



CHEMISTRY ONLINE
— **TUITION** —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

CHEMISTRY

INORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	AMINO ACIDS, PROTEIN & DNA
PAPER TYPE:	SOLUTION - 3
TOTAL QUESTIONS	10
TOTAL MARKS	39

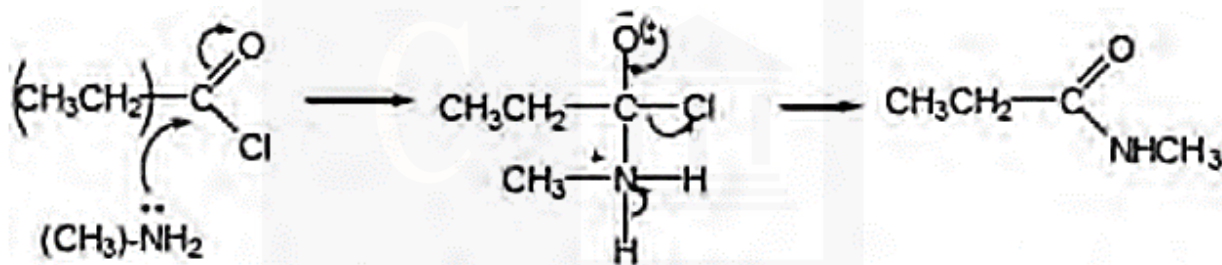
ChemistryOnlineTuition Ltd reserves the right to take legal action against any individual/ company/organization involved in copyright abuse.

Amino Acids, Protein and DNA

1.

Name of mechanism: Nucleophilic addition elimination

Mechanism:

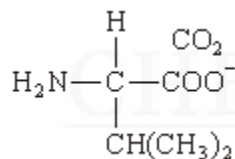


(5)

2.

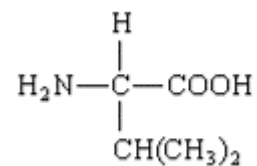
(a)

Following is the amino acid species present in a solution at pH 12:

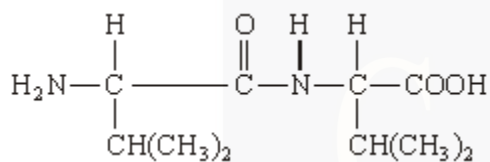


(1)

I am Sorry !!!!!

(b)

Following is dipeptide formed from two molecules of amino acid.

**(1)****(c)**

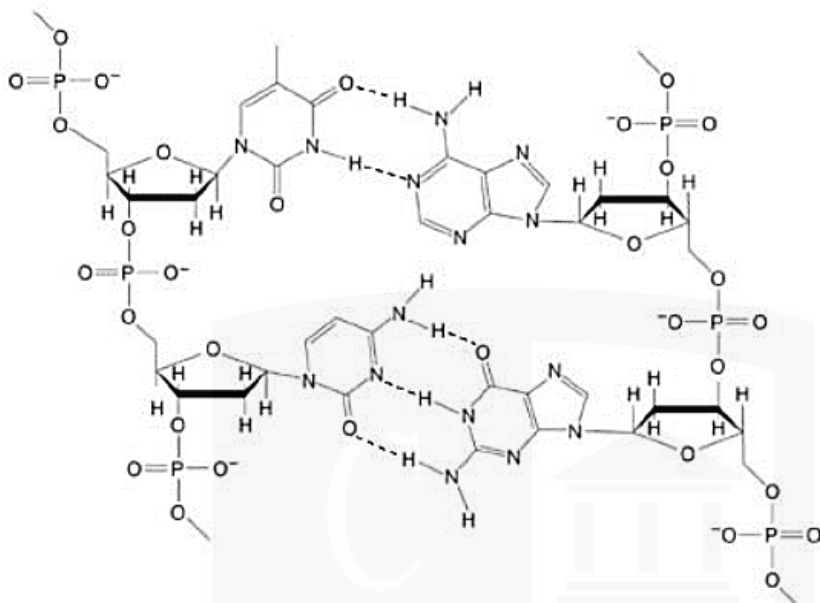
Hydrogen bonding is responsible for holding the protein chain in this shape.

(1)**3.****(a)**

Showing the hydrogen bonds:

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!



