
West Midlands Training Course in Clinical Biochemistry

Course Assessment – December 2005

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

1. If a radio-isotope has a half life of 12 hours. What percentage of the initial activity would remain after 24 and 72 hours.
- 2.

Propionyl CoA

*Propionyl CoA
carboxylase*

Compound 1

Enzyme A

L-Methylmalonyl CoA

Methionine

Enzyme B

Process 1

Acyl CoA

Compound 2

Study the biochemical pathway shown above and answer the following questions: -

- 2a. name of *Enzyme A*?
 - 2b. name of *Enzyme B*?
 - 2c. name of *Compound 1*?
 - 2d. name of *Compound 2*?
 - 2e. Briefly describe what is happening in *Process 1*
3. Match the following diseases or syndromes with one choice from each of the subsequent sections: -
 - A) Wilson's disease
 - B) Menkes' Syndrome
 - C) Phenylketonuria
 - D) Tetrahydrobiopterin (BH₄) deficiency
 - a) Kinky or Steely hair
 - b) Patients may have a high frequency red hair within the population
 - c) Kayser-Fleischer rings
 - d) Fair colouring as a result of tyrosine deficiency

e) Most commonly present with megaloblastic anaemia and pallor

i) High liver copper concentrations

ii) Most commonly associated with 6-pyruvoyl-tetrahydropterin synthase deficiency

iii) Low activity of copper containing enzymes

iv) High tyrosine hydroxylase activity

v) Results from low phenylalanine hydroxylase activity

4. A screening test for a disease with a prevalence of 1 in 1500 is applied to a population of 150,000 subjects and is found to have a sensitivity of 90% producing 22485 false positive results. Calculate the following characteristics of the test: -

A) Negative predictive value

B) Positive predictive value

C) Test specificity

D) The efficiency (accuracy) of the test.

5. The following results from a 16 day old term neonate with persistent jaundice and no clinical/biochemical evidence of liver dysfunction: -

Total serum bilirubin 65 $\mu\text{mol/L}$

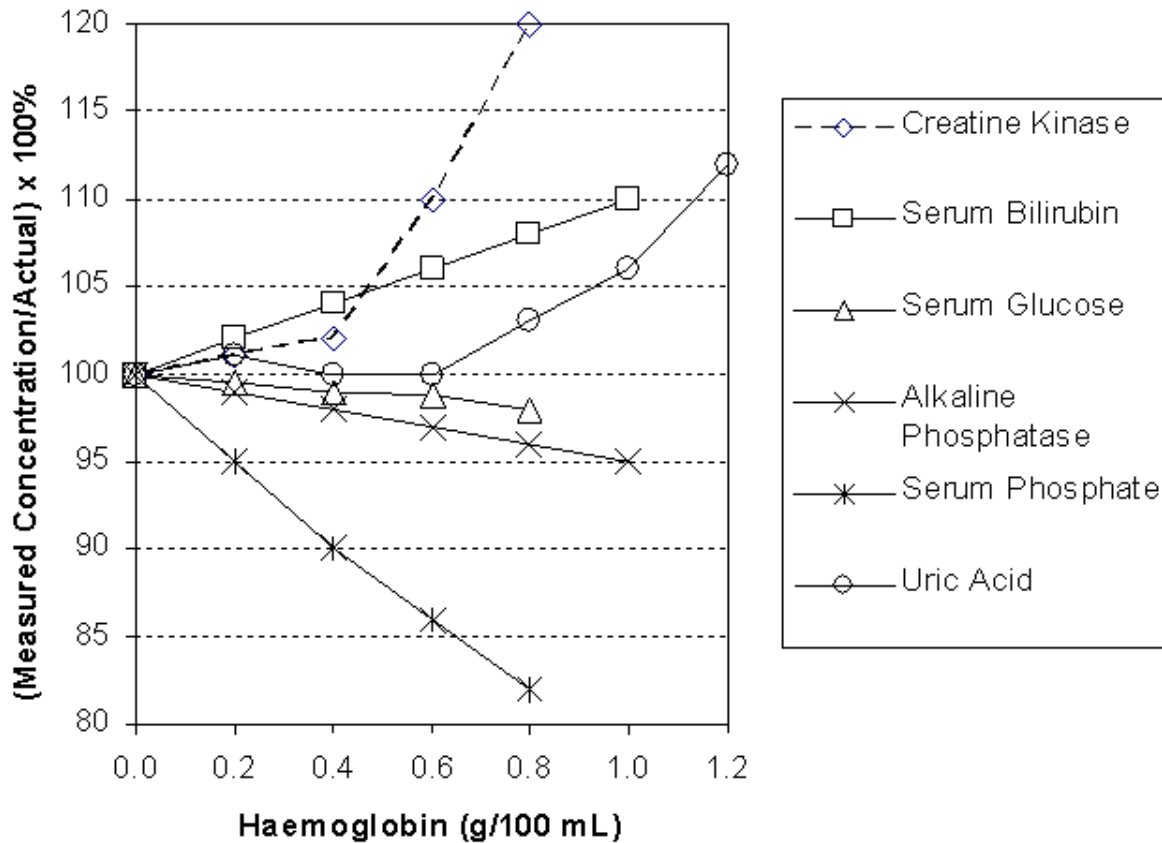
Conjugated bilirubin 5 $\mu\text{mol/L}$

A) List the potential causes of hyperbilirubinaemia in this type of scenario.

B) List further relevant initial investigations that should be requested.

6.

Effect of Haemolysis on the GetITRight Analyser



The figure above displays an interferogram illustrating the effect of haemoglobin on the analysis of a number of serum constituents on a new analyser. If an average CV for all analytes measured is 2% then: -

- At 0.2 g/100 mL haemoglobin which analytes demonstrate a clearly definable interference?
 - At 0.6 g/100m L haemoglobin which analytes demonstrate a clearly definable negative interference?
 - What is the appropriate interpretation of the curves exhibited for creatinine kinase and uric acid?
 - Which analytes are subject to positive interference by haemoglobin at concentrations above 0.6g/100 mL.
- A solution containing 1×10^{-5} M ATP has a transmission of 0.702 (70.2%) at 260 nm in a 1 cm cuvette. Calculate: -
 - the transmission of a 5 fold dilution of the solution in a 3 cm cuvette.
 - the absorbance of a 5 fold dilution in a 1 cm and in a 3 cm cuvette
 - the absorbance and transmission of a 5×10^{-5} M solution in a 3 cm cuvette.
 - Calculate the molarity of pure water.
 - Calculate the pH of solutions containing: -
 - 50 nmol/L of hydrogen ion
 - 27nmol/L of hydrogen ion.
 - The serum seasonal turkey toxin was measured in 10,000 healthy male adults. Assuming a Gaussian distribution, the normal range was calculated to be 50 -150 nmol/L. How many results in the study population would you expect to find below 35 nmol/L?