

17 (a) Fig. 17.1 is a diagram of the external view of a mammalian liver.

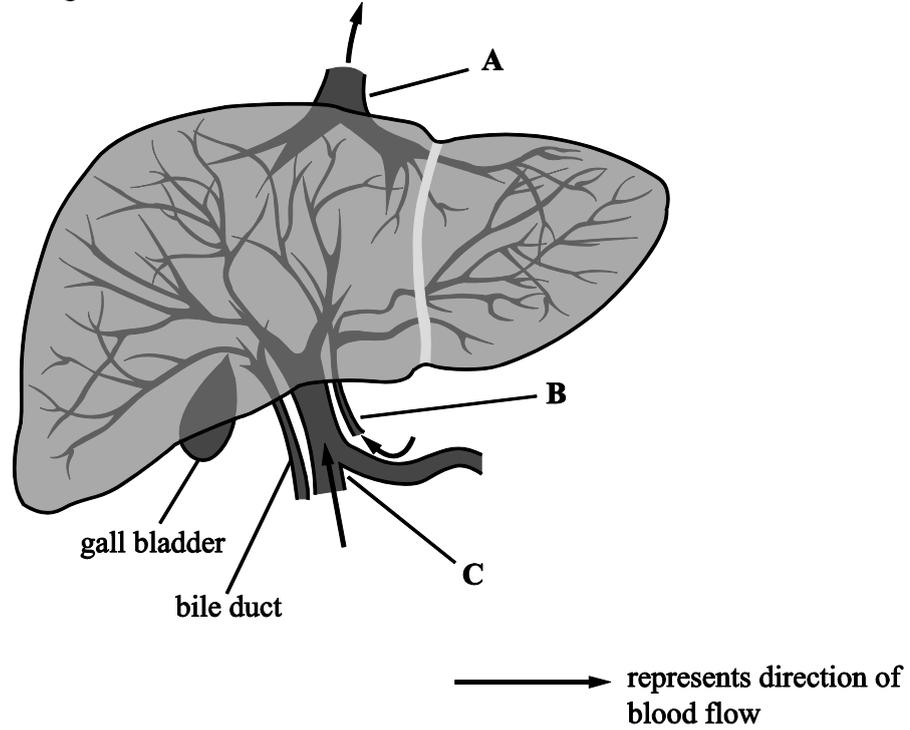


Fig. 17.1

Identify, with reasons, each of the blood vessels labelled A – C in Fig. 17.1.

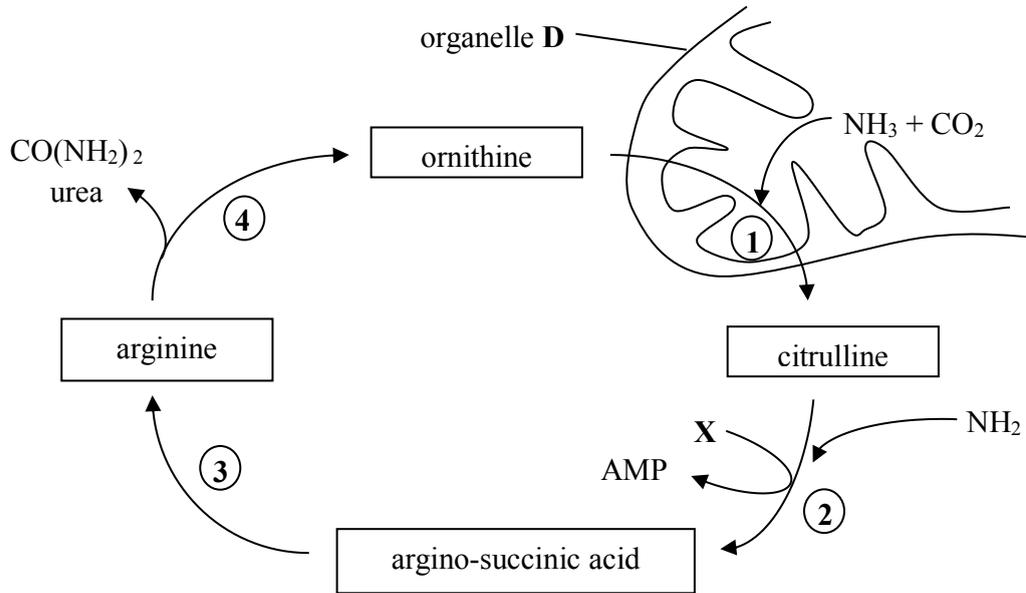
A.....  
.....

B.....  
.....

C.....  
.....

[3]

- (b) One of the main functions of the liver cells is the formation of urea by the ornithine cycle, an outline of which is shown in **Fig. 17.2**.



**Fig. 17.2**

- (i) Step 1 of the cycle takes place in the organelle represented by **D**.

Identify organelle **D**.

..... [1]

- (ii) During the cycle ornithine moves into organelle **D** and citrulline moves out of the organelle.

Suggest the method by which these molecules move into and out of the organelle during the cycle. Give reasons for your choice.

.....  
 .....  
 .....  
 ..... [2]

- (iii) How has the ammonia that is used in step 1 been formed?

.....  
 ..... [1]

- (iv) Identify the compound labelled **X** in **Fig. 17.2**.

..... [1]

- (c) Liver cells have a high metabolic rate. Hydrogen peroxide is a metabolic product produced in significant quantities in liver cells. It needs to be removed in order to prevent serious damage to the liver cells.

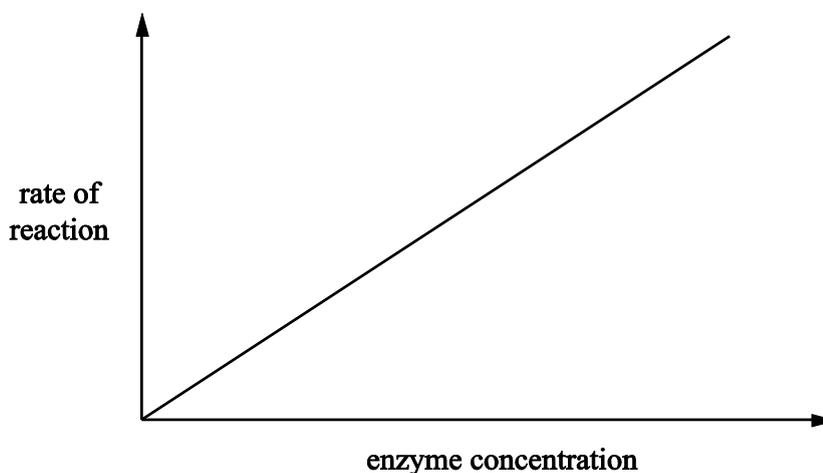
Hydrogen peroxide is detoxified by the enzyme catalase:



Catalase has a very high turnover number. A single catalase molecule can catalyse the breakdown of approximately 6 million hydrogen peroxide molecules every minute. Catalase is found in peroxisomes inside the liver cells. Peroxisomes are organelles surrounded by a single membrane.

The activity of catalase was investigated in a laboratory, using chopped liver tissue and dilute hydrogen peroxide. When the chopped liver was added to the hydrogen peroxide large quantities of froth as bubbles of oxygen were produced in the liquid.

**Fig. 17.3** shows the effect of increasing enzyme concentration on the rate of the reaction.



**Fig. 17.3**

- (i) Identify **two** variables that would need to be controlled in this laboratory investigation.

1.....

2.....

[1]

- (ii) How could you control **one** of the variables that you identified in (i) in the laboratory investigation?

.....

..... [1]