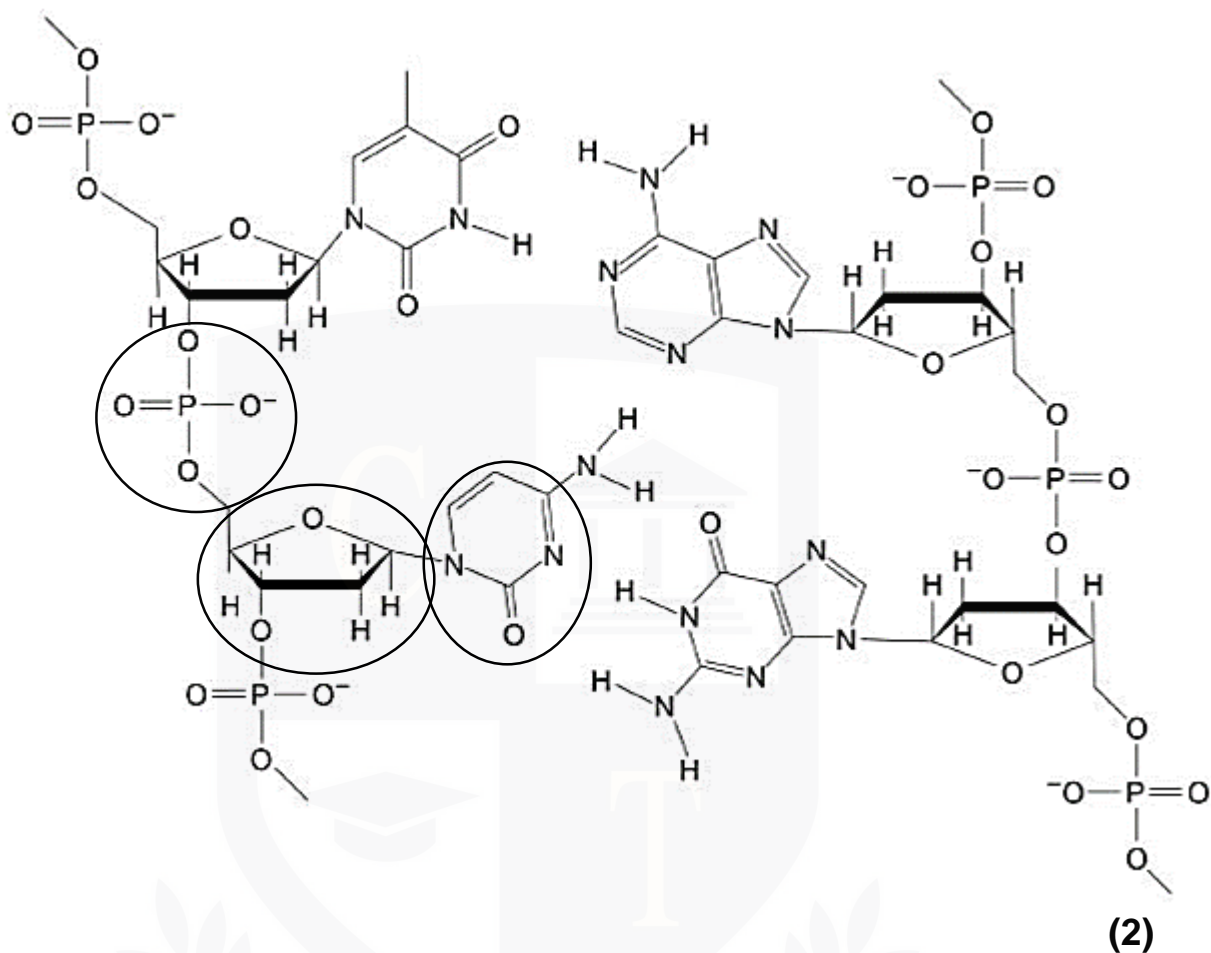
(2)

(b)

Ring showing around each of the component parts that make up the cytosine nucleotide in the section of DNA shown in the diagram:

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!



(c)

When referring to DNA strands, "complementary" means that the two strands must have base sequences that match in a specific way adenine (A) must pair with thymine (T), and cytosine (C) must pair with guanine (G)

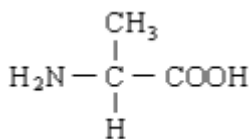
(1)

I am Sorry !!!!!

4.

(a)

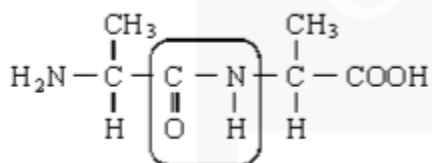
Structure of 2-aminopropanoic acid.



(1)

(b)

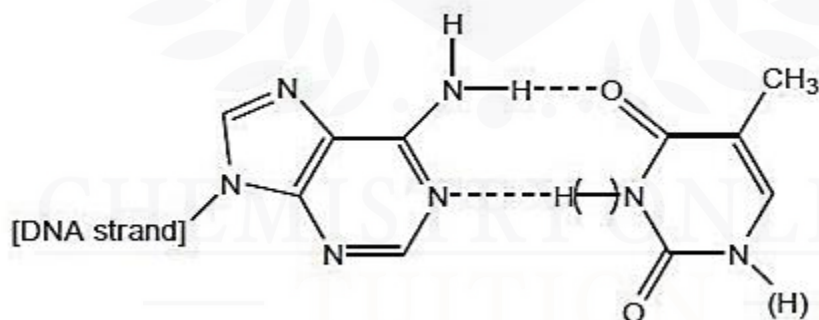
Following is an organic product formed by the condensation of two molecules of 2-aminopropanoic acid.



(1)

5.

