

EXAM COVER SHEET

Course Code: CLS 432

Course Description: Clinical Biochemistry

Example Past Exam Modal Answer

Duration: 2 hour

1st semester 1432/1433

Part 1 – Multiple choice questions

Answer all the questions by encircling the best answer. (20 marks).

1. Which of the following anticoagulants is most suitable for the collection and preservation of specimens for measurement of plasma glucose?
 - A. Lithium heparin
 - B. Potassium and ammonium oxalate mixture
 - C. Potassium citrate
 - D. Sodium fluoride and potassium oxalate mixture**
 - E. None of the above
2. Which of the following measurements of plasma enzyme activity is most likely to be abnormal in the prodromal stages of infectious hepatitis?
 - A. Urea stable lactate dehydrogenase
 - B. Alanine aminotransferase**
 - C. Alkaline phosphatase
 - D. Gamma glutamyl transferase
 - E. All of the above
3. Which of the following substances is most likely to be present in plasma in increased concentration in patients with cirrhosis of the liver?
 - A. Albumin
 - B. Transferrin
 - C. Urea
 - D. Immunoglobulins**
 - E. All of the above
4. A diagnosis of hepatolenticular degeneration (Wilson's disease) is strongly supported by finding:
 - A. A generalized amino aciduria and increased plasma copper.
 - B. A decreased plasma ceruloplasmin and increased excretion of copper in the urine.**
 - C. An increased plasma ceruloplasmin and decreased excretion of copper in the urine.
 - D. A decreased plasma copper and increased plasma ceruloplasmin.
 - E. None of the above
5. Insulin induced hypoglycaemia produces an increase in the plasma concentration of:
 - A. Thyrotrophin-releasing hormone
 - B. Parathyroid hormone
 - C. Pituitary gonadotrophins
 - D. Growth hormone**
 - E. All of the above

Part 2 - short answer questions. Answer all questions (20 marks)

1. What is the Enzyme Linked ImmunoSorbent Analysis (ELISA) technique? Explain the difference between competitive and non-competitive immunoassays.

An ELISA or enzyme-linked immunosorbent assay is a method used in the laboratory to aid in the diagnosis of a wide range of diseases. This test is performed on blood or urine and is used for measuring the amount of a particular protein or substance in these bodily fluids, such as infectious agents, allergens, hormones or drugs. The two major types of reaction formats used in immunochemical assays are known as competitive and non-competitive.

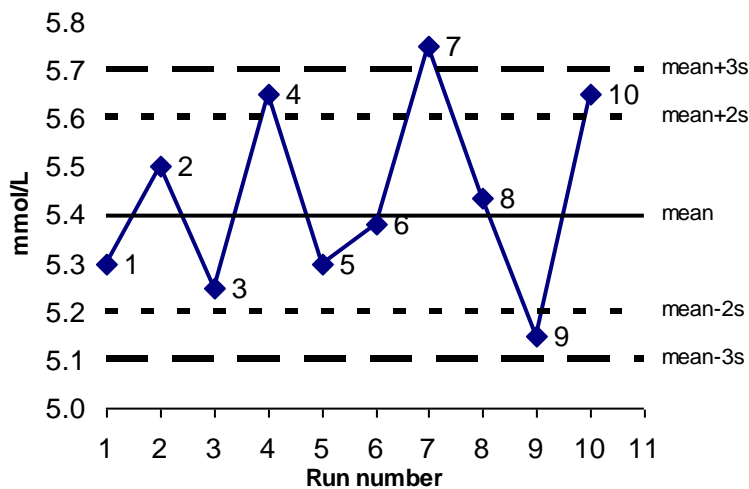
In competitive immunoassay all reactants are simultaneously (one step competitive assay) or sequentially (two step competitive assay) mixed together. In the one step competitive format, both the labeled antigen (Ag^*) and unlabeled antigen (Ag) compete to bind with a limited amount of antibody. In a twostep competitive assay, the antibody concentration of the reaction solution is present in excess amount is mixed with unlabeled antigen. Then in the second step, Labeled antigen is added. In a competitive immunoassay, the less label measured in the assay means more of the unlabeled (test sample) antigen is present. The amount of antigen in the test sample is inversely proportional to concentration of label antigen.

On the other hand, in a noncompetitive assay, the antibody is bound to the surface of a solid phase. Then, the antigen in the sample will react with the solid phase antibody. A washing step is done to remove unbound antigen and labeled antibody is added to react with the antigen. Another washing is done to remove unbound antibody. The amount of antibody-antigen complex is then measured to determine the amount of antigen present in the sample. In noncompetitive assay, the measurement of labeled analyte, is directly proportional to the amount of antigen present in the sample.

There are major differences between competitive and noncompetitive immunoassay that can be seen the table.

Immunoassay	Competitive	Noncompetitive
excess	Antigen excess	Antibody excess
Type of labeled in the reaction	Usually involves labeled competing antigen	Usually involves secondary labeled antibody
Measurement	The amount of antigen is <i>indirectly proportional</i> to the amount of signal	The amount of antigen is <i>directly proportional</i> to the amount of signal.

2. List the Westgard quality control rules. What action should you take when obtaining result number 10 on the following QC chart? Which other results would have generated warning or rejection flags?



Westgard rules

1. 13s
2. 12s
3. 22s
4. R4s
5. 41s
6. 10x

Number 10 is going to be reject because of R4s rule

Other points Number 7 reject flags and Number 9 and 4 warning flags

3. A patient with a history of gall stones presents with abdominal pain.

Bilirubin 139 $\mu\text{mol/l}$ (RR 3-20)

Albumin 41 g/L (RR 35-50)

A. Would you expect the alkaline phosphatase to be highly elevated, moderately raised or normal?

- Highly elevated

B. Would you expect the alanine aminotransferase to be highly elevated, moderately raised or normal?

- Normal

C. Would you expect the urine bilirubin to be elevated?

- Yes

D. Where does bilirubin come from?

- Bilirubin is breakdown product of normal heme catabolism. Heme is found in hemoglobin, a principal component of red blood cells

E. How is bilirubin measured?

- Total Serum Bilirubin (Jendrassik-Grof Method)