


المادة: الكيمياء الشهادة: الثانوية العامة فرع: الاجتماع والاقتصاد/ الآداب والانسانيات نموذج رقم - 2 - المدة : ساعة واحدة	الهيئة الأكاديمية المشتركة قسم: العلوم	 المركز العربي للبحوث والدراسات
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نموذج مسابقة (يراعي تعليق الدروس والتوصيف المعدل للعام الدراسي 2016-2017 حتى صدور المناهج المطورة)

This exam includes two exercises. The use of a non- programmable calculator is allowed. Answer the following two exercises:

### Exercise 1 (10points)

#### Sodium Benzoate and Ascorbic Acid

Manufacturers have used sodium benzoate (and its family close to benzoic acid) for a century to prevent the growth of microorganisms in acidic food. These substances are produced naturally in many plants and animals. These additives appear to be safe for most people, but they cause hives (skin rash), asthma, or other allergic reactions in sensitive individuals.

Another problem occurs when sodium benzoate is used in beverages that also contain ascorbic acid (Vitamin C). Both substances can react together, in an acidic solution, to form small amounts of benzene, a chemical product that causes leukemia and other cancers. Although the amounts of benzene that form are small, they can lead to a small risk of cancer. In the early 1990s, the FDA (**Food and drug Administration**) had urged companies not to use benzoate in products that also contain ascorbic acid.

*Adapted from: <http://www.cspinet.org/reports/chemcuisine.htm#dyes>*

Some average nutritional value for 100 g Pineapple		Energy value for 1 g of nutrient	
Proteins 0.54g	Carbohydrates (sucrose) 13.52g	Proteins: 17 kJ	
Lipids 0.12g	Vitamin C 47.8mg	Carbohydrates: 16 kJ	
Sodium 1 mg	Potassium 109mg	Lipids: 38 kJ	
Calcium 13mg	Magnesium 12mg		
Water 80g			
<i><a href="http://www.nutrition-and-you.com/pineapple.html">http://www.nutrition-and-you.com/pineapple.html</a></i>			
Average daily needs of some mineral ions :			
Minerals	Ca	K	Mg
Daily needs(in mg)	600-1000	3000-4000	300-400

#### Document-1

#### Questions:

##### 1. Referring to the text:

- 1.1 Indicate the role of sodium benzoate in the acidic food.
- 1.2 Deduce the class of additives to which sodium benzoate belongs.
- 1.3 Explain why the FDA had urged companies to prevent use sodium benzoate in products containing ascorbic acid.

##### 2- Referring to document-1:

- 2.1 Show that pineapple is rich in macro minerals.
- 2.2 Determine, in KJ, the energy value of 100 g of pineapple.

3-Specify whether the following statements are true or false:

- 3.1 The hydrolysis of sucrose, a disaccharide found in pineapple, produces only glucose.
- 3.2 Vitamin C prevents the rancidity of fats; hence it is an anti oxidant.
- 3.3 Vitamin C is hydrosoluble, so it is stored in fats.

4- State three functions of proteins in human body.

## Exercise 2 (10 points)

### An Antibiotic “Ketek”

Ketek (brand name of telithromycin), marketed in Canada from May 2003, is indicated for the treatment of pneumonia (acute lung infection), throat and sinus infections, chronic bronchitis and severe or resistant infections to multiple drugs. A recent article in the journal *Annals of Internal Medicine* reported three cases of liver failure associated with Ketek. These patients suffered from jaundice (yellowing of the skin) and liver dysfunction. One of the patients recovered, the second had to undergo a transplant and the third died. Health Canada is currently reviewing Canadian cases of less severe liver problems and other information about Ketek's safety (non-harmfulness).

In the same time, the Ministry makes the following recommendations to health professionals and patients:

- Prescription of Ketek is not recommended in patients with pre-existing liver problems.
- Any patient treated with Ketek should immediately consult his doctor in case of yellowing of the eyes or skin or other symptoms of liver problems such as, loss of appetite, dark urine, pale stools, itching or abdominal pain
- Patients who have been prescribed Ketek but have not experienced any of the above side effects should continue taking the drug unless otherwise recommended by their doctor.

#### Extract from the Ketek prospectus:

- Ketek 400 mg film-coated tablets.
- Qualitative and quantitative composition:  
Each film-coated tablet contains 400 mg of telithromycin.
- The excipients are: Magnesium stearate, microcrystalline cellulose.  
Telithromycin has in vitro activity against bacterium called streptococcus pneumonia.

[ec.europa.eu/health/documents/community-register/2015/20150729132680/anx\\_132680\\_fr.pdf](http://ec.europa.eu/health/documents/community-register/2015/20150729132680/anx_132680_fr.pdf)

#### Document -1

1. Based in your knowledge and referring to **document-1** and **the text**, answer the following questions:

- 1.1 Indicate the active ingredient of Ketek.
- 1.2 List three diseases where Ketek is prescribed.
- 1.3 Pick out the side effect of this drug.
- 1.4 Deduce, in what case, this drug is not recommended.
- 1.5 Choose the right answer:

1.5.1 The symptoms that show liver problems are:

- i- Rheumatism
- ii- Yellowing of the eyes
- iii- Clear urine and stools

1.5.2 Ketek kills streptococcus pneumonia, then its class is:

- i- Bactericidal
- ii- Fungicidal
- iii- Anti- inflammatory


2- Ketek is formulated into tablets; list two other formulations of medicinal drugs.

3- The doctor prescribed, for an adult having an acute sinusitis, 800mg one a day for 5 days. Determine the number of tablets taken by this patient during this period.

4- An antibiotic is classified as narrow spectrum or broad spectrum antibiotics.

4.1 Distinguish between these two classes.

4.2 Identify the class of antibiotic to which Ketek belongs.

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أسس التصحيح (تراعي تعليق الدروس والتوصيف المعدل للعام الدراسي 2016-2017 وحتى صدور المناهج المطورة)

<p align="center"><b>Exercise 1 (10 points)</b> <b>Sodium Benzoate and Ascorbic Acid</b></p>		
Part of question	Expected answers	Mark
1.1	It prevents the growth of microorganisms in acidic food.	1/2
1.2	It's a preservative (prevent the growth of microorganisms in acidic food).	3/4
1.3	Sodium benzoate and ascorbic acid can react together, in an acidic solution, to form small amounts of benzene, a chemical product that causes leukemia and other.	1
2.1	Ca, K, et Mg, containing in pineapple, are macro elements since their daily needs is greater than 100 mg. The pineapple is then rich in macroelement.	2
2.2	The energy value of 100 g pineapple is : $E.V = (17 \times 0.54) + (0.12 \times 38) + (16 \times 13.52) = 9.18 + 4.56 + 216.32 = 230.06 \text{ kJ}$	2
3.1	False, Sucrose is hydrolyzed into glucose and fructose.	1/4 1/2
3.2	True, Since, vitamin C prevents the oxidation so it is an anti oxidant.	1/4 1/2
3.3	False, Vitamin C is hydro soluble, then it is soluble in water and not stored in the body.	1/4 1/2
4	Enzymatic activity Transport proteins Structural proteins Or other functions	3x(1/2)

<b>Exercise 2 (10 points)</b> <b>An Antibiotic “Ketek”</b>		
Part of question	Expected answers	Mark
<b>1.1</b>	The active ingredient is telithromycin.	½
<b>1.2</b>	Three answers from the following : - The treatment of pneumonia (acute lung infection) - The throat and sinus infections - The chronic bronchitis - Severe or resistant infections to multiple drugs	1 ½
<b>1.3</b>	The side effect is liver failure.	½
<b>1.4</b>	Prescription of Ketek is not recommended in patients with pre-existing liver problems.	1
<b>1.5.1</b>	iii- Yellowing of eyes.	½
<b>1.5.2</b>	i- Bactericidal	½
<b>2</b>	Two of the following formulations: Aerosols, syrup (liquid), ointment	1
<b>3.</b>	In each day, we need: $\frac{\text{Daily needed per day (mg)}}{m(\text{telithromycin})\text{in tablet}} = \frac{800\text{mg}}{400\text{mg}} = 2$ tablets. In 5 days, we need: $5 \times 2 = 10$ tablets.	½ ½
<b>4.1</b>	Broad spectrum antibiotics are effective against a wide variety of microorganisms Narrow spectrum antibiotics are effective against specific microorganisms.	2
<b>4.2</b>	Ketek is a narrow spectrum because telithromycin acts on the bacterium of streptococcus pneumonia.	½ 1