringent, and in large doses as a laxative
- **B** In large doses as astringent, and in small doses as a laxative
- **C** In any doses as a laxative
- **D** In small doses as a laxative
- **E** In large doses as astringent remedy

NB! Anthraquinones and tannins:

Horse sorrel – *Rumex confertus*

Rhubarb – *Rheum palmatum*

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, of *Rhamnus frangula*

- Buckthorn bark contains anthraquinones. When the harvested bark can be used?
A * In 1 year after harvesting
B Freshly harvested
C In 1 month after harvesting
D Immediately after drying
E In 6 months after harvesting

Alder buckthorn bark is used as a purgative drug. Choose the term of alder buckthorn bark collection:
A * In spring, in the period of sap movement
B In a period of total ripening of the fruits
C In winter
D In a period of leaves appearance
E In autumn

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

- Alder **buckthorn bark** is used as a purgative drug. **Alkaline solution** was added to alder buckthorn bark. **Red colour** appeared that confirmed the presence of:
- **A * Anthracene derivatives**
- **B Saponins**
- **C Tannins**
- **D Flavonoids**
- **E Phenolic alcohols**

The batch of the crude drug was received by a pharmacy without analytical certificate. The **red color** formed under the action of **potassium hydroxide** solution lets us admit that it's:

- A * Cortex Frangulae**
- B Cortex Quercus**
- C Cortex Salicis**
- D Cortex Viburni**
- E Cortex Quillajae**

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

- If the internal surface of **alder buckthorn** rind is moistened with **5% alkaline solution**, it gains cherry-red colouring. This is the evidence of the following substances presence:
- **A * Anthracene derivatives**
- **B Alkaloids**
- **C Saponins**
- **D Flavonoids**
- **E Tannins**

Alder buckthorn bark contains **anthracene** derivatives. Which qualitative reaction confirms its presence in the raw material?

A * Reaction with alkali solution

B Reaction with Dragendorff's reagent

C Reaction with iron alum solution

D Reaction with iron sulfate

E Reaction with Fehling's reagent

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

- Medicines of **buckthorn bark** are used as **laxative** agents. **Content** of active ingredients – **anthraquinones** – is determined by:
 - **A *** Spectrophotocolorimetric method
 - **B** Chromatospectrometric
 - **C** Gravimetry
 - **D** Polarography
 - **E** Titrimetric method

Assay of **anthracene** derivatives in **buckthorn bark** is carried out by **spectrophotometric** method. Which reaction is the basis for this method?

A * Phenolates formation with alcoholic solution of alkali

B Precipitated salt formation

C Anthraquinone recovery

D Oxidation of anthracene derivatives

E Sublimation

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

- At the macroscopic analysis of a MRM such diagnostic features were detected: the pieces of bark are tubular or channeled, the external surface of bark is smooth, darkly brown, often with whitish transversal prolate lenticels; at peeling the outer cork layer off a **red-coloured layer** is visible; the inner surface is smooth, **reddish-brown**. The pharmaceutical chemist made a conclusion that the MRM is:
 - **A** * Common **buckthorn bark**
 - **B** High cranberry bark
 - **C** Oak bark
 - **D** Willow bark
 - **E** Hazel bark

At microscopic analysis of transversal cross section through a piece of bark the presence of wide **dark-red cork layer**, tangential collenchyma, druses, bast fibres, with the crystalliferous bundle sheath were detected. The diagnosed MRM is:

- A** * Alder **buckthorn bark**
- B** Birch bark
- C** Common buckthorn bark
- D** Willow bark
- E** Manna Ash bark

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

Common buckthorn, or rhineberry – *Rhamnus cathartica*

- Which **poisonous fruits** are able to cause vomiting and cannot be an **admixture** for the **Common buckthorn** plant material?
- **A** * **Alder buckthorn fruits**
- **B** Hawthorn
- **C** Black chokeberry
- **D** Whortleberry
- **E** Schizandra

