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# West Midlands Training Course in Clinical Biochemistry

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## Course Assessment – Autumn 2008

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

1. List five types of inherited metabolic disease which result in lactic acidemia and indicate whether or not they are associated with hypoglycaemia. **(2 marks for each pair)**
  
  
  
  
  
  
  
  
  
  
2. How many mL of hydrochloric acid (SG 1.16) are required to prepare 500 mL of 2.5M hydrochloric acid? The purity of the acid is 32% w/w. **(10 marks)**

Number of mL HCl

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3. The pka of acetic acid is 4.76. What volume of 0.2 mmol/L acetic acid should be added to 80 mL 0.2 mmol/L sodium acetate to give a buffer with a pH of 5.8. Comment on the buffer capacity of this buffer. **(8 marks & 2 marks)**

**Volume of acetic acid**

**Comment on buffer capacity of this buffer.**

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4. The following results were obtained on a fasting sample from a 40 year old male. The clinical details on the request form were tired and thirsty but otherwise he was fit and healthy and not on any medication.

Sodium	141	mmol/L
Potassium	4.3	mmol/L
Urea	4.0	mmol/L
Creatinine	78	umol/L
Urate	545	umol/L (208-506)
Calcium	2.45	mmol/L
Albumin	44	mmol/L
Cholesterol	6.0	mmol/L
Triglyceride	7.6	mmol/L
Glucose	6.1	mmol/L

Comment on the results and indicate any further tests that you would suggest. **(10 marks)**

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5. A laboratory using a method with an analytical coefficient of variation of 5% at a concentration of 100 mmol/L for a serum constituent examined samples from a healthy population and found a Gaussian distribution with a 95% reference range of 74-126 mmol/L. If the method coefficient of variation had been 22%, what reference range would the laboratory have found? **(10 marks)**

**Reference Range**

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6. List 10 factors to consider when deciding whether to perform an assay in house or to send to another laboratory for analysis.  
**(1 mark each)**

7. Match the drug with the assay that it is most commonly recognised to affect.

**Drug**

Rasburicase  
Icodextrin  
Cephalosporin  
Prednisolone  
Lithium

**Test**

Creatinine  
Cortisol  
TSH  
Urate  
Glucose on Roche Inform Meter (Glucose Dehydrogenase)  
**(2 marks each)**

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8. Calculate the probability that a disease is present when the test for it is positive, if the sensitivity is 0.95 and the specificity is 0.98 when:-
- a. The prevalence of disease is 1 in 1000
  - b. The prevalence of disease is 1 in 50     **(5 marks each)**

**Prevalence of disease 1 in 1000**

**Predictive value of a positive result**

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**Prevalence of disease 1 in 50**

**Predictive value of a positive result**

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9. Calculate the hydrogen ion concentration in nmol/L of solutions of pH 6.7 and 7.4 **(5 marks each)**

**pH 6.7**

**Hydrogen ion conc**

nmol/L

**pH 7.4**

**Hydrogen ion conc**

nmol/L

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10. An assay mixture for the measurement of LDH consists of 2.8 mL of buffered NADH and 50  $\mu$ L of serum. The reaction was initiated by the addition of 100  $\mu$ L of sodium pyruvate. Over 5 minutes the optical density change was 0.25 absorbance units when measured in a 1cm cuvette at 340 nm. If the extinction coefficient of NADH at 340 nm is  $6300 \text{ L mol}^{-1}\text{cm}^{-1}$ , calculate the enzyme activity.

**(10 marks)**

**Enzyme Activity**

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