PLANT MICROTECHNIQUE (BOT 213)
Report (2)

Student Name: _____ ID: _____

Part 1: True or False Questions (30 Questions)

Write (T) if the statement is true or (F) if it is false.

1. Glacial acetic acid is a simple non-coagulant fixative. (_____)
2. When used alone, glacial acetic acid causes shrinkage of the sample. (_____)
3. Ethyl alcohol is a coagulant fixative. (_____)
4. Chromic acid penetrates the sample quickly and makes it very hard. (_____)
5. Formalin is the trade name for an aqueous solution of formaldehyde gas. (_____)
6. Picric acid causes strong shrinking of the sample. (_____)
7. Potassium dichromate makes the tissue hard and easy to cut. (_____)
8. Mercuric chloride gives rigidity to the sample without shrinking or distorting it. (_____)
9. Osmium tetroxide forms red crystals. (_____)
10. One single fixative can fix all components of a cell equally well. (_____)
11. FAA stands for Formalin–Acetic acid–Alcohol. (_____)
12. Carnoy's fluid is a chloroform-containing fixative. (_____)
13. Carnoy's fixative penetrates slowly and needs many hours to fix small tissue pieces. (_____)
14. Bouin's fluid is a popular fixative for studying root and shoot apices. (_____)
15. Tissues left too long in Bouin's fluid tend to become brittle and difficult to section. (_____)
16. Navaschin's fluid is used for plant meristems and for preparing mitosis phases. (_____)
17. Farmer's fluid is made of absolute alcohol and glacial acetic acid in a 3:1 ratio. (_____)
18. The Formalin and Alcohol fluid is used when studying pollen tubes. (_____)
19. Sanfelice's fluid is very stable, so it can be stored for a long time before use. (_____)

20. Dehydration is the removal of water from the sample before embedding in paraffin wax. (_____)
21. Acetone is considered an alternative to ethyl alcohol for dehydration. (_____)
22. Glycerin is mainly used for dehydrating hard woody samples. (_____)
23. Dioxane is non-toxic and is highly recommended for dehydration. (_____)
24. Synthetic resins such as epoxy are mainly used to prepare sections for the light microscope. (_____)
25. If the dehydrating fluid dissolves paraffin wax, the clearing step is unnecessary. (_____)
26. Paraffin wax is miscible with water. (_____)
27. Paraplast is a mixture of paraffin wax and polymer plastics. (_____)
28. The celloidin embedding method is faster than the paraffin method. (_____)
29. The rotary microtome is also called the Minot microtome. (_____)
30. The freezing microtome is used to section fresh frozen tissues without embedding procedures. (_____)

Part 2: Multiple Choice Questions (30 Questions)

Choose the correct answer.

1. Which of the following is a simple non-coagulant fixative that penetrates quickly?
    A) Picric acid
    B) Glacial acetic acid
    C) Mercuric chloride
    D) Ethyl alcohol
2. When glacial acetic acid is used alone as a fixative, it causes:
    A) Swelling of the sample
    B) Shrinkage of the sample
    C) Hardening of the sample
    D) Color change of the sample
3. Commercial formalin contains about what percentage of formaldehyde gas?
    A) 5–10%
    B) 15–20%
    C) 90–100%
    D) 35–40%

4. Which fixative causes strong shrinkage of the sample?
    A) Osmic acid
    B) Formalin
    C) Picric acid
    D) Glacial acetic acid

5. Which fixative gives rigidity to the sample and does not cause shrinking or distortion?
    A) Potassium dichromate
    B) Mercuric chloride
    C) Picric acid
    D) Glacial acetic acid

6. Which fixative makes the tissue so soft that it is difficult to cut?
    A) Potassium dichromate
    B) Mercuric chloride
    C) Chromic acid
    D) Picric acid

7. Osmium tetroxide is made of crystals of which color?
    A) Red
    B) Blue
    C) Green
    D) Yellow

8. Which fixative is a chloroform-containing fixative that penetrates tissues extremely rapidly?
    A) Bouin's fluid
    B) Zenker's fluid
    C) Carnoy's fluid
    D) Navaschin's fluid

9. Small tissue pieces are fixed in Carnoy's fluid for approximately:
    A) 24 hours
    B) 1 hour
    C) 1 week
    D) 2 weeks

10. Bouin's fluid is especially suitable for studying:
    A) Root and shoot apices and embryo sacs
    B) Bones and teeth
    C) Wood and bark only
    D) Dead dry leaves

