

اسم: مسابقة في الثقافة العلمية- مادة الكيمياء  
الرقم: المدة: ساعة واحدة

**This Exam Includes Two Exercises numbered in pages 1 and 2.  
The Use of a Non Programmable Calculator is Allowed  
Answer the Two Following Exercises:**

### **First Exercise (10 points) Chocolate, The Natural Aspirin?**

....Chocolate has excellent healing virtues for the heart .This food improves the function of blood vessels. But we don't mean any kind of chocolate: only are effective the richest ones in specific molecules, the flavonols. These compounds, which are naturally present in cocoa, have positive effects on our vessels. Scientists have succeeded to show that consumption of chocolate, rich in flavonols, promotes the well-being of the artery wall , reinforces their elasticity and keeping a good blood flow.

Other studies even qualify this food with "natural aspirin", because of its similar effects on blood platelets: cocoa itself would also allow reducing clot formation ...

In all cases, consumption of chocolate bars must however be done without excess! Because before all, chocolate is made up of fat material and its caloric value content remains high, even if they are unsaturated fatty acids that can especially reduce bad cholesterol.

*Doctissimo.fr by Alain Sousa*

Every morning, a teenager eats a chocolate bar of 40 g. The bar label shows the following information :

<b>Nutritional Information</b>
Proteins: 2.80 g
Carbohydrates: 22.84 g
Lipids: 13.31 g
Fibres: 1.02 g
Sodium: 0.028 g

#### **Given:**

- 1g carbohydrates provides 16 kJ
- 1g lipids provides 38 kJ
- 1g proteins provides 17 kJ

### **Questions**

1-Referring to the text, answer the following questions:

- 1.1-Give the name of the molecules responsible for the healing virtues in chocolate.
- 1.2-Pick up the roles of the consumption of a chocolate rich in these molecules.
- 1.3- Specify why chocolate is considered as "natural aspirin".
- 1.4-Chocolate bars should not be consumed in excess. Justify.

2-Indicate the type of nutrient that is missing in the chocolate mentioned in the bar label.

3- Give the role of fibres in a diet.

4- Compare the molecular structure between saturated fatty acid and unsaturated fatty acid.

5- Proteins are macromolecules in which the monomer units are amino acids.

5.1 Write the general formula of  $\alpha$ -amino acid.

5.2 Name the bond that joins these monomers.

6-Calculate the energy provided to the teenager by this chocolate bar.

## Second Exercise (10 points)

### Maalox<sup>®</sup> and Acid reflux

Acid reflux is when the excessive gastric acid leaks up into the esophagus. This may cause heartburn ...

One of the fast acid reflux treatments is the use of anti-acids. These are alkali liquids or tablets that neutralize the acid.

One of the most popular anti-acid is: Maalox<sup>®</sup>.

An extracted leaflet is given below.

#### **MAALOX<sup>®</sup> chewable tablets**

##### **Composition:**

Each tablet contains:

400 mg of Dried Aluminum Hydroxide Gel, 400 mg of Magnesium Hydroxide.

Excipients: Mannitol Powder (E421), Sucrose, Saccharin sodium, Sorbitol (E420), Peppermint oil, Seelock peppermint flavour, Talc, Magnesium stearate.

##### **Properties and indications:**

Maalox is an anti-acid that provokes the neutralization of acidity resulting in the increase of the pH... It is used in a symptomatic treatment of an acid reflux, in pain and in therapy of gastroduodenal ulcer....

##### **Posology and method of administration**

The route of administration is oral.

Recommended Dosage

Adults: 1-2 tablets chewed 4 times daily, taken 20 minutes to 1 hour after meals and at bedtime.

##### **Contra-indications**

Use in severely weakly patients or in those suffering from kidney failure.

##### **Special warnings and precautions for use**

Aluminum hydroxide may cause constipation due to its severe action; this effect may be balanced by the healing effect of the magnesium salts.

##### **Undesirable effects**

Gastrointestinal side-effects are uncommon.

Occasionally high doses of antacids may cause diarrhea or constipation.

[http://www.imb.ie/view\\_spc.asp?pa\\_number=PA0540%2F110%2F004&type=HUMAN](http://www.imb.ie/view_spc.asp?pa_number=PA0540%2F110%2F004&type=HUMAN)

#### **Questions**

1-Referring to the text, answer the following questions:

1.1- Name the active ingredients of Maalox<sup>®</sup>.

1.2-Specify how does Maalox<sup>®</sup> relief the pain of an acid reflux .

1.3- Give the possible pharmaceutical forms for an anti-acid.

1.4-Indicate in which cases, it is not preferable to take Maalox<sup>®</sup>.

2- Indicate the side effect of an anti-acid where aluminium hydroxide is the only active ingredient present in it.

3-Specify if the active ingredients of Maalox<sup>®</sup> have a basic or acidic characteristic.

4- Match for each excipient its function:

Excipient: Saccharine – Magnesium stearate

Function: Lubricant – Sweetner.

5- Maalox<sup>®</sup> is manufactured by synthesis, give two other methods for making drugs and give an example of each.

6-Effervescent anti-acid contains among others, sodium bicarbonate and citric acid or tartaric acid. Interpret the effervescent action result from dissolving a tablet of effervescent anti-acid in a cup of water.

معيار التصحيح في مسابقة الثقافة العلمية  
مادة الكيمياء

### First exercise (10 points)

Part of Q	Answer	Mark
1.1	The name of the molecules responsible for the healing virtues in chocolate: Flavonols.	0.75
1.2	The consumption of a chocolate rich in these molecules: promotes the well-being of the artery wall, reinforces their elasticity and keeping a good blood flow.	1
1.3	Chocolate is considered as "natural aspirin" because of its similar effects on blood platelets: cocoa itself would also allow reducing clot formation.	1
1.4	Chocolate bars should not be consumed in excess because chocolate is made up of fat material and its caloric value content remains high.	1
2	The type of nutrient that is missing in the chocolate mentioned in the bar label is: vitamins	1
3	Fibers help intestinal transit.	0.5
4	These two acids are carboxylic acids In a saturated fatty acids all the bonds between carbon atom are simple bond while unsaturated fatty acid contains at least one double bond between its carbon atom and the others are simple bond.	1.5
5.1	The general formula of $\alpha$ -amino acid : $\begin{array}{c} \text{R}-\text{CH}-\text{COOH} \\   \\ \text{NH}_2 \end{array}$	1
5.2	Peptide bond.	0.75
6	Energy provided by this bar is : $(2.8 \times 17) + (22.84 \times 16) + (13.31 \times 38) = 918.82 \text{ kJ.}$	1.5

### Second exercise (10 points)

Part of Q	Answer	Mark
1.1	Active ingredients are: Aluminum hydroxide and magnesium hydroxide.	1
1.2	Maalox® relief the pain of an acid reflux by neutralizing the acidity resulting in the increase of the pH.	1
1.3	The possible pharmaceutical forms for an anti-acid : liquids and tablets	1
1.4	This medicine is contra-indicated in severely weakly patients or in those suffering from kidney failure.	1
2	In this case aluminium hydroxide may cause constipation.	1
3	The active ingredients of Maalox® have a basic characteristics since it neutralize the excessive gastric acid in the stomach.	1
4	Saccharine: sweetner. Magnesium stearate: lubricant.	1
5	Medicinal drugs could be made also by fermentation like antibiotics and by extraction from animals like insulin.	2
6	Effervescence results from carbon dioxide which is obtained by the reaction between sodium bicarbonate and citric acid or tartaric acid in water.	1