



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

ORGANISMS EXCHANGE SUBSTANCES

Level & Board	AQA (A-LEVEL)
TOPIC:	MASS TRANSPORT IN PLANTS
PAPER TYPE:	SOLUTION - 1
TOTAL QUESTIONS	6
TOTAL MARKS	41

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Mass Transport in Plants - 1

1.

(a)

$$9.3 - 7.0 = 2.3 / 2 = 1.15 = \text{uncertainty.}$$

$$7.4 + 8.0 + 7.0 + 8.6 + 8.2 + 9.3 + 7.4 + 9.1 + 8.8 = 73.8 / 9 = 8.2$$

$$1.15 / 8.2 = 0.1402 \times 100 = 14.02\%$$

(b)

- H ions move by active transport to source from companion cells lowering H ion con in CC so diffuses back in by co-transport with sucrose molecule.
- Sucrose diffuses into sieve tube lowering water potential so water enters by osmosis from the xylem.
- Increases volume and therefore hydrostatic pressure in phloem causing mass transport of water and sucrose down towards to sink.
- Sucrose moves into the sink by diffusion down its conc gradient where it is used for respiration.

(c) The low solute potential draws water into the phloem from the adjacent xylem. Movement of water into the phloem creates a high pressure potential (Ψ_p), aka high turgor pressure, in the phloem. The high turgor pressure forces movement of phloem sap from source to sink through a process called "bulk flow."

OR

Phloem pressure falls as rate of water movement in xylem increases

(d)

- High rate of transpiration
- Water lost through stoma causes less water movement from xylem to phloem

2.

(a)

- Initial and final mass of beaker and all contents
- Number of groups of xylem vessels

(b) The purpose of putting oil in the test tube is to prevent the loss of water by evaporation.

(c)

- Water evaporates is transpired from leaves
 - Lower water potential creates tension
- OR**
- Osmosis creates tension/pulls up water
 - Hydrogen bonds maintains column

(d)

- Cut in a direction away from yourself
- Against hard, non-slip surface e.g dissection tray

(e)

Median

Reason: Presence of outliers 80/70

Calculation: 41

3.

(a) As it is regularly covered with seawater, they can absorb water and minerals directly into their thallus leaves.

4.

(a)

used to compare effect of other treatments

shows effects of substance x

(b)

D shows substance X is not required for some root growth.

Substance X moves through plant.

E shows substance X causes increase root growth

(c) YES: F shows phloem is involved. G shows respiration is involved because 4°C stops movement. The agar block is the source and the roots are the sink.

NO: No bulge above ringing in F. No osmosis. Movement could be due to gravity

5.

(a)

The radioactively labelled carbon is converted into sugar/organic substances during photosynthesis

Translocation in the phloem throughout the plant only in plants that were untreated

OR

Movement of sugar/organic substances in the phloem throughout the plant only in plants that were untreated

OR

Movement in phloem requires living cells /ATP

Heat treatment damages living cells so transport in the phloem throughout the plant only in plants that were untreated

(b) The water content of the leaves was not different because means ± 2 standard deviations overlap;

Water is therefore still being transported in the xylem to the leaf

OR

Movement in xylem is passive so unaffected by heat treatment

(c)

- Heat treatment has a greater effect on young leaves than old
- Heat treatment damages the phloem
- Fe^{3+} moves up the leaf, suggests Fe^{3+} is transported in the xylem in older leaf
- But no statistical test to show if the difference is significant

6.

(a) The cohesion-tension theory (C-T theory) by Boehm (1893) and Dixon and Joly (1894) postulates that the water ascent in trees is exclusively due to the transpirational pull from continuous water columns in the xylem conduit running from the roots to the leaves.

OR

- Water evaporates from leaves transpiration
- This creates tension suction, pulling more water up the lead
- Water molecules are cohesive stick together due to H bonds so when some are pulled up, others follow. SO whole column of water moves upwards.
- Water enters the stem through roots.

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I am Sorry !!!!!



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- Founder & CEO of Chemistry Online Tuition Ltd.
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