

اسم: _____
رقم: _____

مسابقة في الثقافة العلمية- مادة الكيمياء
المدة: ساعة واحدة

**This Exam Includes two Exercises. It is inscribed on two pages numbered 1 and 2.
The Use of a Non-Programmable Calculator Is Allowed.**

Answer the Two following Exercises:

First Exercise (10 points) Dietary Factors and Heart Disease Risk

A number of studies have demonstrated an inverse relationship between the consumption of fruits and vegetables and the incidence of cardiovascular disease.... Fruits, vegetables, whole grains, and legumes are good sources of fiber, vitamins, minerals, and phytochemicals.

Soluble fibers, such as those in oat bran, legumes, ... have been shown to reduce blood cholesterol levels and therefore reduce heart disease risk. The vitamins (such as C and E), minerals, and phytochemicals in plant foods protect against heart disease because many have antioxidant functions. Antioxidants decrease the oxidation of LDL cholesterol and therefore are hypothesized to prevent development of plaque in artery walls.

Adequate intakes of vitamin B₆, vitamin B₁₂, and folic acid (B₉) can help protect against heart disease because they keep blood levels of the amino acid homocysteine low.

Niacin (B₁) is another B vitamin that may affect heart disease risk. When consumed in extremely high doses the nicotinic acid form of niacin can be used to lower blood cholesterol.

Extracted from: Smolin, L., Grosvenor, M. Nutrition: science&applications. WILEY, 2007.

Questions

1. Referring to the text :

- 1.1. Pick out two sentences showing the importance of vitamins B in protecting against heart disease.
- 1.2. Justify the suggestion to use vitamins C and E as supplements to reduce the risk of cardiovascular disease.
2. Vitamins are classified into hydrosoluble vitamins and liposoluble vitamins.
 - 2.1. Indicate the criterion for this classification.
 - 2.2. Give the class of each of the vitamins listed in the text.
3. It is advised to consume raw fruits and vegetables rather than to consume them cooked in water at high temperature. Give two reasons justifying this advice.
4. Choose the correct answer:
 - 4.1. The chemical elements that constitute simple lipids:
 - a. C, H and N
 - b. C, H and O
 - c. H, O and N
 - 4.2. The energetic nutrients are:
 - a. Vitamins and minerals
 - b. Water and fibers
 - c. Lipids and carbohydrates
5. The label of the dark chocolate << *lindt* >> shows, among others, the following nutritional information per 100g:
Carbohydrates: 23 g ; protein: 9.2 g ; total fat: 47g (of which is cholesterol) ; dietary fibers: 15.2 g ; and sodium: 12mg.
Given: 1g of carbohydrates gives 3.75 kcal, 1 g of proteins gives 4 kcal, 1 g of lipids gives 9 kcal

- 5.1. Although diets high in cholesterol increase the risk of heart disease, cholesterol is still essential for the body. Indicate the role of cholesterol in the human body.
- 5.2. Calculate the energy value of 100 g of << *lindt* >>.

Second Exercise (10 points) Treatment of Arthritis

Arthritis means inflammation of joints. This inflammation leads to stiffness, pain, instability and weakness in the body that worsens with age. Arthritis-related inflammation is usually treated with a combination of natural anti-inflammatory solutions, such as supplements, rest, exercise, and inflammatory diet, or with prescription or over-the-counter medications.

Ibuprofen (Motrin[®]) is a non-steroidal anti-inflammatory drug. Non-steroidal anti-inflammatory drugs don't have steroidal nucleus and are the most widely used anti-inflammatory drugs recommended by physicians.

Ibuprofen helps to reduce blood loss from heavy menstrual bleeding and also used for relief of symptoms of arthritis (osteoarthritis).

Many people have experienced side effects to non-steroidal anti-inflammatory drugs and other anti-inflammatory drugs, including nausea, gastrointestinal bleeding, raised liver enzymes, diarrhea, headache, dizziness, salt and fluid retention.