The medicinal raw material of ***Rhamnus cathartica*** is used as a laxative. An **impermissible** admixture to common buckthorn fruits are **fruits**, which have emetic action:

A * **Alder buckthorn fruits**

B Rhineberry leaves

C Buckthorn bark

D Rhineberry flowers

E Rhineberry bark

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

Common buckthorn , or rhineberry – *Rhamnus cathartica*

Whortleberry, or bilberry – *Vaccinium myrtillus*

- The medicinal plant material of *Rhamnus cathartica* is used as a purgative agent. Choose the medicinal plant material of this plant
- **A** * Fruits
- **B** Leaves
- **C** Bark
- **D** Roots
- **E** Shoots

Whortleberry fruits are used in medicine as an astringent and anti-inflammatory agent. An **admixture** for this raw material is:

A * **Buckthorn** fruits

B Dog rose fruits

C Hawthorn fruits

D Mountain ash fruits

E Viburnum fruits

ANTHRACENE DERIVATIVES

Alder buckthorn – *Frangula alnus*, or *Rhamnus frangula*

Common buckthorn, or rhineberry – *Rhamnus cathartica*

- Fruits are juicy, black, berry-like drupes of 6-8 mm in diameter, have **3-4 seeds** of various forms. They are often included to **purgative** medicinal herbal tea. The raw material is:
 - **A * Common buckthorn fruits**
 - **B Olive fruits**
 - **C Bird cherry fruits**
 - **D Schizandra fruits**
 - **E Hawthorn fruits**

Anthracene derivatives of **emodin** group show purgative effect. Specify, which raw material can a pharmacist recommend as a **purgative**:

- A * Rhineberry (common buckthorn) fruits**
- B Elder fruits**
- C Blackberry fruits**
- D Whortleberry fruits**
- E Alder buckthorn fruits**

ANTHRACENE DERIVATIVES

Senna – Senna acutifolia, or Cassia acutifolia

- Usage of **Senna** leaves is not recommended for pregnant and breastfeeding women, because this raw material has **purgative** effect, conditioned by such biologically active agents:
- **A** * **Anthracene derivatives**
- **B** Tannins
- **C** Iridoids
- **D** Coumarins
- **E** Phenolic glycosides

Senna leaves are used as a purgative. Extract and decoction of this raw material **must be filtered after cooling** to prevent its pollution by such irritating matters:

- A** * **Resinous substances**
- B** Tannins
- C** Phenolic substances
- D** Vitamins
- E** Bitter substances

ANTHRACENE DERIVATIVES

Senna – *Senna acutifolia*, or *Cassia acutifolia*

- Party of medicinal raw material of **senna** leaves was received by a pharmacy warehouse. **Content** of which active agents is the characteristic of quality according to the requirements of Pharmacopoeia:
- **A * Anthracene derivatives**
- **B Tannins**
- **C Flavonoids**
- **D Coumarins**
- **E Extracted matter**

To identify **senna** leaves pharmacist-analyst carried out the quality reaction with **10% sodium hydroxide** solution (red color appeared). What group of biologically active substances is present in the crude drug?

- A * Anthracene derivatives**
- B Alkaloids**
- C Fatty oils**
- D Tannins**
- E Mucilage**

The main active components of **senna** leaves and fruits are **senosides** A, B, C, D. They relate to the following class of biologically active substances:

- A * Anthracene derivatives**
- B Phenolic acids**
- C Flavonoids**
- D Iridoids**
- E Thioglycosides**

ANTHRACENE DERIVATIVES

Senna – *Senna acutifolia*, or *Cassia acutifolia*

- Which medicinal raw material is the source of the laxative medicine «**Senadexin**»?
- **A** * **Folia Sennae**
- **B** Herba Meliloti
- **C** Fructus Ammi majoris
- **D** Fructus Pastinacae sativae
- **E** Herba Hyperici



Adaptation (**tolerance**) to the herbal raw material containing **anthracene** derivatives appear in case of the following MRM prescription:

