Determination the osmotic suction force by curvature the Ricinus petioles

Tools:

Ricinus petioles- knife or scalpel, NaCl solution (concentrated), distilled water, petri-dishes, different concentrations.

Procedures:

1- Cut the Ricinus petioles with knife
2- Put some of these petioles in 3 petri dishes
3- One of the petri dish contain distilled water , the second contain concentrated solution of NaCl
4- Put different concentrations of NaCl in petri dishes
5- Observe the curvature of Ricinus petioles in each petri dish.

Observation

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Determination the osmotic suction force by weighing method using potato tubers

Tools:

Potato tuber, knife or scalpel, NaCl solution, distilled water, petri-dishes.

Procedures:

1-Cut potatoes into six groups of small, uniform cubes measuring 1/2 cm by 1/2 cm.

2-Make four different solutions of NaCl: 0.0N,0.2 N, 0.4N ,0.6 N,0.8N and 1N

3-Weigh each group, on a mass balance, before immersing it in the appropriate NaCl solution for half an hour.

4-After immersion, weigh each group again and calculate the changes in the potato masses.

Observation

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Recognition some organic compounds in the plant cell

1- Carbohydrates

a- Detecting monosaccharide

Tools:

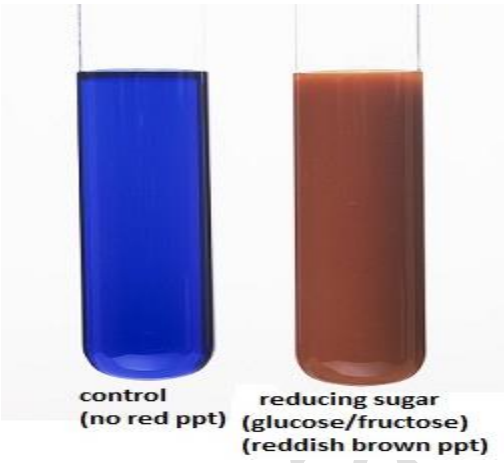
Glucose soln.- Fehling reagent – test tubes – water bath 100℃

Procedures:

1- Take 5ml of Glucose soln.in clean test tube.

2-Add 5ml of Fehling reagent (blue color)

3-Put the tube in water bath at 100℃ for 15 min.



Observation

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b- <u>Detecting disaccharide</u>

Tools:

Sucrose soln.- Fehling reagent – test tubes – water bath 100℃ , 40℃- invertase

Procedures:

1- Take 5ml of sucrose soln.in two clean test tubes.

2-Add 2ml of invertase in one tube and let the other tube without addition

3-Put the tubes in water bath at 40℃ for 30 min.

4-Add 5ml of Fehling reagent in the two test tubes.

5- Put the tubes in water bath at 100℃ for 15 min.

Observation

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c- Detecting of polysaccharides (Starch)

Tools:

Starch soln.- Fehling reagent – chines plate – water bath 100℃ , 40℃- diastase- iodine soln. -

Procedures:

1- Take 3 test tubes and add 5ml of starch soln.in three test tubes.

2-Add 2ml of diastase in two tubes and let the third one without addition

3-Put the tubes in water bath at 40℃ for 30 min.

4- After 15 min. take drops of the mix. In the chines plate which contain iodine soln. to detect the complete conversion of starch to simple sugar.

4-Add 5ml of Fehling reagent in the two test tubes (the tube contain diastase and the tube without diastase).

5- Put the tubes in water bath at 100℃ for 15 min.

Observation

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2-Proteins

a- **Yellow protein test (Xanthoproteic Test)**

Tools:

Egg albumin (protein sample)- concentrated nitric acid – test tube – NaOH

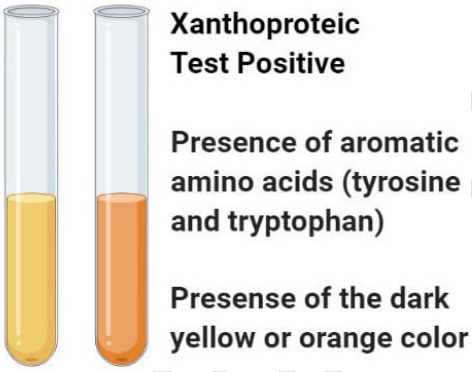
Procedures:

2- Take 5ml of egg albumin in clean test tube.

2-Add 1ml of concentrated nitric acid (white ppt.)

3-Heat in water bath

4- Add 2ml of NaOH (40%) and cooling under tap water.



Observation

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b- Biuret test

Biuret test is a general test for compounds having a peptide bond.