11. Farmer's fluid is a mixture of absolute alcohol and glacial acetic acid in which ratio?
    A) 1:1
    B) 1:3
    C) 2:1
    D) 3:1
12. Which fixative is used to study pollen tubes in plant material?
    A) Carnoy's fluid
    B) Zenker's fluid
    C) Formalin and Alcohol fluid
    D) Allen's fluid
13. Sanfelice's fluid is mainly used to study:
    A) Fungal spores
    B) Chromosomes in cell division
    C) Starch grains
    D) Cell walls only
14. Which type of microtome uses a razor blade and is suitable for school education?
    A) Hand microtome
    B) Rotary microtome
    C) Sliding microtome
    D) Freezing microtome
15. Dehydration in plant microtechnique means:
    A) Adding water to the sample
    B) Staining the sample
    C) Cutting the sample
    D) Removing water from the sample
16. Which of the following is a commonly used dehydrating agent?
    A) Xylene
    B) Paraffin wax
    C) Ethyl alcohol
    D) Canada balsam
17. Which dehydrating fluid is highly toxic and not recommended for use?
    A) Ethyl alcohol
    B) Dioxane
    C) Acetone
    D) Glycerin

18. 2,2-Dimethoxypropane (DMP) reacts with water to form:
    A) Methanol and acetone
    B) Ethanol and water
    C) Xylene and acetone
    D) Glycerin and methanol

19. Which of the following dehydrating fluids does NOT dissolve wax?
    A) Normal butyl alcohol
    B) Tertiary butyl alcohol
    C) Dioxane
    D) Ethyl alcohol

20. Which of the following dehydrating fluids dissolves wax?
    A) Ethyl alcohol
    B) Acetone
    C) Tertiary butyl alcohol
    D) Glycerin

21. Clearing means transferring the sample from the dehydrating fluid to a fluid that:
    A) Fixes the cells
    B) Dissolves the paraffin wax
    C) Stains the nucleus
    D) Freezes the tissue

22. Which of the following is a clearing reagent?
    A) Xylene
    B) Formalin
    C) Picric acid
    D) Carbowax

23. If samples are left too long in xylene, they tend to become:
    A) Very soft
    B) Transparent and fragile
    C) Green in color
    D) Excessively hardened

24. Clove oil is commonly used to clear sections before mounting in:
    A) Paraffin wax
    B) Gelatin
    C) Canada balsam
    D) Celloidin

25. What is the most common embedding medium for plant samples?
    A) Gelatin
    B) Paraffin wax
    C) Celloidin
    D) Carbowax

26. Most common paraffin waxes have a melting point between:
    A) 55–58 °C
    B) 10–15 °C
    C) 25–30 °C
    D) 80–90 °C

27. Paraplast is a mixture of paraffin wax and:
    A) Gelatin
    B) Clove oil
    C) Glycerin
    D) Polymer plastics

28. Synthetic resins such as Araldite are mainly used for samples to be examined under the:
    A) Light microscope only
    B) Hand lens
    C) Electron microscope
    D) Stereo microscope only

29. Which microtome is the most widely used and is also called the Minot microtome?
    A) Hand microtome
    B) Rotary microtome
    C) Rocking microtome
    D) Freezing microtome

30. Which microtome is used to section fresh frozen tissues without embedding?
    A) Freezing microtome
    B) Rotary microtome
    C) Sliding microtome
    D) Rocking microtome

Part 3: Matching Questions (20 Questions)

Match each description in Column A with the correct term in Column B. Write the letter of the term in the blank. Each term is used once.

Column A (Description)	Column B (Term)
1. A simple non-coagulant fixative that causes swelling of the sample when used alone (____)	A) 2,2-Dimethoxypropane (DMP)
2. The trade name for an aqueous solution of formaldehyde gas (____)	B) Xylene
3. A simple coagulant fixative that causes strong shrinking of the sample (____)	C) Synthetic resins
4. A fixative that makes the tissue so soft that it is difficult to cut (____)	D) Glacial acetic acid
5. A fixative made of yellow crystals that does not cause shrinking (____)	E) Potassium dichromate
6. A chloroform-containing fixative that penetrates tissues extremely rapidly (____)	F) Bouin's fluid
7. A popular fixative for studying root and shoot apices and embryo sacs (____)	G) Sanfelice's fluid
8. A mixture of absolute alcohol and glacial acetic acid in a 3:1 ratio (____)	H) Dioxane
9. A fixative used to study pollen tubes in plant material (____)	I) Clove oil
10. An unstable fixative prepared in two groups (A and B) to study chromosomes (____)	J) Rotary microtome
11. The process of removing water from the sample before embedding (____)	K) Formalin
12. A rapid dehydrating agent that reacts with water to form methanol and acetone (____)	L) Osmium tetroxide
13. A highly toxic dehydrating fluid that is not recommended for use (____)	M) Farmer's fluid
14. Transferring the sample from the dehydrating fluid to a fluid that dissolves paraffin (____)	N) Dehydration
15. A common clearing agent that causes hardening if the sample is left in it too long (____)	O) Clearing
16. A clearing agent used for sections before mounting in Canada balsam (____)	P) Paraplast

Column A (Description)	Column B (Term)
17. A mixture of paraffin wax and polymer plastics used for embedding (____)	Q) Freezing microtome
18. Embedding materials such as Araldite, used for electron microscope samples (____)	R) Picric acid
19. The most widely used microtome, also called the Minot microtome (____)	S) Carnoy's fluid
20. A microtome used to section fresh frozen tissues without embedding (____)	T) Formalin and Alcohol fluid