



Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF **MEDICAL SCIENCES**

DIPLOMA IN PHARMACEUTICAL TECHNOLOGY

(DPT 11M)

APM 2218: PHARMACEUTICAL CHEMISTRY

SPECIAL/SUPPLEMENTARY: EXAMINATIONS

SERIES: February 2013

TIME: 2 HOURS

INSTRUCTIONS:

You should have the following for this examination

- *Answer booklet*

This paper consists of **THREE sections A, B and C.**

Answer all questions in section **A** and **B** and choose **THREE** out of **FIVE** questions in section **C.**

This paper consists of 9 PRINTED pages
SECTION A (40MARKS)

1. The main role at bio transformation is to render is to render drugs
 - a) More protein bound
 - b) Less ionized
 - c) Less lipid soluble
 - d) Less protein bound

2. Which of the following underlined proteins is likely to be strongest hydrogen bond donor.
 - a) Alcohol (ROH)
 - b) Amine (RNH₂)
 - c) Phenol (ArOH)
 - d) Ammonium ion (RNH⁺₃)

3. Anticonuulsants with ureidal morety include the following except
 - a) Barbiturates
 - b) Cyclic GABA analogs
 - c) Hydantoins
 - d) Succinamides

4. The following are excreted faster in basic urine
 - a) Weak acids
 - b) Weak bases
 - c) Strong acids
 - d) Strong bases

5. Short acting benzodiazepines
 - a) Are appropriate for insomnia
 - b) Are appropriate for anxiety
 - c) Diazepam is an example
 - d) Lack a halogen at position 7

6. Short acting barbiturates
 - a) Are appropriate for general anaesthesia
 - b) Are appropriate for insomnia
 - c) Are appropriate for epilepsy
 - d) Phenobarbitone is an example

7. The most lipophilic barbiturates
 - a) Are metabolized rapidly
 - b) Have a long duration of action
 - c) Enter the CNS slowly
 - d) Amobarbital is an example

8. A prodrug
 - a) Facilitates absorption and distribution of drugs with poor lipid solubility
 - b) Increase the duration of action of drugs

- c) Promote site specific delivery of drugs
 - d) All the above.
9. Flumazenil is an example of
- a) Benzodiazepine antagonist
 - b) Long acting benzodiazepine
 - c) Short acting benzodiazepine
 - d) Long acting barbiturate
10. Sulfonamides are metabolized in humans principally by
- a) Acetylation
 - b) Deamination
 - c) Oxidation
 - d) Conjugation with glucuronic acid
11. Select a drug type for which microsomal oxidation is the most prominent
- a) Lipid soluble drug
 - b) Water soluble drug
 - c) Low molecular weight drug
 - d) High molecular weight drug
12. Which of the following are not phase I enzymes
- a) Cytochrome P₄₅₀
 - b) Sulfotransferases
 - c) Epoxide hydrolase
 - d) Alcohol dehydrogenase
13. Which of the following statements is the closest description of phase II metabolism
- a) Reactions which add polar functional groups already present on drug or its metabolites
 - b) Reactions which occur in the blood supply
 - c) Reactions which add a polar functional group to a drug
 - d) Reactions that occur in the gut wall
14. The following metabolic processes are non-microsomal oxidative reactions except
- a) N-dealkylation
 - b) Dehalogenation
 - c) Oxidation of aldehydes
 - d) Purine oxidation
15. The only non-microsomal reductive reaction prevalent in man is
- a) Nitro reduction
 - b) Azo reduction
 - c) Ketone reduction
 - d) Disulphide reduction
16. For a drug to be eliminated from the body unchanged. It has to be