Tools:

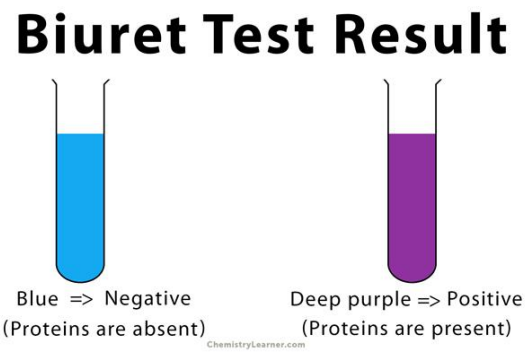
Egg albumin- NaOH – test tube – $CuSO_4$

Procedures:

3- Take 5ml of egg albumin in clean test tube.

4- Add 1ml of NaOH (40%)

5- Add 1ml of $CuSO_4$(10%)



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3-Pigments

Tools:

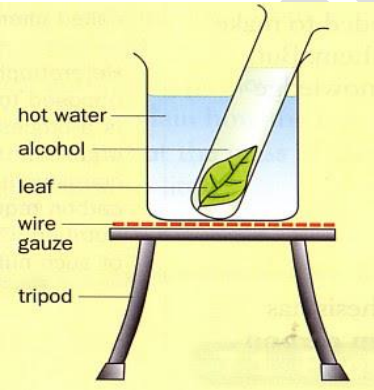
Green leaves- ethyl alcohol or ethyl alcohol (conc.) – test tubes - water bath

Procedures:

1- Take the green leaves in clean test tube

2- Add 5 ml of concentrated ethyle or methyle alcohol

3- Put the test tube in water bath at 60C.



Observation

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4-Fats and oils

Tools:

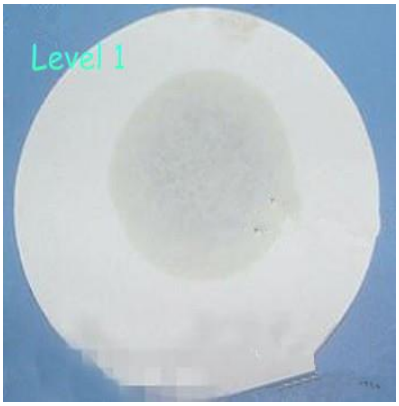
Filter paper- oil or butter– distilled water –

Procedures:

1- Take the filter paper

2- Add drops of oil or butter on the filter paper.

3- Add drops of water on another filter paper .



Observation

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Factors affecting on diffusion in the plant cell

1- pH

Tools:

Beet roots – test tubes– solutions of different pH(2,4,6,8) –

Procedures:

1-Cut the beet roots to small pieces

2-Put an equal amount in each test tube

3-Add 5 ml of different pH(2,4,6,8)solutions in each tube.

Observation

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2- Temperature

Tools:

Beet roots – test tubes–distilled water – water bath at(0,20,50,70C)

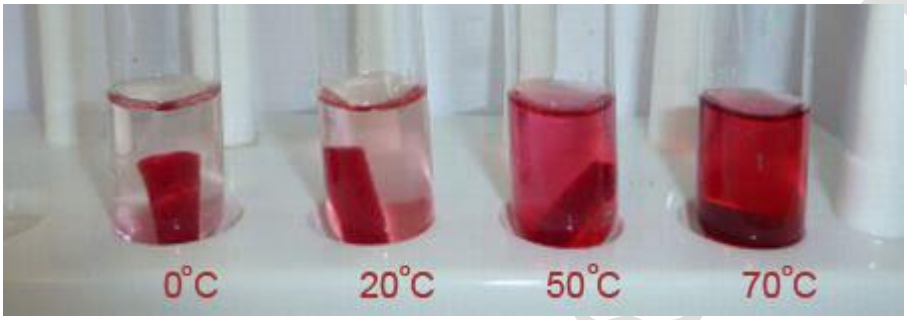
Procedures:

1-Cut the beet roots to small pieces

2-Put an equal amount in each test tube

3-Add 5 ml of distilled water in each tube.

4-Put each tube in different water bath



Observation

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3-Ethyl alcohol

Tools:

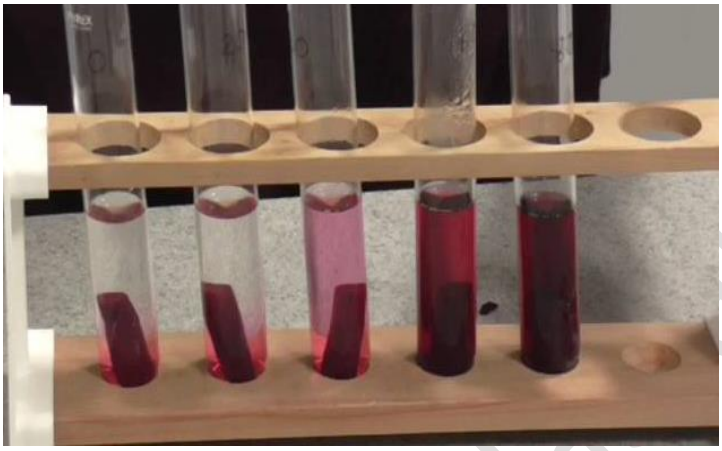
Beet roots – test tubes–different concentration of ethyl alcohol –

Procedures:

1-Cut the beet roots to small pieces

2-Put an equal amount in each test tube

3-Add 5 ml of different concentration of ethyl alcohol.



