

الاسم:
الرقم:مسابقة في الثقافة العلمية: كيمياء
المدة ساعة واحدة

This Exam Includes **Two Exercises**. It Is Inscribed on 2 Pages Numbered **1** and **2**.
The Use of A Non-programmable Calculator Is Allowed.

Answer The Following Two Exercises:**First Exercise (10 points)****Olive oil**

... "Olive oil is an oil rich in mono-unsaturated fatty acids. It could accelerate and increase the excretion of cholesterol from the small intestine. We taught, 20 years ago, that: the animal fats increase cholesterol; the poly-unsaturated vegetable oils decrease cholesterol; the mono-unsaturated vegetable oils do not have this effect on cholesterol while the fish oils (in cod-liver oil form) are good to prevent rickets. Today, researches show that the mono-unsaturated oils, as the ancient olive oil or the modern canola oil, have the power to decrease selectively the bad cholesterol (LDL) and to conserve the good cholesterol (HDL). Olive oil is beneficial not only for the cardio-vascular system because it decreases the blood cholesterol. This oil is also beneficial for the digestive system since it inhibits partially the gastric secretions and could cure the irritated or ulcerated stomach. This oil increases the concentrations of the gall-bladder and permits then to combat (fight) constipation. Olive oil slows down the pancreatic secretions and puts in rest this organ (*pancreas*) which is easily overworked by excessive consumption of proteins and greases. This oil increases the absorption of minerals especially that of calcium. The use of this oil is favourable for the tubercular patients.

The virgin (crude) olive oil under the first cold pressing, contrary to the commercial poly-unsaturated oil, limits seriously the oxidation of lipids and particularly that of the cholesterol (LDL). Oxidation is a highly destroying phenomenon because it produces free radicals which are certainly a cause for cancer and accelerated ageing. Olive oil, being a mono-unsaturated one, could be really considered as a protector to the ravages (life's marks) of ageing".

Extracted from " Le mal du gras (pp 177-178), Daniel Starenkyj, ORION – Inc (Québec) – septembre 2000".

Questions:

- 1- State the two classes of lipids and specify that of olive oil. Give the names of the chemical elements corresponding to the class of olive oil.
 - 2- State two functions of lipids in the human body.
 - 3- The general formula of a fatty acid is $R - COOH$. Specify the difference in structure between the three kinds of fatty acids: saturated, mono-unsaturated and poly-unsaturated.
 - 4- Give the meaning of the representation (18 : 2) of a fatty acid.
- Referring to the above passage, answer the two following questions:
- 5- Explain how olive oil could:
 - a) Help the maintenance of bones and teeth;
 - b) Protect the human body against cancer and accelerated ageing.
 - 6- State two other benefits of olive oil.

Second exercise (10 points)
Vitamin C UPSA effervescent 1000 mg

The notice of vitamin C UPSA effervescent 1000 mg includes, among others, the following information:

- **Effervescent tablet.**
 - **Composition:**
ascorbic acid (vitamin C): 1000 mg;
excipients: sodium bicarbonate (283 mg of sodium), dry citric acid, sugar, sodic saccharin, macrogol 6000, sodium benzoate, yellow orange, s.q.f. (sufficient quantity for) an effervescent tablet.
 - **Pharmaceutical form:** effervescent tablet. Box of 2 tubes of 10 each.
 - **Pharmaceutical class:** vitamin C.
 - **In what case (s) the medicinal drug is used?** This medicinal drug is advised to adults for:
the treatment of vitamin C deficiency (scurvy);
the momentary over-tired cases.
 - **Attention:** in what case (s) this medicinal drug is not used?
The medicinal drug should not be used in the following cases: hypersensitivity to one of its components; kidney stone; in cases of: intolerance to fructose, syndrome of the bad absorption of glucose and galactose or deficiency in sucrase-isomaltase, due to the presence of sucrose.
IN CASE OF DOUBTING, IT IS INDISPENSABLE TO CONSULT YOUR PHYSICIAN OR PHARMACIST.
 - **Precautions of use:**
It is desired not to take vitamin C after day time due to its stimulating effect.
Take into consideration the cases of persons that follow a strict diet poor in salt.
...
 - **Medicinal interactions and other interactions:**
... When consumed at high doses (more than 2 g/day), ascorbic acid could interfere with the following biological tests: creatine and glucose, blood and urine (control of diabetes by the glucose-oxidase strip).
....
- Extracted from the notice of the vitamin C UPSA effervescent 1000*