- A** * **Senna leaves**
- B** Aloë leaves
- C** Dyer's-madder roots
- D** Peppermint leaves
- E** Melissa leaves

ANTHRACENE DERIVATIVES

Common madder, or dyer's madder – *Rubia tinctorum*

- Rhizomes and roots of **dyer's-madder** contain **alizarin** and have **nephrolytic** activity. Which class of biologically active substances does this compound belong to?
- **A * Anthracene derivatives**
- **B Saponins**
- **C Flavonoids**
- **D Alkaloids**
- **E Hydrocarbons**



In case of **urolithiasis** treatment by preparation of **madder** rhizomes and roots, coloring of urine and sweat into **red color** is possible, that is conditioned by such class of active agents in this raw material:

- A * Anthracene derivatives**
- B Flavonoids**
- C Alkaloids**
- D Tannins**
- E Terpenes**

TANNINS

Whortleberry, or bilberry – *Vaccinium myrtillus*

- Whortleberry leaves are harvested in Ukraine. Specify the term of the plant material collection:
- **A*** During the phase of flowering
- **B** Before flowering
- **C** Before green fruits formation
- **D** In the period of fruit ripening
- **E** After collection of fruits

Whortleberry fruits are used in medicine as an **astrigent** and anti-inflammatory agent. An **admixture** for this raw material is:

A * Buckthorn fruits

B Dog rose fruits

C Hawthorn fruits

D Mountain ash fruits

E Viburnum fruits



TANNINS

Whortleberry, or bilberry – *Vaccinium myrtillus*

- **Bilberry** fruits are used as an **astrigent** agent and for **vision improvement**. Quality control of crude drug is carried out according to the content of:
 - **A * Tannins**
 - **B Saponins**
 - **C Vitamins**
 - **D Polysaccharides**
 - **E Lipids**



Tannins are used as **astrigent** agent for colitis, enterocolitis and diarrhea treatment. Which crude drug should be recommended by a pharmacist in this case? **Or Which herbal raw material contains a lot of tannins?**

- A * Fructus Myrtilli**
- B Fructus Sambuci nigri**
- C Fructus Ribis nigri**
- D Fructus Rhamni catharticae**
- E Fructus Frangulae**

TANNINS

Whortleberry, or bilberry – *Vaccinium myrtillus*

- **Whortleberry** (bilberry) fruits are rich in flavonoids, **anthocyanins**, **tannins**. They are used for:
 - **A * Improvement of eyesight**
 - **B Stimulation of digestion**
 - **C Stimulation of breathing**
 - **D As a cholagogue remedy**
 - **E As a laxative remedy**



A doctor advised a patient suffering from **diabetes** mellitus medicinal herbal tea “**Arfazetin**”. It contains kidney-bean pods, japanese angelica tree roots, rose hips, common horsetail herb, common St. John’s-wort herb, wild chamomile flowers. Choose an **absent** herbal raw material:

- A * Bilberry shoots**
- B Common plantain leaves**
- C Immortelle flowers**
- D Hops strobile**
- E Mountain ash fruits**

TANNINS

Whortleberry, or bilberry – *Vaccinium myrtillus*

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- C Immortelle flowers**
- D Hops strobile**
- E Mountain ash fruits**

TANNINS

INDUSTRIAL SOURCES OF TANNIN

- The plant material for **industrial** tannin production is:
- **A * Gallae**
- **B Rhizomata Valerianae**
- **C Rhizomata et radices Inulae**
- **D Fructus Viburni**
- **E Rhizomata Calami**



- The plant material for **industrial** tannin production is:
- A * Folium Cotini coggygriae**
 - B Rhizomata Bistortae**
 - C Rhizomata et radices Sanguisorbae**
 - D Fructus Viburni**
 - E Rhizomata Bergeniae**

- Pharmaceutical enterprises produce tannin from medicinal plant material. Choose **tannin plant source:**
- A * Folium Rhois coriariae**
 - B Cortex Quercus**
 - C Rhizoma Bergeniae crassifoliae**
 - D Herba Hyperici**
 - E Radices Sanguisorbae officinalis**

TANNINS

- A pharmaceutical network carries out determination of **tormentil** rhizomes reserve. How often should this medicinal plant material be collected?
- **A** * Once in **7** years
- **B** Once in 3 years
- **C** Yearly
- **D** Once in 2 years
- **E** Once in 15 years

Pharmacies determine the **Tormentil root** reserve. By which method the **reserve** of this raw material is determined?