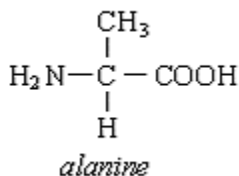
Hydrogen bonding represented with dotted lines:



(2)

6.

(a)



The systematic name for alanine:

2-amino propanoic acid

(1)

(b)

(i)

Stereoisomers are molecules with the same structural formula but different spatial arrangements of atoms or groups in three-dimensional space.

(2)

(ii)

Stereoisomers can be distinguished by observing how they rotate plane-polarized light.

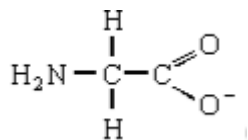
One may rotate it clockwise, while the other rotates it counterclockwise.

This phenomenon, known as optical activity, allows for differentiation between stereoisomers based on the direction and magnitude of rotation.

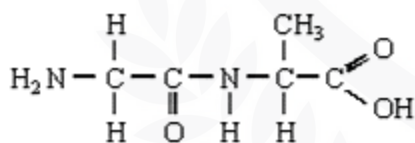
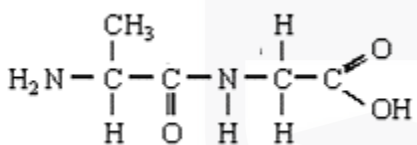
(2)

(c)

Following is the structural formula of the species formed by glycine at pH 14:

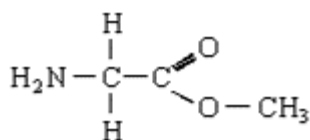
**(1)****(d)**

Following is the structural formulae of the two dipeptides which are formed when alanine and glycine react together.

**(2)****(e)**

The reaction involves the esterification of the carboxyl group of glycine with methanol.

Here's the structural formula:



(1)

7.

(a)

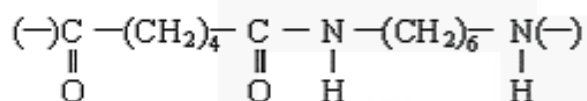
Name the compound $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$ is :

1,6-diaminohexane

(1)

(b)

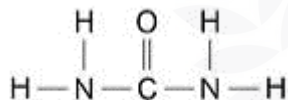
Repeating unit in the polyamide nylon 6,6:



(1)

8.

Urea:



The amino ($-\text{NH}_2$) groups in urea can substitute for the hydrogen bonds in the double helix of DNA.

That is why urea is effective at separating the complementary strands in DNA.

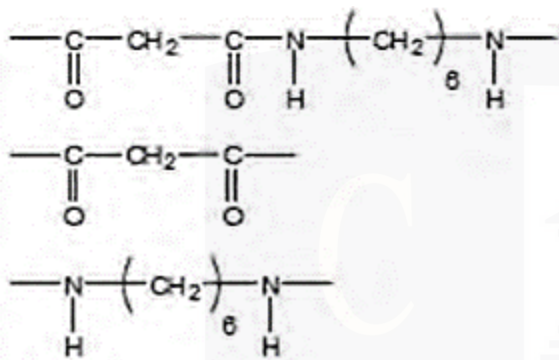
(2)

I am Sorry !!!!!

9.

(a)

Following are the repeating units of the polyamide formed by the reaction of propanedioic acid with hexane-1,6-diamine:



(2)

(b)

Polyamides, such as nylon, can be made into strong and flexible fibers suitable for sewing and weaving due to the presence of **hydrogen bonding** between polymer chains.

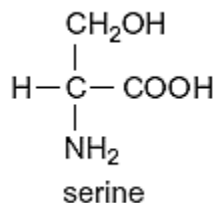
These hydrogen bonds are stronger compared to the van der Waals forces found in polyalkenes like polyethylene and polypropylene.

Consequently, the stronger intermolecular forces in polyamides result in fibers with superior strength and durability, making them ideal for such applications.

(3)

10.

(a)



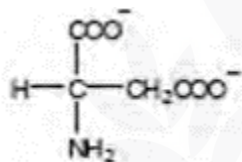
IUPAC name of serine:

2-amino-3-hydroxypropanoic acid

(1)

(b)

Following is the structure of the species formed when aspartic acid reacts with aqueous sodium hydroxide.



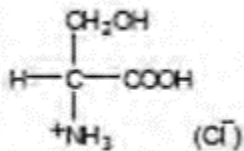
(1)

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!

(c)

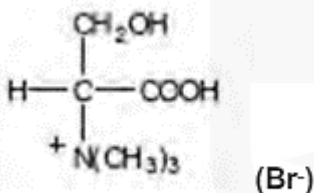
Following is the structure of the species formed when serine reacts with dilute hydrochloric acid.



(1)

(d)

Following is the structure of the species formed when serine reacts with an excess of bromomethane.



(1)

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!



DR. ASHAR RANA



**CHEMISTRY ONLINE
TUITION**

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- Chemistry, Physics, and Math's Tutor

CONTACT INFORMATION FOR CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK