Test – Medicines & Drugs

SCH4UE 2004 -2005 **Name: _____**

1. The structure of penicillin is given in the Data Book, Table 21

(a) State the names of the two functional groups present in penicillin.

A: _____ B: _____ [2 marks]

(b) The letter R in the structure of Penicillin represents a side chain. State two reasons why there are a number of different modifications of this side chain. [2 marks]

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(c) State the difference between *broad spectrum* and *narrow spectrum* antibiotics. [1 mark]

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(d) Explain briefly how penicillin works. [2 marks]

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(e) State one reason why a prescribed course of penicillin should be completed. [1 mark]

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(f) Explain the consequence of over prescribing penicillin. [2 marks]

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(g) Look at the structure of "ACYCLOVIR" in the Data Book, Table 21. Acyclovir is a drug that is used in treating cold sores and shingles

(i) Draw the part of the structure that shows the functional group "amide". [1 mark]

(ii) Name and draw the part of the structure that shows another functional group. [2 marks]

(iii) Explain why Acyclovir is more soluble in dilute acid than in water. [2 marks]

(iv) Many drugs can be taken orally while some must be infected. Suggest two reasons why some drugs can not be taken orally. [2 marks]

2. Potassium dichromate (VI), $K_2Cr_2O_7$, is used in breathalyzers in many countries. When it is placed in an acidic medium, it will oxidize ethanol vapor from a person's breath.

(a) Give the name and structural formula of the oxidation product of ethanol. [2 marks]

(b) If a policemen suspects that a driver has been drinking alcohol, he may ask the driver to take a breathalyser test. Explain briefly how this works. [3 marks]

(c) State one other technique currently used to detect ethanol in the breath, blood or urine. [1 mark]

(d) Outline two synergistic effects of ethanol with other drugs. [2 marks]

(e) In the United Kingdom 80 mg of ethanol per 100 cm^3 of blood is the legal limit for driving. Deduce this limit in terms of moles of ethanol per liter of blood. [2 marks]

(f) Alcohol is a "depressant". Explain the word "depressant". [2 marks]

(g) Give three short term and three long-term effects of high alcohol consumption. [3 marks]

3. (a) Cisplatin, Pt $(NH_3)_2Cl_2$, is an effective anticancer drug. It bonds with the base guanine in the DNA present in cancer cells and prevents the DNA from replicating

(i) Draw the structure of the trans *isomer*, trans-platin. [1 mark]

(ii) Describe the feature of guanine that enables it to bond with Cisplatin and state the type of reaction that occurs when the bonds are formed. [2 marks]

(b) Explain why it is important to carry out clinical trials on all the different enantiomers of a new drug. [2 marks]

(c) When most reactions take place to form chiral compounds, this results in giving a racemic mixture which then has to be separated into the two different enantiomers. Describe how a *chiral auxiliary* can be used to isolate the desired enantiomer of a particular drug. [3 marks]

(d) The anticancer drug taxol can be synthesised using chiral auxiliaries. Part of its structure is shown below. Identify with an asterisk (*) **two** chiral centres. [2]