OCR
Oxford Cambridge and RSA

AS Level Biology A

H020/02 Depth in biology

Question Set 7

1 (a) Fig. 1.1 shows the general structure of an amino acid.

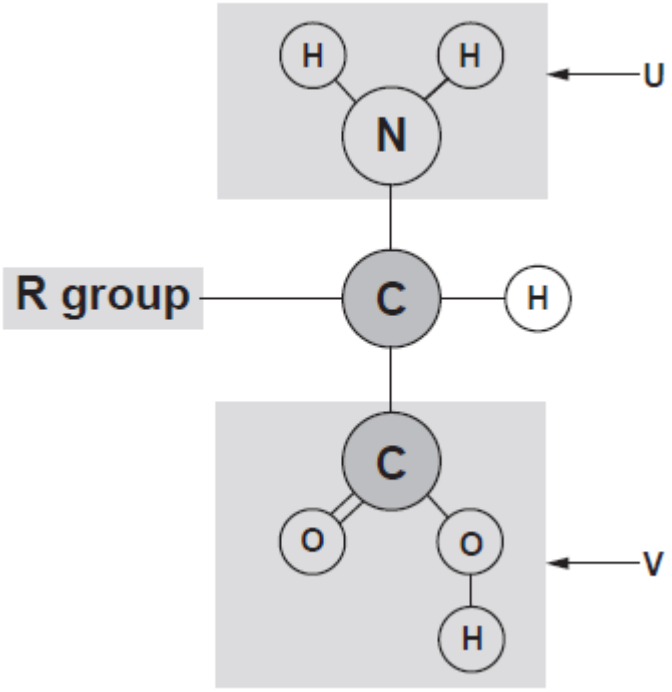

Fig. 1.1

(i) State the names of the groups labelled **U** and **V**.

U .....

V .....

[1]

(ii) Fig. 1.2 shows a representation of a short polypeptide chain made from three aminoacids.

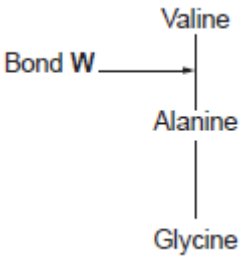

Fig. 1.2

Name bond **W and** state what type of reaction takes place to form this bond.

Name of bond **W**.....

Type of reaction ..... **[1]**

(b) Pepsin is a protease enzyme with a polypeptide chain containing 327 amino acids.

Titin is the largest known protein. It has a polypeptide chain containing at least 92 times more amino acids than pepsin.

(i) DNA sequences in genes code for polypeptide molecules such as pepsin and titin.

Explain why a process known as transcription is necessary for polypeptide synthesis.

[2]

(ii) Calculate the minimum length of the DNA base sequence required to code for titin.

Show your working.

Answer……

[2]

(iii)* Titin is a fibrous protein. Pepsin is a globular protein.

Compare the properties and functions of fibrous proteins and globular proteins in the human body.

[6]

(iv) Another protease enzyme is HIV1 protease, which is essential for the life cycle of the human immunodeficiency virus (HIV). Inhibition of this protease prevents HIV from maturing.

In 1995, saquinavir was the first HIV1 protease inhibitor drug to be approved by the US Food and Drug Administration (FDA).

The data in Fig. 1.3 show the number of acquired immune deficiency syndrome (AIDS) diagnoses and deaths between 1981 and 2007 in the US.

