
اسم: _____
رقم: _____

مسابقة في الثقافة العلمية: الكيمياء
المدة ساعة واحدة

This Exam Includes **Two Exercises**. It Is Inscribed on 2 Pages Numbered 1 and 2.

Answer The Two Following Exercises:

First Exercise (10 points)
Take Two Aspirin*

As we enter the twenty-first century, new uses are being found for a drug that was first discovered 2400 years ago. Then, the Greek physician Hippocrates told patients who suffered headaches, fevers, and labour pains to chew willow bark. But it was not until 1763 that doctors knew what was inside the willow bark that relieved pain. English physician Edmund Stone found that magic chemical, *salicin*, which has since been synthesized into *acetylsalicylic acid*, or aspirin.

Today, aspirin is being used as more than just a pain killer. In 1991, American Cancer Society researchers reported that aspirin may be used to prevent colon cancer. They discovered that people who used aspirin 16 or more times per month for at least a year cut their death rates from colon cancer nearly in half.

Pregnant women may also reap the benefits of aspirin. In the past, doctors have warned women not to take aspirin during pregnancy because it promotes bleeding and discourages the uterus from contracting delivery. Under a doctor's careful supervision, low doses of aspirin may actually help pregnant women who are risk for a complication of pregnancy called *preeclampsia*. Preeclampsia can cause the death of both mother and child. If aspirin proves to be successful, many lives will be saved. Aspirin is, more than ever before, being touted as a wonder drug for headache sufferers. In a recent study, 20 % of migraine sufferers had fewer migraine headaches after following a regimen of one aspirin every other day. Scientists are now studying theories that aspirin may prevent strokes, curb gum disease, prevent gallstones, relieve allergies, and retard cataracts. The world's "newest" drug may be one of its oldest.

*Adapted from World Book Health & Med 1993, pp. 38 – 53

Questions:

- 1- State the different ways used to prepare a medicinal drug and give an example for each way.
- 2- Analgesics are divided into three groups: narcotics, anti-pyretics and anti-rheumatics. Associate for each group one of the following therapeutic domains: to decrease fever; to reduce inflammation; to eliminate severe pains. Indicate to which group (or groups) aspirin belongs.
- 3- The use of aspirin has many advantages and few disadvantages. State one disadvantage and propose a medicinal drug that can replace aspirin.
- 4- Referring to the passage, answer the following questions:
 - a) Pick up the sentence that indicates if aspirin is a natural or a synthetic medicinal drug.
 - b) Give the name of the chemical compound that constitutes aspirin.
 - c) Give two therapeutic effects showing that aspirin exceeds its analgesic role.
 - d) Pick up the reasons which justify the conclusion given by the passage: "The world's "newest" drug may be one of its oldest".

Second Exercise (10 points) The Vegetarian Diet *

" The vegetarian diet is followed by a great extent of the world population, ... The number of the vegetarian people has increased... since the discovery of several diseases, especially in cows, chickens and sheep ("crazy" cow, dioxin chicken and aphthous fever).

...In fact, the vegetarianism decreases the risks of cardio-vascular diseases and of breast or colon cancers.

Statistics has shown that this alimentation (nutritional) mode, provides a longer life hope, better than that of a "normal" mode, because it is generally less rich in lipids and so, it is more save.

...Vegetables as meat are able to supply proteins for the organism. However, it is true that vegetarians should mix their food (vegetables and dairy products) to obtain a complete supply in proteins. Thus in Africa, it is required to mix mil**, millet** and sorghum** to obtain the eight essential amino acids.

... Carbohydrates, ..., are classified into three kinds :...

Lipids are present in vegetables but in amounts much less than in meat. ... They are easily stored and are often the cause of an overweight (obesity).

Consumption of fruits and vegetables is recommended for their low rate of glucose in blood, because they are essentially composed of fructose and alcoholic sugar, and they have a weak energy value which is benefit especially for diabetics.

Fruits and vegetables are also source of fibers (from 10 % to 30 % of the dried weight). Their consumption is recommended because, under a hydrocarbon form, fibers stimulate the digestive elimination of cholesterol which is useful for overweighed persons.

The vegetarian diet provides a wide variety of minerals and vitamins.

