

<b>Exam &amp; State:</b>	Year 12 HSC Exam in NSW
<b>Subject:</b>	Biology
<b>Type of Exam Preparation Material:</b>	Study Notes
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### **Summary**

This document contains information needed for each syllabus dot point for HSC Biology: 9.2 Maintaining a Balance, as published by the Board of Studies (BOS). It includes definitions and concise information which facilitate learning. Where students are required to gather, process and analyse information from secondary resources, brief and concise information is provided in this document as well. However, students are encouraged to deepen their understanding by carrying out further research, which is an essential skill for any students studying science-related subjects.

### **In general this document may be useful for,**

Year 11 -12 HSC Biology students

### **Useful for**

students as a study material and for revision

### **Notes about the Exam in General**

1. Section 1 contains Part A (Multiple Choice Questions) and Part B (Short and Long Response Questions) carrying 75%. Sections 1 usually only tests on the 3 Core Modules.
2. Section 2 contains questions for the Option that your teacher/you have chosen to study. It carries 25%.

### 3. TRANSPORTATION OF NUTRIENTS AND GASES IN ORGANISMS

Identify the form(s) in which each of the following is carried in mammalian blood:

Substance	Form in which it is carried in mammalian blood
CO <sub>2</sub>	Bicarbonate ions; carbaminohaemoglobin; and dissolved CO <sub>2</sub> in plasma
Oxygen	98% oxyhaemoglobin in red blood cells 2% dissolved in plasma
H <sub>2</sub> O	91% of plasma is water
Salts	Transported as ions dissolved in plasma
Lipids	Glycerol & fatty acids (After digestion) Lipoproteins/Chylomicrons (Absorption and synthesis in intestine lining)
Nitrogenous waste	Mostly urea with little amounts of ammonia, uric acid and creatinine dissolved in blood plasma
Other products of digestion	Glucose, amino acids, Vitamins B and C (water soluble) Vitamins A, D, E and K (fat soluble)

Explain the adaptive advantage of haemoglobin (Hb)

- Single Hb molecule has 4 iron-containing haeme units which can bond with 4 oxygen molecules, beneficially increasing oxygen carrying capacity of blood
- Hb forms loose combination with oxygen
- Capacity of Hb in releasing oxygen increases when CO<sub>2</sub> is present → important in metabolism

Compare the structure of arteries capillaries and veins in relation to their function

	Arteries	Capillaries	Veins
Structure	Thicker, stronger, more elastic muscles as compared to veins	One cell thick walls	Thin muscle layer with outer fibrous layer
Blood pressure	High to force blood to reach body tissues from heart	High	Low
Function	Carry oxygenated blood away from the heart to body tissues (EXCEPT the pulmonary artery)	Allows exchange of nutrients, gases and intercellular fluid to be transported to cells.	Carry deoxygenated blood to the heart from body tissues (EXCEPT the pulmonary vein)

Describe the main changes in the chemical composition of the blood as it moves around the body and identify tissues in which these changes occur

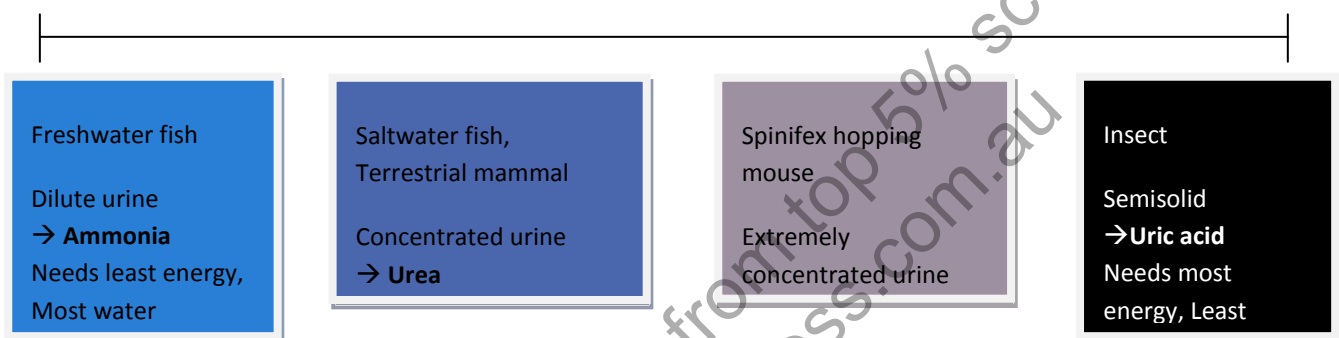
Tissues	Chemical composition of the blood as it moves around the body
Lung tissue	Blood receives O <sub>2</sub> and CO <sub>2</sub> is released
Body tissues	Blood receives CO <sub>2</sub> and O <sub>2</sub> is released
Small intestine	Digested food substances diffuse into the bloodstream or lymph
Liver tissues	Glucose converted to glycogen or vice versa, Amino acids broken down (deamination)
Kidney tissues	Excretion of excess H <sub>2</sub> O, nitrogenous wastes and salts, reabsorption of salts into the bloodstream Note: More on this in later syllabus dot points

**Gather, process and analyse information from secondary sources to compare the process of renal dialysis with the function of the kidney**

- Haemodialysis
  - Filters blood but does not carry out other functions of the kidney
  - Removes urea, but not as complex as kidney found in organisms
  - Diffusion of urea and other substances in or out of the blood is entirely passive as compared to some active processes in kidneys

**Analyse information from secondary sources to compare and explain the differences in urine concentration of terrestrial mammals, marine fish and freshwater fish.**

**Use available evidence to explain the relationship between the conservation of water and the production and excretion of concentrated nitrogenous wastes in a range of Australian insects and terrestrial mammals.**



**Describe adaptations of a range of terrestrial Australian plants that assist in minimising water loss**

1. Tiny hairs on stems to maintain moisture
2. Waxy cuticle to prevent water loss via transpiration
3. Thin, tiny leaves to reduce occurrence of transpiration

**5. REGULATION OF SALT LEVELS FOR ESTUARINE ORGANISMS**

**Define enantiostasis as the maintenance of metabolic and physiological functions in response to variations in the environment and discuss its importance to estuarine organisms in maintaining appropriate salt concentrations**

- Enantiostasis : Maintenance of metabolic and physiological functions in response to variations in the environment
- Estuary : Region where freshwaters of a river meets the salt water of the sea
- Fluctuations of salinity means organisms need to maintain suitable internal salt concentrations

**Process and analyse information from secondary sources and use available evidence to discuss processes used by different plants for salt regulation in saline environments**

- Mangrove trees:
  1. Special tissues in roots which exclude salt from being absorbed
  2. Leaves drop off with excess salt