

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

This Exam Includes 2 Exercises 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)
Carbohydrates

Carbohydrates are the major energy components in the food and in particular, in that of a sportsman. They provide 4 kcal/g.

Carbohydrates are subdivided into fast sugars and slow sugars according to the rate of their intestinal absorption.

For a sportsman, the choice of the quality of the consumed carbohydrates depends on the date of the competition:

- If, the date is far-off the slow carbohydrates are preferred in accumulating energy.
- If, the date is close (day before or especially the same day), the consumed carbohydrates are fast sugars which provide a supply of energy immediately or in a very short period.

Dietary carbohydrates are considered fast when the glycemic index (GI) is high, below 55 as low (GI), between 55 and 70 as moderate (GI), and above 70 as high (GI).

The GI of glucose is 100 and that of fructose is 20.

The table below gives the glycemic index of some foods:

Food	Glycemic Index (GI)
Carrot	92
Honey	88
Brown rice	66
Sweeten (sucrose)	65
Orange	40
Milk	25
Complete pasta products	42
Mashed potatoes	80

Questions

- 1- Arrange the foods given in the table above into dietary carbohydrates: Rapid, moderate or slow.
- 2- Give the names of the chemical elements that constitute the carbohydrates.
- 3- Choose the correct answer(s) by justifying your choice:
To conserve a significant amount of energy, a sportsman participating in a competition after two days can intake:
a) Honey; b) Milk; c) Complete pasta products; d) Carrots.
- 4- Sucrose is formed by the condensation reaction of two monosaccharides.
4.1 - Write the word equation of the condensation reaction.
4.2- Give the reason why sucrose is not a reducing sugar.
- 5- Transform the table given above into a bar graph.

- 6- Starch is a polysaccharide that can be easily hydrolyzed in the presence of an acid or an enzyme:
- 6.1- Define polysaccharide. Give the name of a polysaccharide other than starch.
 - 6.2- Indicate the different steps of the hydrolysis of starch in acidic medium.
 - 6.3- Give the name of the enzyme that activates the transformation of starch into maltose.

Second Exercise (10 points)

The Oil in Grapefruit Pips, a Powerful Natural Antibiotic

...Already, we had made up a file: "Essential oil as assistance for antibiotics"... It has just appeared a new "Zorro" of the infection and inflammation, the pips oil of grapefruit.

Specific Properties of the Product

The action of the extract of grapefruit pips extends almost to 800 species of bacteria and virus, and almost to 100 species of fungi as well as to a very great number of unicellular parasites. ... The extract of grapefruit pips helps immunizing defenses, whereas the traditional antibiotics inhibit them.

In the intestinal level, whereas the extract of the grapefruit pips inhibits the harmful bacteria, it does not absolutely touch the indispensable **bifid*** and decreases a little bit the lacto-bacteria.

Therapeutic Applications

The oil of grapefruit pips is used for many years in the United States and it is actually found in all Swiss dietetic shops where it has met a great success.

It is used for: gastro-intestinal diseases, infestations by yeasts, urinary infections and for immune deficiencies...

The Composition of the Product

It is important that the extract should be issued from biological grapefruits ...

The chemical analysis of the extract reveals biflavonoïds and glucosides.

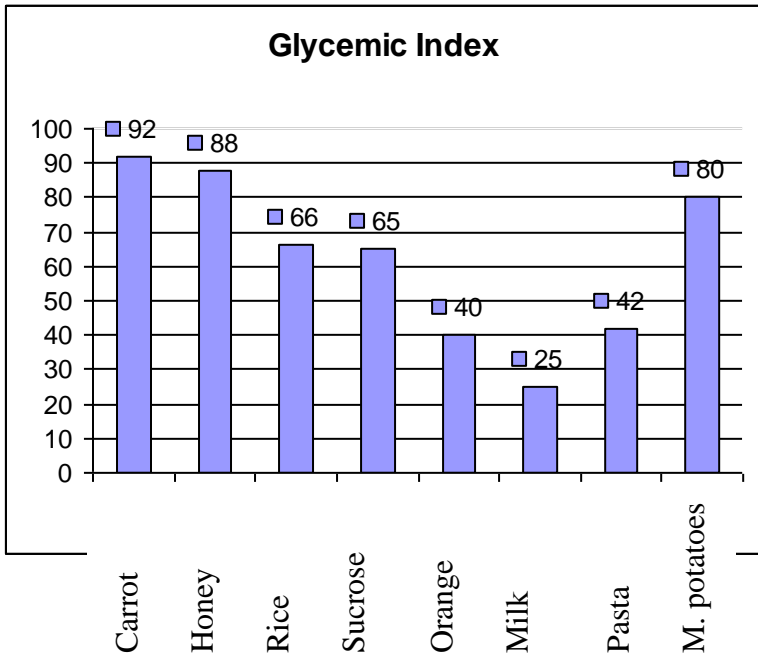
Extract of the magazine "Vérités Santé pratique".