- A** * **Method of model specimens**
- B** Method of record plot
- C** Method of projective cover
- D** By the Geodesic method
- E** By sight



TANNINS

- **Tannins** can be used as an antidote in **alkaloids poisonings treatment**. Choose the crude drug:
- **A * Tormentil** cinquefoil rhizome (**or Cinquefoil rhizome**)
- **B** Sweetflag rhizome
- **C** Marshmallow root
- **D** Madder rhizomes and roots
- **E** Elecampane root

Tannins from Tormentil (**or silwerweed**) roots and rhizomes are used as an **astringent**. Choose the officinal species of **Tormentil (or silwerweed)**:

- A * Potentilla erecta**
- B** Potentilla argentea
- C** Potentilla pilosa
- D** Potentilla impolita
- E** Potentilla anserine

TANNINS

- A pharmaceutical network carries out determination of **bistort rhizomes** reserve. How often should this medicinal plant material be collected?
- **A** * Once in **20** years
- **B** Once in 2 years
- **C** Yearly
- **D** Once in 5 years
- **E** Once in 10 years



TANNINS

- **Burnet** (*Sanguisorba officinalis*) plant material contains **tannin**. Which method should be used to determine tannin content according to Pharmacopoeia:
 - **A * Permanganatometry**
 - **B Chromatography**
 - **C Photoelectrocolorimetry**
 - **D Nephelometry**
 - **E Spectrophotometry**



TANNINS

- The analyzed MRM is black **shiny drupes** up to 6-8 mm in diameter, **a stone** is large, very strong, spherical, light brown, with one seed, and taste is sweetish, slightly astringent. This MRM is:
- **A * Bird cherry fruits**
- **B Whortleberry fruits**
- **C Black chokeberry fruits**
- **D Common buckthorn fruits**
- **E Hawthorn fruits**

Bird-cherry tree (*Prunus padus*) fruits are used in medicine as an **astrigent**. **Content** of **tannins** in fruits is determined by the method:

- A * Permanganatometry**
- B Spectroscopy**
- C Iodometry**
- D Chromatography**
- E Gravimetry**



TANNINS

- The batch of **oak bark** was received by a pharmacy warehouse. **Content** of which active agents is the characteristic of quality according to the requirements of Pharmacopoeia:
 - **A * Tannins**
 - **B Anthracene derivatives**
 - **C Flavonoids**
 - **D Extracted matter**
 - **E Coumarins**

For **oak bark** decoction authenticity determination few drops of **iron chloride solution** were added. Appearance of **dark-blue colour** confirms the presence of:

- A * Tannins**
- B Vitamin K**
- C Carotenoids**
- D Flavonoids**
- E Anthracene derivatives**



TANNINS

- Medicinal plant material is stored in different groups and under special conditions in a pharmacy. Point out the herbal raw material which belongs to the **general storage group**:
- **A * Oak bark**
- **B** Belladonna roots
- **C** Spring Adonis herb
- **D** Strophanthus seed
- **E** Valerian rhizome



TANNINS

- What method is used to **isolate low-molecular tannins** from the medicinal plant material in the laboratory?
- **A * Chromatography**
- **B Polarimetry**
- **C Spectrophotometry**
- **D Potentiometry**
- **E Extraction**

What biologically active substances of plant origin give a positive reaction with **iron alum solution**?

- A * Tannins**
- B Saponins**
- C Polysaccharides**
- D Bitters**
- E Fatty oils**