



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

ORGANISMS EXCHANGE SUBSTANCES

Level & Board	AQA (A-LEVEL)
TOPIC:	SURFACE AREA TO VOLUME RATIO
PAPER TYPE:	SOLUTION - 2
TOTAL QUESTIONS	5
TOTAL MARKS	41

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Surface Area to Volume Ratio - 2

1.

(a) Tissue fluid is formed by the overall outward pressure of 3.2kPa forces small molecules out of the capillaries.

(b) The force of hydrostatic pressure means that as blood moves along the capillary, fluid moves out through its pores and into the interstitial space. This movement means that the pressure exerted by the blood will become lower, as the blood moves along the capillary, from the arterial to the venous end.

OR

It is because loss of water.

(c) If someone's blood pressure is too high, the pressure will not have dropped enough by the end of the capillary bed to allow fluid to return to the blood. Instead, it stays in the tissues and makes them swollen and puffy.

OR

- Water has left the capillary
- Proteins are too large to leave the capillary
- Higher concentration of proteins
- So, water potential is more negative

(d) The water potential in blood plasma is more negative at the venule end of a capillary due to the process of filtration and reabsorption. High blood pressure at the arteriole end pushes water out, while lower pressure at the venule end allows reabsorption.

OR

- Water has left the capillary
- Proteins in blood too large to leave capillary
- Increasing / giving higher concentration of blood proteins

2.

(a) During forced expiration, accessory muscles of the abdomen, including the obliques, contract, forcing abdominal organs upward against the

diaphragm. This helps to push the diaphragm further into the thorax, pushing more air out.

OR

- Contraction of internal intercostal muscles
- Relaxation of diaphragm muscles / of external intercostal muscles causes decrease in volume of chest / thoracic cavity
- Air pushed down pressure gradient.

(b)

$$4.2 - 0.8 = 3.4$$

$$3.4/4.2 = 0.8095$$

$$0.8095 \times 100 = 80.95\%$$

$$100 - 81 = 19\%$$

(c)

- Muscle walls of bronchi/bronchioles contract walls of bronchi/bronchioles secrete more mucus
- Diameter of airways reduced, therefore flow of air reduced

3.

(a) Water potential becomes lower as sugar enters phloem. Water enters phloem by osmosis. Increased volume of water causes increased pressure.

(b)

- Rate of photosynthesis is proportional to rate of sucrose production and therefore the rate of translocation of sugar
- As rate of translocation is higher when the concentration of sucrose increases as there is an increased concentration gradient.

(c) The rate of translocation did not drop to zero but sucrose is no longer able to enter the cytoplasm of phloem cells as it is inhibited therefore must occur via cell walls.

4.

(a) Every few seconds, with each inhalation, air fills a large portion of the millions of alveoli. In a process called diffusion, oxygen moves from the alveoli to the blood through the capillaries (tiny blood vessels) lining the alveolar walls.

OR

Trachea and bronchi and bronchioles

Down pressure gradient

Down diffusion gradient

Across alveolar epithelium

Across capillary endothelium / epithelium.

(b)

$$4.2 - 0.8 = 3.4$$

$$3.4 / 4.2 = 0.81$$

$$0.81 \times 100 = 81\%$$

(c) Group B because breath out as quickly as healthy/ have similar FEV to group A so bronchioles not affected

FVC reduced/total volume breathed out reduced

5.

(a) There is a lower affinity for oxygen and so oxygen unloads more readily to muscles, tissues and cells for rapid respiration.

OR

There is a lower affinity for oxygen and so oxygen unloads more readily to muscles, tissues and cells for rapid respiration.

(b) They have a small surface area to volume ration this reduces the heat loss of the seal.

(c) The diving response demonstrates a cessation of breathing, decreased heart rate, and an increase in peripheral vascular resistance leading to a redistribution of blood flow to adequately perfuse the brain and heart while limiting flow to non-essential muscles.

OR

The rate of blood flow to the brain is the same, others fall. The brain controls other organs so it needs a constant supply of oxygen. Lungs not used as seal is not breathing. Heart rate decreases so blood diverted to muscles. These changes in blood flow were to enable oxygen to be conserved.



I am Sorry !!!!!



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- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
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