



AUSTRALIAN INSTITUTE OF MEDICAL AND CLINICAL SCIENTISTS

AIMS Membership Single Discipline Examination – Chemical Pathology

Guide to Study & Suggested Reading List

Areas of knowledge expected from candidates:

An understanding of the underlying techniques utilised and methodology behind the measurement of common chemistry analytes and their clinical utility including:

- Sound understanding of the phases of laboratory testing including pre-analytical, analytical and post analytical
- Basic physiological and pathophysiology
- reagent preparation, concentration and dilutions
- Blood gas and electrolytes measurement, anion gap, osmolarity and osmolar gap
- Urea, creatinine, and creatinine clearance, uric acid
- Glucose, glucose tolerance, HbA1c
- Liver function tests
- Lipid analysis
- Iron studies, haemoglobins and Porphyrin analysis
- Current Australian practices for antenatal screening and post partum testing
- Thyroid function tests
- Adrenal function tests
- Plasma proteins and protein electrophoresis
- Specific plasma proteins e.g., CRP
- Principles of enzyme assays.
- Enzyme tests e.g. amylase, creatine kinase
- Calcium, phosphates, magnesium
- Bilirubin including neonatal bilirubin measurement
- Myocardial function tests.
- Common tumour markers e.g., Prostatic specific antigen, CEA
- Basic serology tests now performed in core lab settings for example Hepatitis B, C and HIV
- Dynamic function testing
- Bionstrumentation including immunoassays, spectrophotometric assays and point of care testing (TDM) and toxicology
- Bionstrumentation including immunoassays, spectrophotometric assays and point of care testing
- Quality Control and quality systems concepts as they apply to an automated biochemistry laboratory.
- Therapeutic drug monitoring (TDM) and toxicology
- Vitamin assays including Vitamin B12, folate and Vitamin D
- trace elements analysis.

Recommended Reading List:

- Rifai N, Horvath AR and Wittwer CT *Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics*, Elsevier
- Kaplan LA and Pesce AJ *Clinical Chemistry: Theory, Analysis, Correlation*, Mosby.

- Bishop ML, Fody EP and Schoeff LE *Clinical Chemistry: Principles Techniques and Correlations*, Jones & Bartlett Learning
- Marshall WJ, Lapsey M, Day AP and Ayling RM *Clinical Biochemistry: Metabolic and Clinical Aspects*, Elsevier

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Sample Examination Questions

1. List the three (3) factors in the collection of blood that can invalidate the result. (1.5 marks)
2. Pre-analytical factors are particularly important when testing hormones. List three (3) causes of error that may only occur when measuring hormones. (1.5 marks)
3. The Dexamethasone Suppression test is used to diagnose what conditions? (1 mark)
4. List two (2) hormones that are useful in the investigation of female fertility. Explain Why. (1.5 marks)
5. List three (3) enzymes that can be used to assess liver damage. (1.5 marks)
6. What is the clinical significance of a PSA of 30 ng/mL? (1 mark)
7. Comment on the possible consequence for a three (3) day old baby with an unconjugated bilirubin of 360 $\mu\text{mol/L}$. (1 mark)
8. What is the difference between accuracy and precision? (1 mark)
9. You are required to make 200mls of a 0.2 molar sodium hydroxide solution. How much sodium hydroxide do you need to make this solution? (1 mark)
10. Define the following: (4 marks)
 - a. Zero Order kinetics
 - b. First Order kinetics
 - c. Osmolality
 - d. Euvolaemia
11. What condition/s do the following results indicate? Give reasons for your comments. (4 marks)
 - a. ALP: 1150 U/L
GGT: 25 U/L
 - b. ALP: 89 U/L
GGT: 110 U/L
 - c. Ca: 1.89 mmol/L
PO₄: 1.75 mmol/L
 - d. Albumin: 34 g/L
Sweat chloride: 75 mmol/L