

FLAVONOIDS: EXTRACTION & IDENTIFICATION EXAMINATION

Pharmacognosy & Phytochemistry Laboratory Examination | Experiment 8

Course: Pharmacognosy Lab

Total Marks: 15 Marks (1 pt each)

Topic: Flavonoids (Exp 8)

Time Allowed: 30 Minutes

Question 1

Flavonoids belong to a class of plant secondary metabolites that possess which of the following chemical basic structures?

- A) Monoterpenoid structure
- B) Polyphenolic structure
- C) Steroidal structure
- D) Alkaloidal structure

Question 2

What is the basic carbon skeleton backbone of flavonoids?

- A) C10 skeleton
- B) C12 skeleton
- C) C15 skeleton
- D) C20 skeleton

Question 3

In flavonoids, the basic skeleton consists of a Chromane ring system attached to a second aromatic ring B. In Isoflavonoids, at which position of the C ring is ring B attached?

- A) Position 2 (2-phenyl-chroman)
- B) Position 3 (3-phenyl-chroman)
- C) Position 4 (4-phenyl-chroman)
- D) Position 1

Question 4

Flavonoids in which the aromatic B ring is linked to position 4 of the C ring are classified as:

- A) Isoflavones
- B) Flavanones
- C) Neoflavonoids
- D) Flavonols

Question 5

Which of the following is NOT a physiological or biological function of flavonoids in plants?

- A) Acting as unique UV filters
- B) Primary structural cell wall components
- C) Attracting pollinators via flower color/aroma
- D) Functioning as antimicrobial defensive compounds

Question 6

Flavonoids are known to be potent inhibitors of which group of key cellular enzymes?

- A) Xanthine oxidase (XO), Cyclo-oxygenase (COX), and Phosphoinositide 3-kinase
- B) DNA Polymerase and RNA Polymerase
- C) Amylase, Lipase, and Pepsin
- D) Acetylcholinesterase and Monoamine oxidase

Question 7

Which extraction procedure is considered the most suitable choice when dealing with thermolabile (heat-sensitive) plant drugs?

- A) Decoction
- B) Soxhlet extraction
- C) Maceration
- D) Reflux under boiling heat

Question 8

What is the standard minimum contact period required during the process of maceration?

- A) 15 minutes
- B) 2 hours
- C) 24 hours
- D) 3 days

Question 9

Decoction is an extraction process specifically used for extracting constituents that are:

- A) Thermolabile and oil-soluble
- B) Water-soluble and heat-stable (boiled for 15 minutes)
- C) Volatile oils only
- D) Completely insoluble in boiling water

Question 10

What is the primary advantage of utilizing Soxhlet extraction (hot continuous extraction)?

- A) It is ideal for heat-sensitive (thermolabile) compounds
- B) One single batch of solvent is continuously recycled through the sample
- C) It requires no heat or condenser setup
- D) It finishes the entire extraction in under 2 minutes

Question 11

In qualitative chemical testing of flavonoids, what reagent mixture constitutes Shinoda's Test?

- A) Plant extract + Ferric chloride solution
- B) Plant extract + Aluminum chloride solution
- C) Plant extract + Potassium hydroxide (KOH)
- D) Plant extract + Magnesium (Mg) metal + dropwise Hydrochloric acid (HCl)

Question 12

Which group of botanical samples is selected for ethanol extraction and TLC identification in Experiment 8?

- A) Arnica flowers, Grapefruit peels, Orange peels, and Calendula flowers
- B) Cinnamon bark, Quassia wood, Sage leaf, and Senna leaf
- C) Chamomile flowers, Clove flowers, Anise fruit, and Rhubarb
- D) Nutmeg seed, Liquorice root, Turmeric rhizome, and Wormwood

Question 13

Which reference standard compounds are used for TLC comparison in this experiment?

- A) Caffeine, Theobromine, and Theophylline
- B) Rutin, Hesperidin, and Quercetin
- C) Atropine, Scopolamine, and Hyoscyamine
- D) Morphine, Codeine, and Papaverine

Question 14

What ratio of Ethyl acetate : Formic acid : Glacial acetic acid : Water is used as the solvent system for TLC development?

- A) 50 : 50 : 10 : 10
- B) 100 : 11 : 11 : 24
- C) 10 : 1 : 1 : 2
- D) 80 : 20 : 5 : 5

Question 15

To detect yellow intensity differences in flavonoids on TLC or via chemical testing, which reagent solution is added to the alcoholic solution?

- A) Lead acetate solution
- B) Aluminum chloride (AlCl₃) solution
- C) Sodium hydroxide solution
- D) Silver nitrate solution

ANSWER KEY & EXPLANATIONS

Experiment 8: Extraction and Identification of Flavonoids

Q#	Correct Answer	Reference & Explanation
Q1	B	Flavonoids belong to plant secondary metabolites having a polyphenolic structure.
Q2	C	Flavonoids are based on a C15 carbon skeleton with a Chromane ring bearing a second aromatic B ring.
Q3	B	Isoflavonoids have the B ring linked to position 3 (3-phenyl-chroman) of the C ring.
Q4	C	When the B ring is attached to position 4 of the C ring, they are termed neoflavonoids (4-phenyl-chroman).
Q5	B	Flavonoids function as pigments, UV filters, signal molecules, and antioxidants, but are not structural cell wall polymers (like cellulose/lignin).
Q6	A	Flavonoids are potent inhibitors of xanthine oxidase (XO), cyclo-oxygenase (COX), lipoxygenase, and phosphoinositide 3-kinase.
Q7	C	Maceration is performed without continuous heating, making it the method of choice for thermolabile drugs.
Q8	D	Maceration involves keeping the drug in contact with solvent in a stoppered container for a minimum of 3 days.
Q9	B	Decoction involves boiling crude drug in water for 15 minutes, suitable for water-soluble and heat-stable constituents.
Q10	B	The key feature of Soxhlet extraction is that a single batch of solvent is continuously recycled through the extraction tube.
Q11	D	Shinoda's test consists of adding Magnesium metal (Mg) followed by dropwise addition of Hydrochloric acid (HCl) to the alcoholic extract.
Q12	A	The selected botanical samples in the lab procedure are Arnica flowers, Grapefruit peels, Orange peels, and Calendula flowers.
Q13	B	The reference standard compounds specified are Rutin, Hesperidin, and Quercetin.
Q14	B	The TLC mobile phase ratio is Ethyl acetate : Formic acid : Glacial acetic acid : Water (100 : 11 : 11 : 24).
Q15	B	Aluminum chloride (AlCl ₃) solution is added to detect intensity differences in the yellow color formed by flavonoids.