- a) Strongly lipophilic
 - b) Strongly hydrophilic
 - c) Resistant to drug-metabolizing enzymes
 - d) (b) and (c) are correct
17. The following sedative hypnotic is an aldehyde
- a) Chloralhydrate
 - b) Glutethimide
 - c) Zolpidem
 - d) Doxylamine
18. The following benzodiazepine has no anticonvulsant activity
- a) Diazepam
 - b) Chlordazepoxide
 - c) Carbamazepine
 - d) Acetazolamide
19. An example of a drug that undergoes amino acid conjugation phase II reaction is
- a) Isoniazid
 - b) Salicylic acid
 - c) PARacetamol
 - d) Sulphanilamide
20. Which of the following functional groups is most likely to participate in dipole interactions
- a) Aromatic ring
 - b) Ketone
 - c) Alcohol
 - d) Alkene
21. Which of the following elements does not belong to the alkaline earth metal
- a) Magnesium
 - b) Barium
 - c) Strontium
 - d) None of the above
22. Dietary supplementation of calcium becomes necessary during the following EXCEPT
- a) Pregnancy
 - b) Lactation
 - c) Period of rapid growth
 - d) Acromegally
23. Which one of the following compounds is a chain silicate:
- a) Bentonite
 - b) Kaolin
 - c) Attapulgate
 - d) Talc

24. Ascorbic acid is normally administered with haematinics in order to:
- Convert Fe^{2+} to Fe^{3+}
 - Convert Fe^{3+} to Fe^{2+}
 - Reduce pH of intestinal fluid
 - None of the above
25. Boron / Borate is added to glass in order to:
- Hide blue-green color due to silica
 - Modify thermal properties of glass
 - Increase refractive index of glass
 - Produce light resistant glass
26. Ringer's solution for injection consists of all the following EXCEPT
- NaCl
 - CaCl_2
 - KCl
 - CaCO_3
27. Choose the incorrect statement in regard to non-systemic antacids
- Their antacids effect is localized to the gastro-intestinal tract
 - The compounds used are generally soluble in the DIT fluid and plasma
 - Examples of cations used include aluminium magnesium and calcium bismuth
 - Anions used include carbonates, phosphates hydroxides or silicates
28. Which of the trace element is involved as a coenzyme in protein synthesis and is a central feature of Vit .B?
- Molybderium
 - Magnesium
 - Zinc
 - Cobalt
29. Fe^{3+} (ferric) employed in medicinal products is frequently encountered in the form of one of its soluble complex below EXCEPT
- Ferric pyrophosphate
 - Ferric ammonium tartarate
 - Ferric ammonium citrate
 - Ferric iodide
30. Iodine is an oxidizing agent and hence the need for antioxidant in preparations involving iodine . Such antioxidants are:
- Hypophosphorous and sucrose
 - Chloroform
 - Alcohol – water mixture
 - Benzene and dextrose
31. Uses of silicone the following EXCEPT:
- Antifoaming agent in gastric bloating
 - Silicon rubbers used in catheters and nasal gastric tubes

- c) Ingredient of bases for ointments and liniments
 - d) None of the above
32. The following are uses of talc EXCEPT
- a) Used in dusting powders as protective's
 - b) Used in mediated dust in topical products
 - c) Used as filter aid
 - d) Used as a suspending agent
33. Layer silicate is made up of
- a) Talc and clay minerals
 - b) Attapulgite
 - c) Metasilic acid
 - d) Silanol
34. The following compounds constitute Darrow's solution EXCEPT
- a) Dextrose
 - b) $MgCl_2$
 - c) NaCl
 - d) KCl
35. In expression of concentration of fluids, osmolality refers to:
- a) The no. of moles per litre
 - b) The No. Of moles per kilogram
 - c) None of the above
 - d) All of the above
36. Choose the incorrect statement in regard to calcium gluconate solution:
- a) It is less irritating compared to calcium chloride
 - b) It is extensively used as a calcium supplement
 - c) It can be administered either via intramuscular or intravenous route
 - d) It is stabilized by protein lecithin as an injection
37. The following statements are FALSE in respect to calcium ion. Choose the correct one:
- a) About 99% of body calcium is normal found in the liver
 - b) Diffusible calcium in the body is plasma bound
 - c) Phosphate ion is normally an ion that interferes with calcium in the body inversely
 - d) Proper calcium absorption requires adequate levels of Vit. D.
38. Regarding sodium ion, choose the incorrect statement:
- a) It is the predominant cation in the intracellular fluid (ICF)
 - b) It is involved in the osmotic pressure maintenance in the body
 - c) High level of sodium above normal is referred to as hypernatremia
 - d) Normal levels of sodium lie between 130-145mmol/l
39. Which of the following statements is FALSE in respect to the functions of electrolytes in the body:
- a) Help in maintaining osmotic pressure
 - b) Involved in electro-neutrality charge balance
 - c) Useful in maintenance of acid-base balance

