Date ..... Name ..... Group .....

Lab report from the practical lesson on biochemistry

Topic: Calcium, phosphorus, sodium, metabolism of bone tissue

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Task 1: Estimation of total calcium in serum and urine

Principle:

Results:

	Serum sample (Tube No. 1)	Urine sample (Tube No. 2)	Standard (Tube No. 3)	Blank (Tube No. 4)
A 650 nm				-

Calculations:

Concentration of total calcium in the serum (S-Ca):

$$\text{S-Calcium (mmol/l)} = \frac{A_{serum}}{A_{standard}} \times c_{standard}$$

$$\text{S-Calcium (mmol/l)} = \frac{\ldots\ldots}{\ldots\ldots} \times \ldots\ldots = \ldots\ldots$$

Concentration of calcium in the urine (U-Calcium):

$$\text{U- Calcium (mmol/l)} = \frac{A_{urine}}{A_{standard}} \times c_{standard} \times \text{Dilution of urine}$$

$$\text{U- Calcium (mmol/l)} = \frac{\ldots\ldots}{\ldots\ldots} \times \ldots\ldots \times \ldots\ldots = \ldots\ldots$$

Daily output of calcium into urine (dU-Calcium):

dU-Calcium (mmol/24 hrs) = U-Calcium (mmol/l) × Volume of urine (liters/24 hrs)

dU-Calcium (mmol/24 hrs) = …….. × …….. = …….

Conclusion:

Task 2: Estimation of inorganic phosphate in serum and urine

Principle:

Results:

	Serum sample (Tube No. 1)	Urine sample (Tube No. 2)	Standard (Tube No. 3)	Blank (Tube No. 4)
A 340 nm				-

Calculations:

Concentration of inorganic phosphate in serum (fS-P inorg.):

$$\text{fS-Inorganic phosphate (mmol/l)} = \frac{A_{serum}}{A_{standard}} \times c_{standard}$$

$$\text{fS-Inorganic phosphate (mmol/l)} = \frac{\text{.....}}{\text{.....}} \times \text{.....} = \text{.....}$$

Concentration of inorganic phosphate in urine (U-P inorg.):

$$\text{U- Inorganic phosphate (mmol/l)} = \frac{A_{urine}}{A_{standard}} \times c_{standard} \times \text{Dilution of urine}$$

$$\text{U- Inorganic phosphate (mmol/l)} = \frac{\text{.....}}{\text{.....}} \times \text{.....} \times \text{.....} = \text{.....}$$

Daily output of inorganic phosphate into urine (dU-P):

dU-Inorg. phosphate (mmol/24 hrs) = U-Inorg. phosphate (mmol/l) × Volume of urine (liters/24 hrs)

dU-Inorg. phosphate (mmol/24 hrs) = …….. × …….. = …….

Conclusion:

Task 3: Estimation of catalytic concentration of alkaline phosphatase and its isoforms

Principle:

Results:

	Native serum sample (S1)	Control for native sample (S2)	Heat-inactivated sample (T1)	Control for heat-inactivated (T2)
A 420 nm				

Calculations:

Subtraction of control absorbances:

$\Delta A_S = A_{S1} - A_{S2}$

ΔA_S = ... − ..... = ...

$\Delta A_T = A_{T1} - A_{T2}$

ΔA_T = ... − ..... = ...

Total catalytic concentration of ALP:

Total ALP (µkat/l) = $\Delta A_S \times 10.263$ = ... × 10.263 = ...

Catalytic concentration of the liver isoenzyme:

Liver isoenzyme ALP (µkat/l) = $1.5 \times \Delta A_T \times 10.263$ = ...

Catalytic concentration of the bone isoenzyme:

Bone isoenzyme ALP (µkat/l) = Total ALP (µkat/l) − Liver isoenzyme ALP (µkat/l)

Bone isoenzyme ALP (µkat/l) = ... − ..... = ...

Conclusion:

Task 4 Solubility of various calcium salts

Principle:

A. Solubility of calcium salts in water and HCl

Results:

	Tube No. 1 $CaCl_2$	**Tube No. 2** $CaCO_3$	**Tube No. 3** $Ca_3(PO_4)_2$	**Tube No. 4** $Ca_3(PO_4)_2$ + Na_2EDTA
Solubility in water				
Solubility in HCl	-			
Solubility in $NaHCO_3$	-	-		

B. Influence of some food components on solubility of calcium salts

Results:

	Tube No. 1 $CaCl_2$ + Ammonium oxalate	**Tube No. 2** $CaCl_2$ + Lactose
Result		

Conclusion:

Task 5 Quantitative estimation of Na^+ in urine

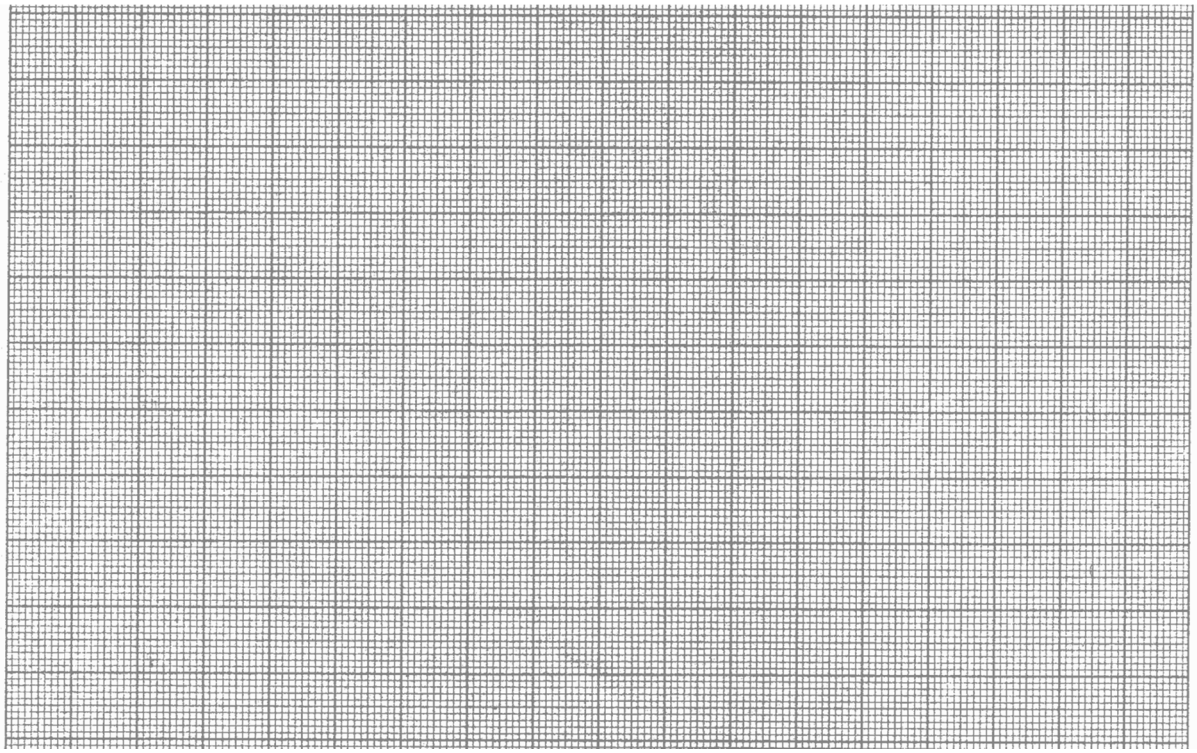
Principle:

Results:

	E (mV)	pNa	Concentration Na^+ (mol/l)
Standard solution 1		1	0.1
Standard solution 2		2	0.01
Standard solution 3		3	0.001
Urine sample			

Calibration curve for estimation of Na^+ concentration:

Plot the pNa values on the x axis and the potential in mV on the y axis. Next, use the calibration graph to read the pNa for the analyzed urine sample.



Calculation of urinary Na^+ concentration:

$pNa = -\log[Na^+]$

$pNa_{diluted\ urine}$ = ... $[Na^+]_{diluted\ urine} = 10^{-pNa}$ = ... mol/l

$U\text{-}Na^+ = 10 \times [Na^+]_{diluted\ urine}$ = ... mol/l

Daily output of Na^+ into urine:

$dU\text{-}Na^+$ = $U\text{-}Na^+$ (mol/l) × Vol. urine (liters/24 hrs)

$dU\text{-}Na^+$ = ... × ..... = ... mol/24 hrs

Fractional excretion (FE) of Na^+:

U_{Cr} Concentration of creatinine in urine (mmol/l): .....

P_{Cr} Concentration of creatinine in serum (mmol/l): .....

U_{Na} Concentration of sodium in urine (mmol/l): .....

P_{Na} Concentration of sodium in serum (mmol/l): .....

$$FE_{Na} = \frac{U_{Na} \times P_{Cr}}{U_{Cr} \times P_{Na}}$$

$$FE_{Na} = \frac{..... \times .....}{..... \times .....} = ...$$

Tubular resorption (TR) of Na^+:

$TR_{Na} = 1 - FE_{Na}$ = ...

Conclusion: