



Benha University  
Faculty of Science  
Chemistry Department

**Pharmaceutical &  
Heterocyclic Chemistry  
(452 Ch)**

May, 26<sup>th</sup> 2019

Time: 2 hrs

4<sup>th</sup> Level Students

Applied Chemistry

الإجابة النموذجية لامتحان مادة الكيمياء الدوائية والحلقات غير المتجانسة

كود المادة: (452 ك)

(نصف ورقة امتحانية)

المستوى : الرابع

التاريخ : الأحد 26 / 5 / 2019

الممتحن : د/ عبد المتعال عبدالمجيد الشيخ

قسم : الكيمياء

كلية : العلوم

**Section (I) Answer the following questions: (24 Mark)**

**\*1. Choose and copy the correct answer for the following: (12X0.5 = 6 Mark)**

- All the following are families of opioid peptides produced by the body **Except**.....  
a) Enkephalins      **b) Dolphins**      c) Dynorphins      d)  $\beta$ -endorphin
- Which of the following are side effects of Aspirin ?  
a) Stomach irritation      b) Ulcer      c) Hypoglycemia      **d) A and B**
- Analgesic works by reducing the level of.....  
a) Acetyl coline      b) Insulin      **c) Thromboxane and Prostaglandin**      d) None of these
- Which of the following Drugs used for treatment of heroin addiction?  
a) Codeine      **b) Methadone (Dolophine)**      c) Nuprin      d) Morphine
- A drug which is chemically related to **Acetanilide** is.....  
a) Letrozole      b) Phenacetin      c) Tylenol      **d) B and C**
- Which of the following strategies **will increase the polarity and water solubility of a drug**?  
a) Replacing an alkyl group with a larger alkyl group      b) Adding extra alkyl groups  
**c) Replacing an aromatic ring with a nitrogen containing heterocyclic**      d) None of these
- Which of the following narcotic drugs has the highest potential?  
**a) Morphine**      b) Methadone      c) Codeine      d) None of these
- .....is one of **Natural opioids**?  
a) Morphine      b) Dolophine      **c) Leu-enkephalin**      d) Novocaine
- The following general structure is representative of sulphonamides. Which of the following statements **is true** for active sulphonamides?



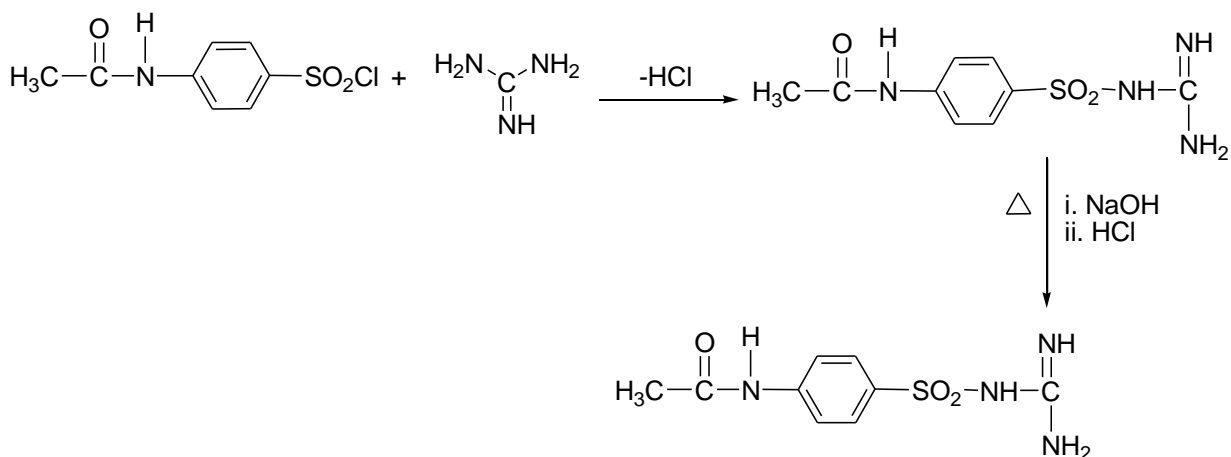
- a) R<sup>1</sup> can be H or an alkyl group      **b) The aromatic ring is essential**  
c) The sulphonamide functional group can be replaced by 2ry alcoholic group.      d) R<sup>2</sup> must be hydrogen
- Drugs which are inactive *in vitro*, but active once the drug has been absorbed *in vivo* are.....  
a) Metabolites      b) Prodrugs      c) Postdrugs      **d) Prodrugs**
- All of the following drugs may used as **antipyretic drugs Except**.....  
a) Antipyrine      b) Tylenol      **c) proflavine**      d) Analgin

12. The general mechanism of action of sulfa drugs is to disrupte bacteri reproduction *via*:

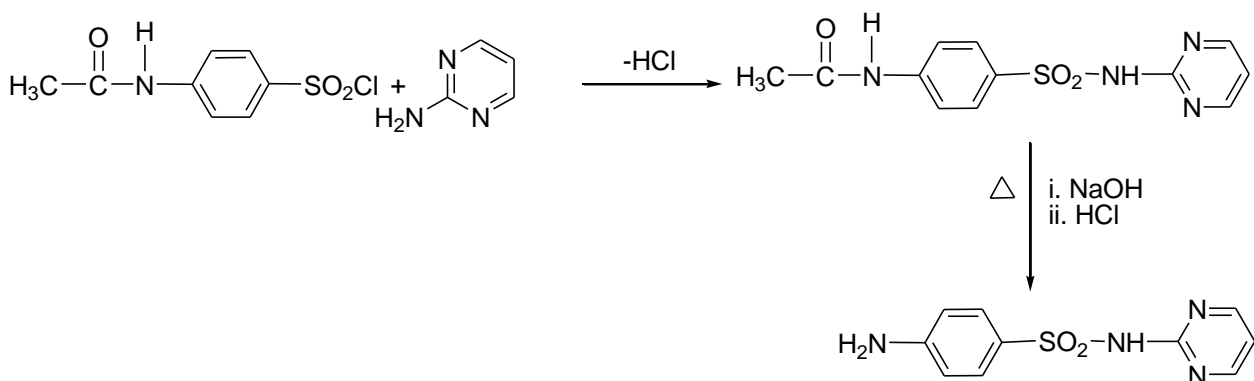
- a) Acting as a part in manufacturing its folic acid and new protein and thus inhibit its DNA and RNA synthesis
- b) Interfering with transcription and blocking RNA synthesis
- c) Cross linking and formation of bridges between separate strands of DNA
- d) None of these

2. (A) Show how you can synthesize Only Five of the following Drugs (5x3=15 Mark)

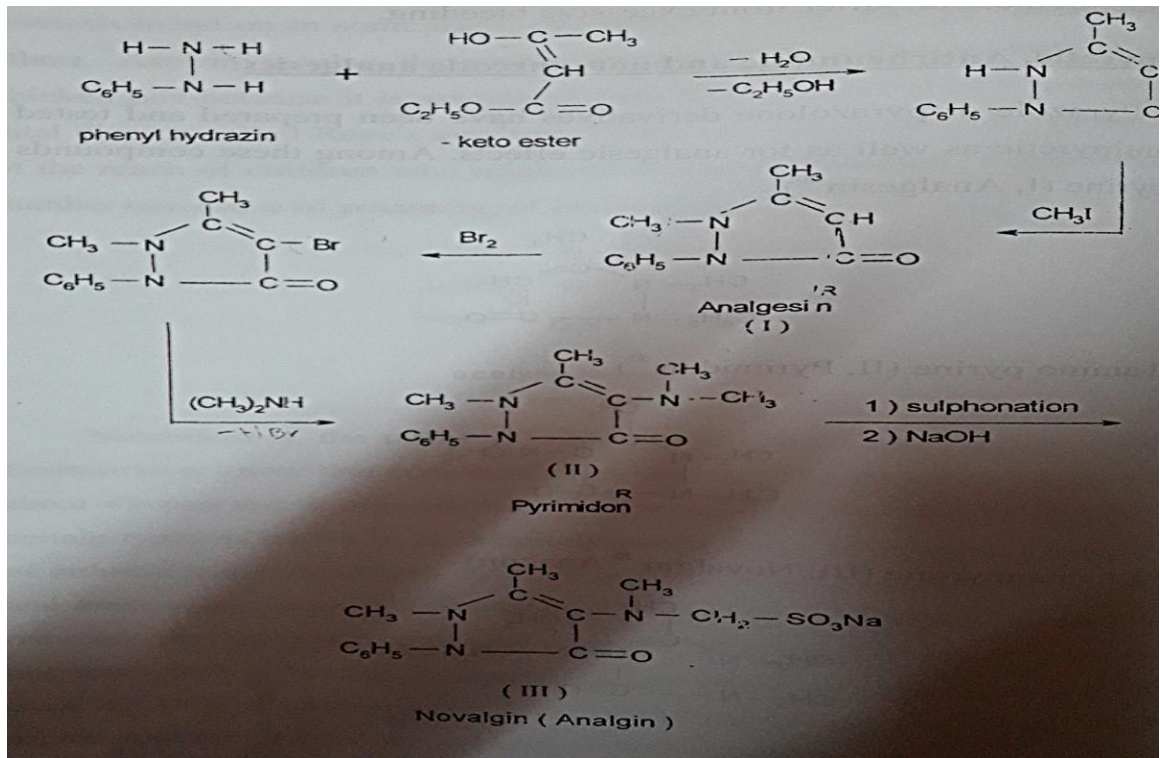
i) Sulfaguanidine



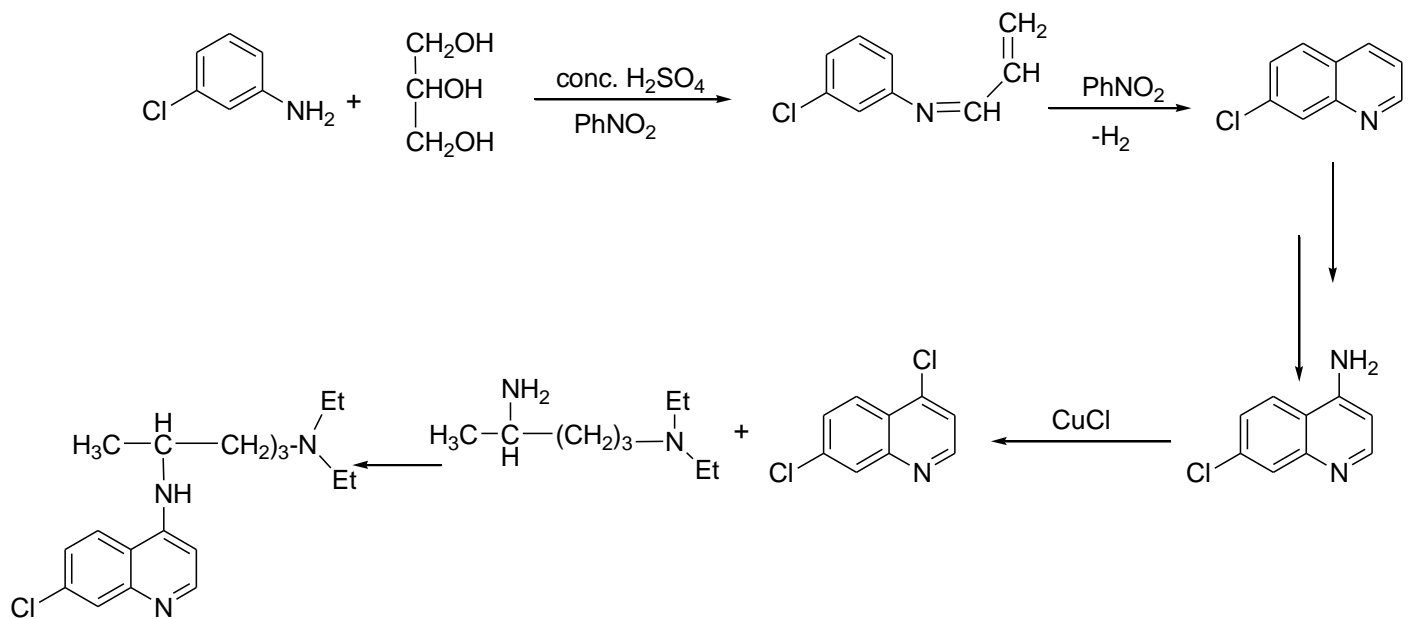
ii) Sulfapyrimidine



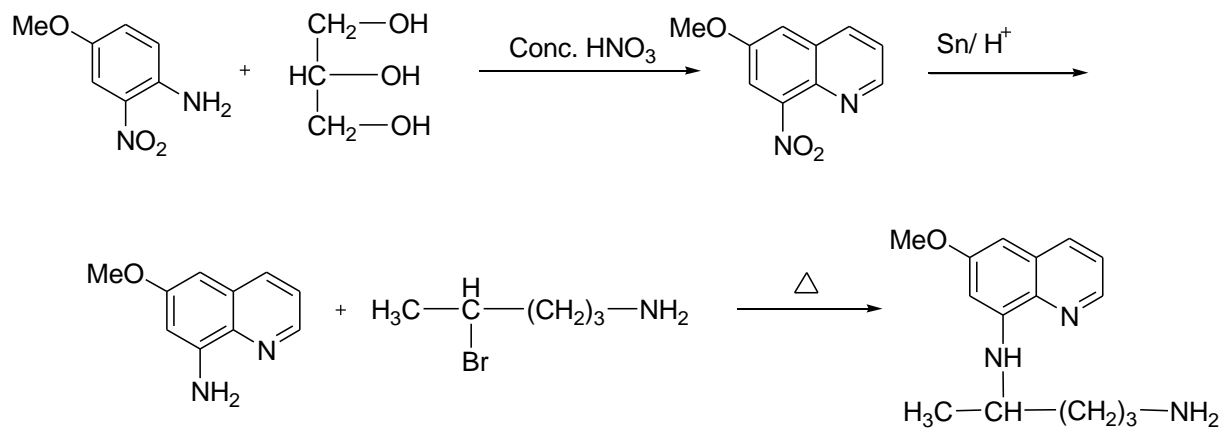
iii) Novalgin



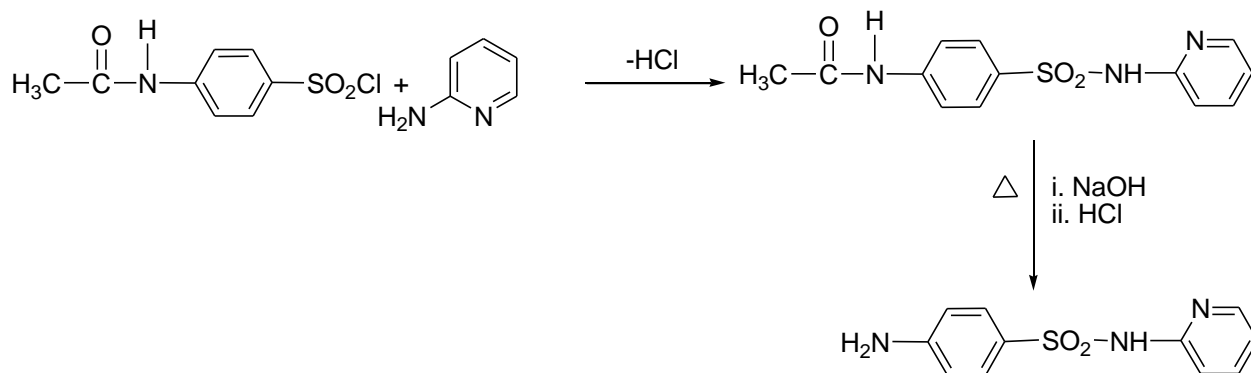
iv) Chloroquine



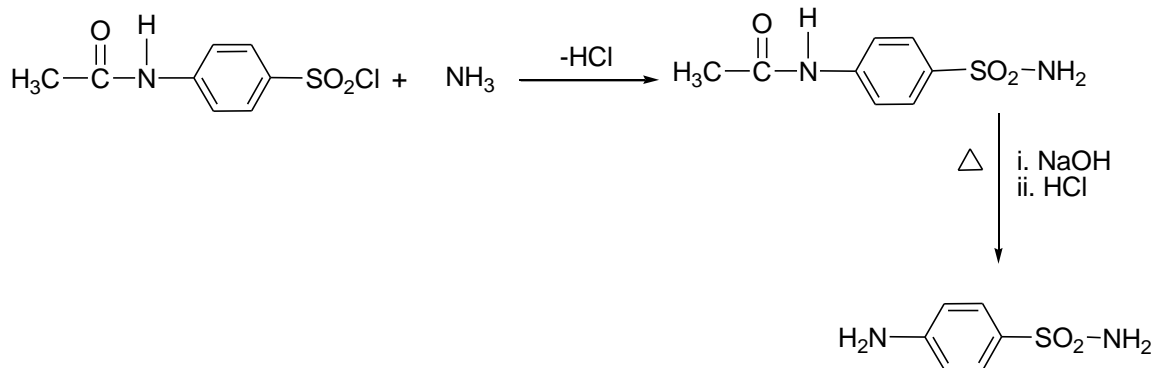
v) Primaquine



vi) Sulfapyridine

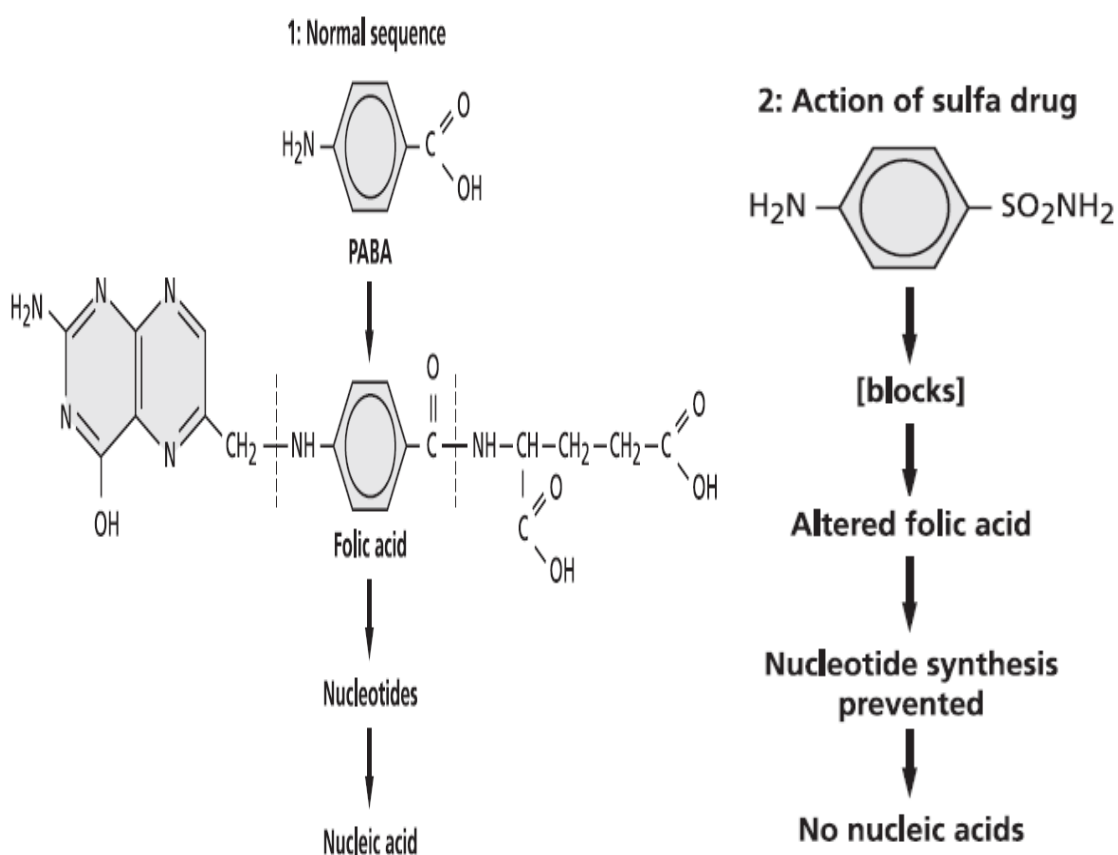


vii) Sulfanilamide



**(B). Discuss the mechanism of action of sulfa drugs on bacteria? (3 Marks)**

1. Bacterium requires p-aminobenzoic acid (PABA) in order to make a second compound, **Folic acid**.
2. Folic acid, in turn, catalyzes the production of nucleic acids that become part of a bacterium's mechanism for manufacturing new proteins and reproducing its own DNA.
3. The structure of sulfa drug molecules, is very similar to that of the PABA molecule.
4. The sulfanilamide molecule can substitute for the PABA molecule in the synthesis of the bacterium's folic acid.
5. The altered form of folic acid is unable to catalyze the synthesis of DNA, and the bacterium's metabolic process is disrupted.
6. Members of the bacterial colony are unable to grow or reproduce , thus they die, and the infection that they cause is successfully treated.



All the best wishes,  
Dr. Abdelmotaal El-Sheikh