

West Midlands Training Course in Clinical Biochemistry

Course Assessment – Summer 2000

Short Answer Questions. Answer all questions. Time allowed 1 hour.

1. In a spectrophotometer, a coloured solution gives a transmittance of 77% in cell with a 2cm light path. Determine the percentage transmission, and absorbance, that would be obtained if the sample concentration is doubled.
2. Match the following vitamins: Vitamin A₁, A₂, D₂, D₃, K₂, B₁, B₂, B₆, B₁₂, and C.

With: -

A. Thiamine

B. Riboflavin

A. Ascorbic Acid

B. Menaquinones

C. Tocopherols

D. Pyridoxine

E. Dehydroretinol

F. Ergocalciferol

I. Retinol

J. Cyanocobalamin

K. Phyloquinone

A. Cholecalciferol

3. A new screening test has been developed for a disease that has a prevalence in the population of 2%. When applied to a population of 100,000 people the test is found to have a diagnostic sensitivity of 78% and specificity of 98%. Calculate the number of false positive results that may be expected in the population. What is the calculated diagnostic efficiency and positive and negative predictive values for the test? Very briefly indicate your opinion as to the suitability of a test with these characteristics as a screening test for HIV infection?
4. You have 100 μL of a solution that you are told contains 29 pmol of

sodium chloride (M.Wt. 58) and 90 fmol of glucose (M.Wt 180). What are the concentrations of each in terms of g/L?

5. The Chief Medical Officer has recently indicated that new criteria should be adopted for the diagnosis of diabetes mellitus utilising blood glucose measurements. Briefly outline these new criteria.
6. A 70 Kg patient with severe hypomagnesaemia requires 32 mmol of magnesium intravenously. What volume of solution containing 0.48 g/2mL of anhydrous magnesium sulphate would be needed. At. Wt. Mg = 24, S=32, O = 16, H =1)
7. A patient who is severely water depleted excreted only 100 mL of urine in the last 6 hours. A short time before he was found to have a creatinine clearance of 100 mL/min with a plasma creatinine concentration of 100 μ mol/L. If renal function remains unchanged what concentration of creatinine would you expect in the latest 6h collection (volume of collection = 100 mL)?
8. A 74 year old lady presents with back pain and a serum total protein concentration of 92 g/L. The initial report to the ward states that the electrophoresis of the specimen revealed monoclonal band which is to be further characterised. There is no evidence of abnormal proteins in her urine. You are asked by the SHO, who has received the initial report, to list what features can help him distinguish between a benign and malignant paraproteinaemia. Write down the list.
9. A) Graphically represent the changes in the important gonadal steroids and the controlling pituitary hormones during a typical menstrual cycle.

B) Very briefly comment on the significance of an FSH of 5 IU/L in a 64 year old woman, not on hormone replacement therapy, who presents complaining of tiredness and weight gain with a free thyroxine of 7 nmol/L and TSH 0.8 U/L and a low free tri-iodothyronine. She is a mother of 4 children and has no known previous history of thyroid disease.
10. A) A 35 year old married women is referred to a clinic with amenorrhoea of three years duration. On questioning she said that she has frequent headaches. What biochemical test(s) do you think would be useful to carry out at the first clinic attendance.

B) A 28 year old housewife presents with mild obesity, facial hirsutism and irregular menstrual cycles. Suggest two possible diagnoses and list initial biochemical investigations applicable in each case.