Questions:

- 1- This medicinal drug is presented as a 1000 tablet form. State two other formulations of a medicinal drug and indicate the way to administrate each.
- 2- Give the meaning of the term: active ingredient of a medicinal drug. Give the name of the active ingredient in this vitamin.
- 3- Justify if people that follow a diet poor in salt could take vitamin C UPSA.
- 4- Write the word equation of the hydrolysis reaction of sucrose.
- 5- Explain how the presence of sucrose justifies the recommendation present in the notice: "The medicinal drug should not be used in the following cases: ... intolerance to fructose, to syndrome of the bad absorption of glucose and galactose or the deficiency in sucrase-isomaltase, due to the presence of sucrose. ...".
- 6-
 - a) Give the role of each of the following excipients: sweetner and preservative
 - b) Pick out from the above notice an example of the excipients mentioned in a)..

Expected answer	grade	Comments
1- The two classes of lipids are: simple lipids and complex lipids (phospholipids). Olive oil is a simple lipid. The elements constituting simple lipids are carbon, hydrogen and oxygen.	0.5 0.5 0.5	
2- The functions of lipids in the human body are : - Important source of energy ; - certain lipids are constituents of the main component of the cell membranes ; - Cholesterol plays a vital biological role in chemical synthesis. It is the starting material in the synthesis of numerous biological products (hormones, vitamin D).	1 1 1	
3- A saturated fatty acid has a saturated carbon chain, the mono-unsaturated fatty acid possesses a double bond in its carbon chain and the poly-unsaturated acid possesses more than one double bond in its carbon chain.	1.5	
4- The representation (18 : 2) means that the carbon chain contains 18 carbon atoms and two double bonds.	1	
5- a) Olive oil increases the absorption of minerals specially calcium which is a principal constituent of bones and teeth. So, olive oil favours the maintenance of bones and teeth b) Virgin olive oil, under the first cold pressing, contrary to commercial unsaturated oil, limits the oxidation of lipids. So olive oil could protect the body from cancer and accelerated ageing.	1 1	
6- Other benefits of olive oil are : - It has the power to decrease selectively the bad cholesterol (LDL) and to conserve the good cholesterol (HDL) ; - It is beneficial for the digestive system since it inhibits partially the gastric secretions and could cure the irritated or ulcerated stomach ; - It increases the concentrations of the gall bladder and permits to fight constipation ; - It slows down the pancreatic secretions and puts in rest this organ (pancreas) which is easily overworked by excessive consumption of proteins and greases.	2x0.5	

Second Exercise (10 points)
Vitamin C UPSA effervescent 1000 mg

Expected answer	grade	Comments
1- Capsule : oral way; cream and ointment: cutaneous way (relative to skin); solution: oral way	4x0.5	
2- Active ingredient: responsible for the therapeutic effect of the medicinal drug. The active ingredient of this drug is ascorbic acid .	2x1	
3- Among the excipients of Vitamin C UPSA, there are the sodium compounds: sodium bicarbonate, sodic saccharin, sodium benzoate. So, a patient following a diet poor in salt should not take this drug which is rich in salt.	2	
4- The word equation of the hydrolysis of sucrose is : Sucrose + water → glucose + fructose	1	
5- Hydrolysis of sucrose gives fructose and glucose, this explains the recommendation for patients, who have problems of intolerance to fructose and syndrome of the bad absorption of glucose, to stop taking vitamin C.	1	
6-		
a) The role of sweetener is to give a sweet taste to the drug to make it edible. The role of preservative is to prevent the development of microorganisms.	2x0.5	
b) Sodic saccharin is a sweetener and benzoic acid is a preservative.	2x0.5	