- d) Iron plays an additional role in strengthening the bones
40. The commonly employed cations in fluid and electrolyte formulations include all the following EXCEPT
- Na⁺
 - K⁺
 - Ti²⁺
 - Ca²⁺

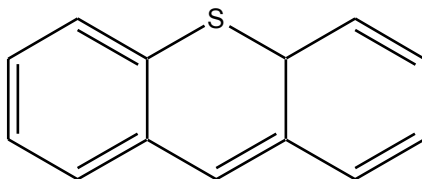
SECTION B (Answer ALL questions)

- Briefly outline FOUR pharmaceutical problems associated with iodine preparations. **(4marks)**
- Briefly define the following
 - Silanes **(2marks)**
 - Siloxanes **(2marks)**
- List THREE dimethylsiloxanes that find
 - Use in pharmaceutical practice **(3marks)**
 - State one use of simethicone in pharmaceutical practice **(1mark)**
- Briefly state why chemical incompatibilities are almost non-existent in fluid and electrolyte replenishers. **(2marks)**
 - List TWO common physical incompatibilities in fluids and electrolyte replenishers **(2marks)**
- Bicarbonate is the second most abundant anion in body fluids. Briefly describe TWO roles of this anion in the body **(2marks)**
 - Using chemical equations, explain why NaHCO₂ solutions become more alkaline on standing or heating **(2marks)**
- Using a suitable example, outline the desirable properties of a carrier moiety in a prodrug **(4marks)**
- Give the classes of drugs used as sedative hypnotics **(4marks)**
- Explain the mode of action of the following antidepressants **(4marks)**

- a) Imipramine
- b) Phenelzine

(4marks)

9. Study the structure given below



Draw the structures of the products formed after the following metabolic pathways

- a) Oxidative desulphuration
- b) Sulphoxidation

(4marks)

10. Comment on the duration of action i.e. long acting, short acting or intermediate acting of benzodiazepines and barbiturates with the following activities.

Benzodiazepines		Barbiturates	
Insomnia	Anxiety	Epilepsy	Anxiety

SECTION C

1.
 - a) Describe the FOUR official types of glass used in pharmaceutical practice (4marks)
 - b) Outline the major functions of electrolyte in the body (5marks)
 - c) Describe the different ways of doing fluoride supplementation (5marks)
 - d) Outline the different ways in which the concentration by fluid and electrolytes can be expressed. (6marks)
2.
 - a) Outline the advantages and disadvantages of the aluminium based antacids in therapy. (10marks)
 - b) Explain the chemistry of the antacid action of aluminium based antacids (4marks)
 - c) Explain why ferrous sulphate is popular in many preparations/ formulations used as haematinics (2marks)
3.
 - a) Briefly define a prodrug (2marks)
 - b) Briefly outline the areas of applications of prodrugs in drug developments (5marks)
 - c) Describe the mechanism involved in microsomal oxidative reactions. Use relevant diagrams where necessary (13marks)
4.
 - a) Classify the anticonvulsant agents according to their chemical structure giving a suitable example for each class (10marks)
 - b) Select one class and discuss how the structure relates to the activity. (10marks)

c)