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Determination of some plant minerals in plant extract

- **Determination of calcium (Ca^{2+}) and magnesium (Mg^{2+})**

Tools:

Plant extract – Muroxide indicator – versine – distilled water- conical flask – burette – E.C.BT indicator.

Procedures:

1- Put known amount of plant extract in the conical flask
2- Add drops of E.C.BT indicator in the conical flask (the color become purple red).
3- Fill the burette with versine (0.1N)
4- Titrate the mix in the conical flask against versine untile the color turned to blue.
5- Calculate the volume consumed from versine
6- Calculate the concentration of calcium and magnesium together (V1)

For determination the calcium (Ca^{2+}) only

7- Put known amount of plant extract in the conical flask
8- Add trace amount of Muroxide indicator in the conical flask (the color become red).
9- Fill the burette with versine (0.1N)
10- Titrate the mix in the conical flask against versine untile the color turned to purple.
11- Calculate the volume consumed from versine

12- Calculate the concentration of calcium only (V2)

13- Subtract V2 from V1 to calculate the concentration of magnesium Mg^{2+}

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- **Determination of Chlorine (Cl^-) in plant extract**
- **Tools:**
- Plant extract –$AgNO_3$ – distilled water- conical flask – burette – $K_2Cr_2O_4$ indicator
- **Procedures**

1- Put known amount of plant extract in the conical flask

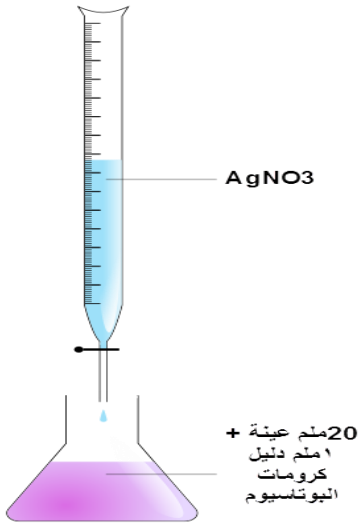
- 2-Add drops of $K_2Cr_2O_4$ indicator in the conical flask (the color become yellow).

3-Fill the burette with $AgNO_3$ (0.01N)

4-Titrate the mix in the conical flask against AgNO3 untile the color turned to red.