...The vegetarian diets can be the causes of deficiency:

"The more frequent deficiency is that of vitamin A, of iodine and of iron. ... The vitamins B₁₂ and D deficiency is more rare but, even though, can lead to serious diseases like anaemia, rachitis or even neurological problems (mental retardation)".

* <http://www.ipm.2001.com/smestres/>

** Cereals.

Questions

- 1- Name the three groups of carbohydrates and give an example of each.
- 2- Write the general formula of alpha amino acids.
- 3- Alpha amino acids have an important role in building up the organism. Explain this role, by specifying the nature of the bond that leads to this process.
- 4- Referring to the passage, answer the following questions:
 - a) Cholesterol is a lipid which becomes very dangerous when it exceeds certain limits. Explain how vegetarians can avoid this danger.
 - b) Indicate the reason which increased the number of vegetarians in the last years.
 - c) Explain why vegetarians should mix their food. Illustrate with an example.
 - d) Vitamins are classified into liposoluble and hydrosoluble.
Give the meaning of each of the above two terms. Deduce why vegetarian diets can cause vitamin A. deficiency.

First exercise (10 points)

Take Two Aspirin

Expected Answers	Marks	Comments
1– Drugs can be prepared: by synthesis (aspirin); by fermentation or microbiological cultures (antibiotics); by extraction from plant sources (opium), or animal sources (insulin).	8 x ¼	
2 – Narcotics are used to eliminate severe pain. Anti-pyretics are used to reduce fever. Anti-rheumatics are used to reduce inflammation. Aspirin belongs to the anti-pyretic and anti-rheumatic groups.	3 x ½ 2 x ½	
3– Aspirin, which is acid, causes a severe damage to the stomach leading to significant bleeding. It can be replaced by panadol which is a non-acidic medicinal drug.	2 x ½	Any other non-acidic medicinal analgesic drug is acceptable as Tylenol.
4 – a) The sentence that indicates aspirin is a synthesized product is the following: The English physician Edmund Stone found that magic chemical, salicin, which has since been synthesized into acetylsalicylic acid, or aspirin.	1	
b)The chemical compound that constitutes aspirin is acetylsalicylic acid.	½	
c) The two therapeutic effects are: - Aspirin may be used to prevent colon cancer. - Under a doctor’s careful supervision, low doses of aspirin may actually help pregnant women who are risk for a complication of pregnancy called preeclampsia.	½ ½	
d) The reasons that justify the conclusion are: - The Greek physician Hippocrates told patients who suffered headaches, fevers, and labour pains to chew willow bark. - Scientists are now studying theories that aspirin may prevent strokes, curb gum disease, prevent gallstones, relieve allergies, and retard cataracts. So aspirin is the “newest” drug.	1 1	

Second exercise (10 points)

The Vegetarian Diet

Expected Answers	Marks	Comments
1– The three groups of carbohydrates are: - monosaccharides (glucose, fructose,...) - oligosaccharides (sucrose, maltose,...) - polysaccharides (starch, cellulose,...)	6 x ¼	Examples should be compatible with the groups.
2 – The general structural formula of an alpha amino acid is: $\begin{array}{c} \text{R} - \text{CH} - \text{COOH} \\ \\ \text{NH}_2 \end{array}$	½	
3– The condensation between the carboxyl group of an alpha amino acid and the amino group of another alpha amino acid leads to the formation of a peptide bond. Proteins that build the organism are polypeptides obtained when more than 100 amino acids are linked together by peptide bonds in one chain.	2	
4 – a) The vegetarian diet, based on fruits and vegetables is less rich in lipids than meat. It is a source of fibers which stimulates the digestive elimination of cholesterol.	1 ½	
b) The discovery of several diseases, especially in cows, chickens and sheep (crazy cow, dioxin chicken and aphthous fever) has increased the number of vegetarians during the last years.	1	
c) Vegetarians should mix their foods (vegetables and dairy products) in order to obtain a complete supply in proteins. Thus in Africa it is required to mix millet and sorghum to obtain the eight essential amino acids.	1 ½	
d) The term liposoluble means that the species is soluble in lipids. The term hydrosoluble means that the species is soluble in water. Fruits and vegetables that are constituted essentially of water and not rich in lipids cause a vitamin A deficiency, because vitamin A is liposoluble.	2 x ½	1