* **Bifid**: bacterium having the role of a lactic yeast.

Questions

- 1- Refer to the text to indicate the active ingredient of pips oil of grapefruit.
- 2- Give the names of the two classes of antibiotics. Justify that the oil of grapefruit pips belong to these two classes.
- 3- Pick up from the text two expressions showing that this antibiotic has a broad spectrum.
- 4- Among the side effects of an antibiotic, one is very frequent: Diarrhea. Give its cause.
- 5- Referring to the text, answer by true or false. Justify the answer.
 - 5.1- Like the majority of antibiotics, the pips oil of grapefruit causes the diarrhea.
 - 5.2- Unlike antibiotics, the pips oil of grapefruit does not decrease immune defense.

First Exercise (10 points)
Carbohydrates

Part of the Q	Answer	Mark																		
1	Fast dietary carbohydrates: Carrot, Honey and mashed potatoes. Moderate dietary carbohydrates: Sugar and brown rice. Slow dietary carbohydrates: complete paste products, milk, oranges.	1.5																		
2	The chemical elements that constitute carbohydrates are: carbon, hydrogen and oxygen.	0.5																		
3	A sportsman having a competition after two days should intake slow dietary carbohydrates having a glycemic index lower than 55 helps accumulating energy: milk and complete paste products.	1.5																		
4.1	Sucrose is the result of the condensation of two monosaccharides: glucose and fructose. Glucose + fructose → sucrose + water.	1																		
4.2	Sucrose is a non-reducing sugar because the carbonyl functions are involved in the bond between the two monosaccharides.	0.5																		
5	<p>The bar graph</p>  <table border="1"> <caption>Glycemic Index</caption> <thead> <tr> <th>Food</th> <th>Glycemic Index</th> </tr> </thead> <tbody> <tr> <td>Carrot</td> <td>92</td> </tr> <tr> <td>Honey</td> <td>88</td> </tr> <tr> <td>Rice</td> <td>66</td> </tr> <tr> <td>Sucrose</td> <td>65</td> </tr> <tr> <td>Orange</td> <td>40</td> </tr> <tr> <td>Milk</td> <td>25</td> </tr> <tr> <td>Pasta</td> <td>42</td> </tr> <tr> <td>M. potatoes</td> <td>80</td> </tr> </tbody> </table>	Food	Glycemic Index	Carrot	92	Honey	88	Rice	66	Sucrose	65	Orange	40	Milk	25	Pasta	42	M. potatoes	80	2
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6.1	Polysaccharide is a polymer formed of a long chain and containing hundreds or thousands of monosaccharide. Another example, cellulose.	1																		
6.2	Starch is hydrolyzed to give dextrin then dextrin in its turn decomposes into maltose and then the maltose breaks up into two glucose.	1.5																		
6.3	The enzyme that activates the decomposition of starch into maltose is called amylase.	0.5																		

Second Exercise (10 points)
The Oil in Grapefruit Pips, a Powerful Natural Antibiotic

Part of the Q	Answer	Mark
1	The active ingredients of pips oil of grapefruit is biflavonoïdes.	1
2	The two classes of antibiotics are: bactericide and fungicide. The action of the extract of grapefruit pips extends almost to 800 species bacteria and virus; it is a bactericide. It also extends almost to 100 fungi species as well as to a very great number of unicellular parasites. ...; it is a fungicide.	3
3	The two expressions are: "The action of the extract of grapefruit pips extends to 800 species of bacteria and virus and almost to 100 species of fungi as well as to a very great number of unicellular parasites..." and "It is used in the gastro-intestinal diseases, infestations by yeasts, urinary infections, immune deficiencies..."	3
4	The use of antibiotics disturbs intestinal flora and destroys its bacteria which causes diarrhea.	1
5.1	False. In the intestine, the extract of grapefruit pips inhibits harmful bacteria and does not touch the bifid and decreases little bit the lacto-bacteria.	1
5.2	True. The extract of grapefruit pips helps immune defenses.	1