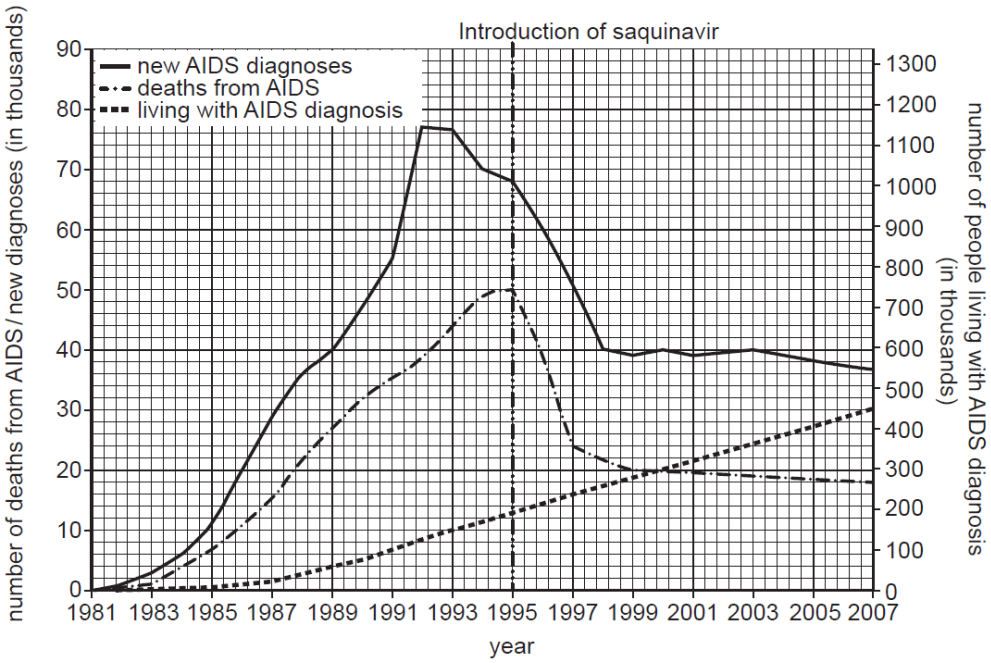

Fig 1.3

Calculate the rate of decrease in deaths from AIDS between 1995 and 1998.

Give your answer to **two significant figures**.

Show your working.

Answer ..... Units

[2]

(v) A student looking at the data in Fig. 1.3 made the following conclusion:

> "The decrease in deaths from AIDS after 1995 is because of the use of saquinavir by HIV patients."

Suggest why this conclusion may be invalid based on the data in Fig. 1.3.

[2]

(c) A group of students wanted to use thin layer chromatography to identify four amino acids.

To produce the chromatogram, the students:

- drew a pencil line 1 cm from the bottom of the chromatography plate and put solvent into the beaker to a height of approximately 0.9 cm
- held the chromatography plate firmly in the middle with their hands and lowered it into the beaker
- left the apparatus to stand as shown in Fig. 1.4.

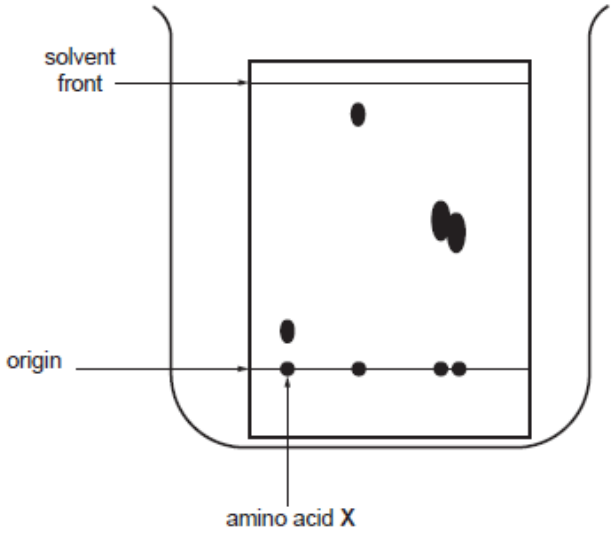

Fig. 1.4

(i) Describe **four** ways you would refine the method used by the students. For each change you suggest, give a reason why this would improve the results of the experiment. **[4]**

(ii) Table 1 shows the R_f values of some amino acids.

Name of amino acid	R_f value
Alanine	0.31
Cysteine	0.40
Glutamine	0.13
Phenylalanine	0.59

Table 1

Using the information in Table 1 and Fig. 1.4, identify amino acid **X** by calculating its R_f value.

Show your working.

R_f value of amino acid **X** .....

Name of amino acid **X** ..... **[2]**

Total Marks for Question Set 7: 22