Extracted from: "Wikipedia, free encyclopedia, A DRUG information sheet (Drugs and Arthritis), Science Daily (Sep, 2005 Aug, 2007)".

Questions

1. Referring to the text, answer the following questions:
 - 1.1. Pick out the four symptoms of arthritis.
 - 1.2. Give the generic name and the trade name of the anti-inflammatory drug used for treating arthritis.
 - 1.3. Indicate two side effects of using non-steroidal anti-inflammatory drugs.
2. Correct the following two statements:
 - 2.1. Non-steroidal anti-inflammatory drugs are used to inhibit the growth of microorganisms.
 - 2.2. Two symptoms of Cortisone overdose which is a steroidal anti-inflammatory drug are weight loss and nausea.
3. Match the items in column A to the corresponding items in column B.

Column A	Column B
a. Bactericidal antibiotics	i. Kill fungi
b. Fungicidal antibiotics	ii. Reduce the excessive gastric acid
c. Anti-acids	iii. Kill bacteria
d. Tranquilizers	iv. Relieve anxiety
4. In certain infection cases, such as otitis in infants, treatment with anti-inflammatory is associated with antibiotic.
 - 4.1. In case where the bacterium of otitis infection is unknown, specify, in terms of its spectrum, the nature of the antibiotic to be prescribed.
 - 4.2. Once antibiotic treatment is started, it is very important that patient continues to take his/her antibiotic dosage as prescribed, even if he/she recovers. Justify.

First Exercise: (10 points) Dietary Factors and Heart Disease Risk

Part of the Q	Answer	Mark
1.1.	Vitamins B can help protect against heart disease because they keep blood levels of homocysteine low. Niacin another B vitamin can be used to lower blood cholesterol.	1
1.2.	Vitamins C and E have antioxidant properties so that they can be used to decrease the oxidation of LDL cholesterol and prevent the development of plaque in artery walls.	1
2.1	The basic criterion for this classification is the solubility in water or in lipids. Vitamins that are soluble in water are hydrosoluble Vitamins that are soluble in lipids are liposoluble	1
2.2	Vitamins: C, B ₆ , B ₁₂ , folic acid(B ₉) and niacin(B ₁) are all hydrosoluble vitamins. Vitamin E is a liposoluble vitamin.	1.5
3	- If fruits and vegetables are cooked, water soluble vitamins such as Vitamins B ₆ , B ₁₂ , folic acid and niacin can be washed away in cooking water. - The higher the temperature is, the more the loss of the vitamins is large because certain vitamins are sensitive to heat (thermosensitive) and can be destroyed at high temperature.	1.5
4.1.	b.	0.5
4.2.	c.	0.5
5.1.	Cholesterol plays an important vital biological role in chemical synthesis within the human body, it is the starting materials for the synthesis of numerous steroid hormones and vitamin D.	1
5.2.	Energy value = (9.2 × 4) + (47 × 9) + (23 × 3.75) = 546.05 kcal	2

Second Exercise: (10 points) Treatment of Arthritis

Part of the Q	Answer	Mark
1.1	This inflammation leads to: stiffness, pain, instability and weakness in the body that worsens with age	1
1.2	The generic name: ibuprofen ; the trade name: Motrin®	1
1.3	Side effects of non-steroidal anti-inflammatory drugs include nausea, gastrointestinal bleeding, raised liver enzymes, diarrhea, headache, dizziness, salt and fluid retention.	1
2.1	,Non-steroidal anti-inflammatory drugs are used to eliminate inflammation	1
2.2	Two symptoms of Cortisone overdose are which is a steroidal anti-inflammatory drug are overweight and hypertension	1
3	a. iii b. i c. ii d. iv	2
4.1	In case the infection is unknown, the prescribed antibiotic is broad spectrum antibiotic that acts on wide variety of microorganisms.	2
4.2	Patients should continue to take their antibiotic dosage as prescribed, in order to prevent resistant bacteria.	1