

مسابقة في الثقافة العلمية - مادة الكيمياء
الاسم: _____
الرقم: _____
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 Following Two Exercises:

First Exercise (10 points)
Is Milk Still a Milk?

Milk, as a drink and food at the same time, which is rich in calcium, is a symbol of strength and health. It is a common factor among all mammals; it gives to the new-born its initial fuel, the antibodies that protect it from infection and the needed nutrients for its development. ...

... There is a problem; milk, being a life product rich in acidifying germs, is not easily conserved and if it is not frozen or boiled, it is "spoiled". ...

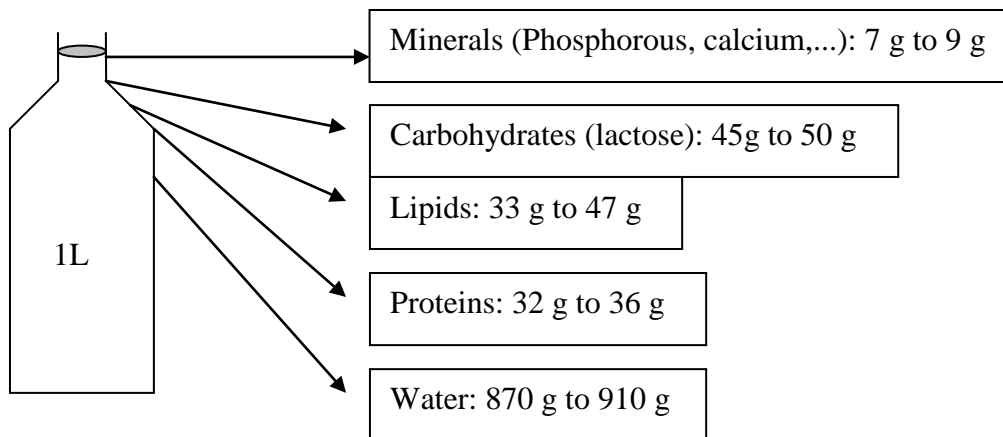
... Sterilization was used to keep glass bottles of milk more than 20 minutes at 120 °C in a sterilizer. ... So, sterilized milk became brownish, with a pronounced taste of burning ... and with no more trace of vitamins. While pasteurized milk often lost its objective: to eliminate pathogen germs, especially the bacillus of Koche, *Mycobacterium tuberculosis*.

Asepsis* guarantee

Today, the pasteurized milk offers the guarantee of satisfying hygiene. Its organoleptic characteristics (its taste, its flavor and its texture) are close to those of raw milk. Unfortunately, milk can not be conserved more than 7 days by cooling. Due to this, the UHT (ultra-high temperature) sterilization is developed UHT milk, barely heated for few seconds between 135 °C and 150 °C, may be conserved for three months at room temperature. ...

The Mother is in a Bottle

Although the density of raw milk varies according to the region from which it is collected, it is still a complete food rich in nutrients.



Translated from : *Science & VieN* ° 978 – Mars 1999.

* **Asepsis** : A preventive method that opposes infectious diseases.

Given: Energy value for 1 g of nutrient:

- Carbohydrates: 17 kJ ;
- Lipids: 38 kJ ;
- Proteins: 17 kJ.

Questions :

- 1- In the passage, milk is described as a drink and food at the same time . Explain this description.
- 2- Explain why milk is not easily conserved.
- 3- " Is Milk Still a Milk ?" Pick out from the passage the sentences that justify this title.
- 4- Milk contains vitamins A, D and B₂ . Justify why skimmed milk is poor in vitamins A and D while the dehydrated milk is poor in vitamin B₂ .
- 5- Lactose is the carbohydrate of milk.
 - a) Give the names of the chemical elements that constitute this carbohydrate.
 - b) Choose, among the following equations, the one that shows the formation of lactose:
 - i. Glucose+ fructose → lactose + water.
 - ii. Glucose + galactose → lactose + water.
 - iii. Fructose + galactose → lactose + water.
 - iv. Glucose + glucose → lactose + water.
- 6- Determine the minimal energy value of one liter of milk in the bottle.

Second Exercise (10 points)

The heart Suffers from Anti-inflammatories

After few months from the withdrawal of Vioxx[®] from the market, other inflammatories currently prescribed are also responsible for the increase of the risk of heart attack. According to a british study that covered 9218 cases of first time heart attack, the persons suffering from the infarctus were also those that had often consumed anti-inflammatories. The infarctus risk varied with the medicinal drug. This risk exceeded 55% with diclofenac, 32% with rofecoxib (Vioxx[®]), 24% with ibuprofen and 21% with celecoxib. However, based on the opinions of those who made this study, certain indirect interpretations should not be neglected because the survey was based on retrospective study of medical files which made the percentage of risk not precise.

Translated from : *Science & Vie N° 1055 – Août 2005.*

Questions

- 1- Indicate the therapeutic effect of anti-inflammatories.
- 2- Name the two groups of anti-inflammatories.
- 3- Cortisone is an anti-inflammatory. Indicate the groups that belong to cortisone and give two undesirable effects for an overdose of it.
- 4- Compare the therapeutic effects of the three medicinal drugs : Vioxx[®] , Aspirin[®] and Panadol[®] .
- 5- Referring to the text, justify if Vioxx[®] is the only anti-inflammatory which increases the risk of heart attack.

First exercise (10 points)		
Expected answer	Mark	Comments
1- Milk is rich in the principal nutrients ; carbohydrates, lipids, proteins, and minerals, so it is described as a food. Milk is rich in water, so it is described as a drink.	1 pt	
2- Milk is not easily conserved because it is a life product rich in acidifying germs.	1 pt	
3- Sterilized milk becomes brownish with a pronounced taste of burning and with no more trace of vitamins. Pasteurized milk often loses its objective : to eliminate pathogen germs, especially the bacillus of Koche.	1 pt	
4- The elimination of lipids from milk to obtain skimmed milk gives a milk poor in vitamins A and D which are liposoluble. Dehydrated milk is poor in vitamin B ₂ which is hydrosoluble because Dehydrated milk does not contain water.	1 pt	
5- a) The chemical elements that constitute lactose are carbon, hydrogen and oxygen. b) Glucose + galactose → lactose + water.	1 pt	
6- The minimal energy value of one liter of milk : (45 × 17) + (33 × 38) + (32 × 17) = 2563 Kj.	2 pt	
Second exercise		
1- An anti-inflammatory is a substance that reduces or eliminates inflammation.	1 pt	
2- The two groups of anti-inflammatories are steroidal and non-steroidal inflammatory agents.	2 pts	
3- Cortisone is a steroidal anti-inflammatory agent. The two undesirable effects resulting from an overdose of cortisone are : hypertension, overweight and obesity, decrease in size of the muscles, muscular paralysis, increase in the level of glucose in blood.	1 pt	
4- Vioxx [®] is an anti-inflammatory. Aspirin [®] is an analgesic, anti- pyretic, and anti-inflammatory. Panadol [®] is analgesic and anti-pyretic.	½ × 2pts	2 effects
5- No, Vioxx [®] is not the only anti-inflammatory that increases the risk of heart attack. In fact the infarctus risk exceeds 55 % with diclofenac, 32 % with rofecoxib (Vioxx [®]), 24 % with ibuprofen and 21 % with celecoxib.	½ × 6pts	
	2 pts	