5-Calculate the volume consumed from $AgNO_3$

6- Calculate the concentration of Cl^-



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Transpiration

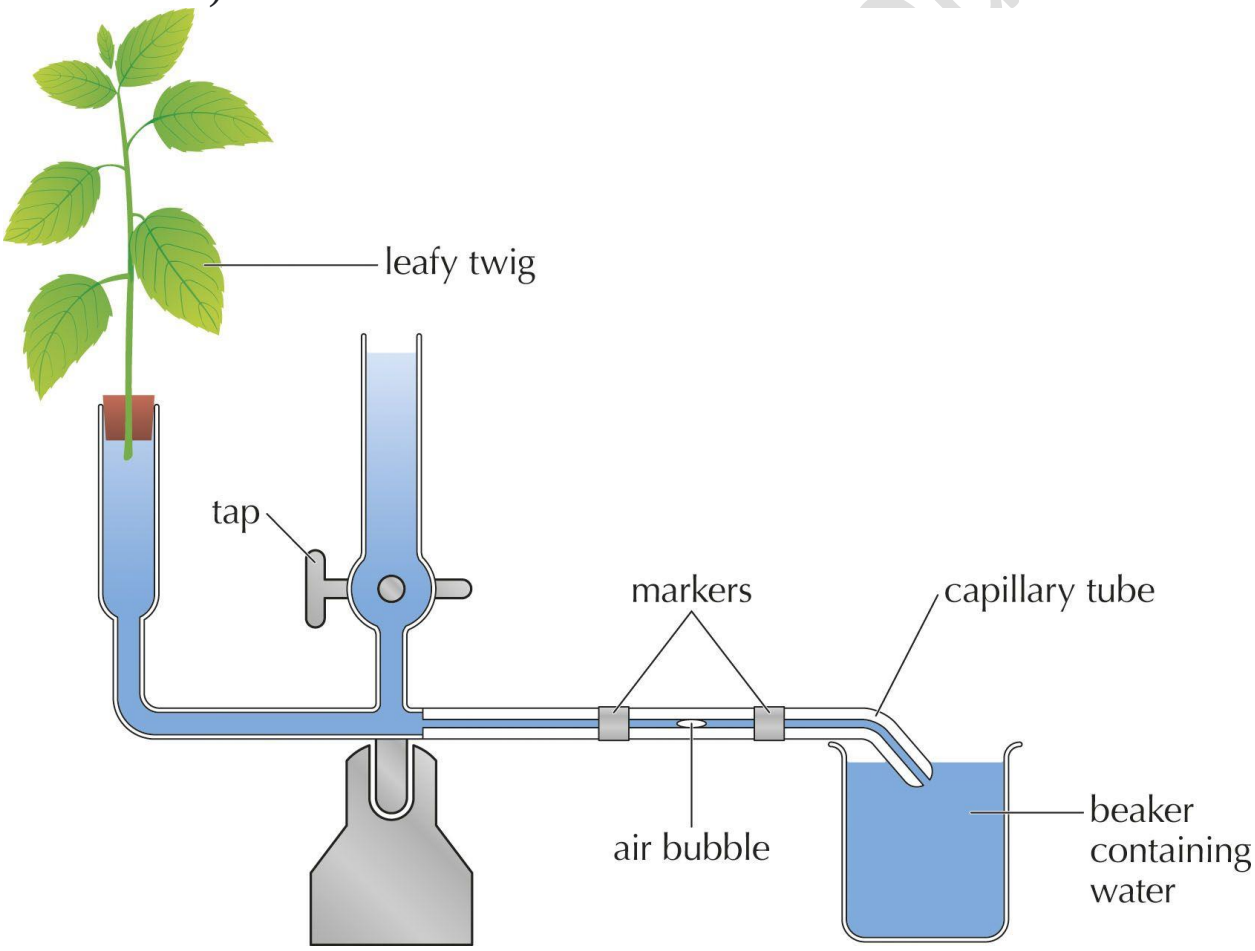
3-Potometer

- **Uses**

It is used to measure the rate of transpiration

- **The idea of its work**

It is based on the idea that the rate of absorption (the rate at which water plants acquire) almost equals the rate of transpiration (the rate at which water is lost)



Mechanism of work and the law

The plant that we want to measure transpiration rate for it is fixed in part designated for it inside the device, and the leaf surface area for this plant is estimated

There are two ways to measure the rate of transpiration

1-The gravimetric method for estimating the rate of transpiration

The apparatus is filled with water and branch of plant is fixed in its appropriate place, then the apparatus is weighted before beginning the experiment and weighted after the end of the experiment, the amount of lost water is calculated as the difference between the two weights

W1 = weight before beginning the experiment

W 2 = weight of the apparatus after the end of the experiment

$$\text{Transpiration rate} = \frac{\text{Weight of water lost (W1-W2)}}{\text{Leaf area (cm) x time (hours)}}$$

g / cm2 / hour

Methods for determining leaf area

1-By graphing

The paper is placed on a graph paper, then its dimensions are drawn with bullets and the number of squares taken is calculated, where each square represents 1 cm through the number of squares The area of the paper is approximately calculated

1- Weighted method

Draws a square with known dimensions, length and width, on a filter paper, and let its area be (A 1), then cut it and weight it (W1) .on the same type of filter paper draw the leave that you want to find its area and let its area A2 and weight it lets its weight W2

W1/ A1= W 2 /A 2

A2 = A1 x W2/W1

Leaf area = number of leaves x area of one leaves

If the stomata are found on two surfaces, the area of the leaves *2

Determining the effect of environmental conditions on transpiration rate

Aim

To determine the effect of environmental conditions on transpiration rate using a simple potometer.

1-Wind velocity

Tools:

Soft green leafy shoot – conical flasks – distilled water-

Procedures:

1-fill the two conical flask with 250ml distilled water

2-fix the Soft green leafy shoot in the conical flask.

3-weight the two conical flask (W1, W2)

4-leave one conical flask expose to wind for 48 hr. and leave the other without exposure.

5-after 48 hr. weigth the frist conical flask exposed to wind W3 and the second (does not exposed to wind) W4.

6-Calculate the rate of transpiration in the two conical flasks.

Observation

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2-Effect of salts (NaCl)

Tools:

Soft green leafy shoot – conical flasks – distilled water- NaCl soln.

Procedures:

1-fill one of the conical flask with 250ml distilled water and the other with 250 ml NaCl soln.

2-fix the Soft green leafy shoot in the conical flask.

3-weight the two conical flask (W1, W2)

4-after 48 hr. weigth the frist conical flask (contain dist.water)= W3 and the second (contain NaCl soln.) =W4.

6-Calculate the rate of transpiration in the two conical flasks.

Observation

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