



AFRICA
UNIVERSITY
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**COLLEGE OF HEALTH, AGRICULTURE AND NATURAL
SCIENCES**

DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES

BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS

NSLS201: TRANSFUSION SCIENCE AND IMMUNOLOGY PRACTICAL

END OF FIRST SEMESTER FINAL EXAMINATIONS

NOVEMBER 2023

LECTURER: Dr A. MARAMBA

DURATION: 3 HOURS

INSTRUCTIONS

1. Write your **Student Registration Number** on the answer sheet provided
2. **Answer ALL questions**
3. Use Answer Sheets Provided
4. Begin your answer for Each Question on a New Page
5. Credit is Given for Neat Presentation
6. You may use the tables provided to write your answers
7. **DO NOT** take any examination material including question papers outside the Laboratory / examination room

1. The following details in **Table 1.** are for the two patients **Mrs Nyabeze and baby Mutsa.**

Table 1. Patient details for Mrs Nyabeze and baby Mutsa

Patient name	Age (years)	Sex	Clinical data
Mrs Nyabeze	36 years old	Female	Day 2 Post delivery
Baby Mutsa	2 day old	Male	Neonatal sepsis with symptomatic anaemia

- a) Perform ABO and Rhesus blood grouping for **Mrs Nyabeze** and Baby Mutsa using the materials, reagents and Standard Operating Procedures provided on page 3. Record your results in Tables 3a & 3b respectively [30 marks].
- b) With the aid of some examples explain how infections usually cause discrepancies in grouping and how they are also responsible for autoantibodies. [10]
- c) What would be the first choice blood group to be cross matched for Mrs Nyabeze and for Baby **Mutsa** if they were to require one unit each of packed red blood cells? [10]

Procedure A: ABO Blood Grouping Procedure for each patient or donor

1	Label 3 tubes as follows: <ul style="list-style-type: none"> • Tube 1- anti-A • Tube 2- anti-B • Tube 3- anti-AB
2	Add 2 drops of anti-A, anti-B and anti-AB to each of the labelled tubes in step 1 above, respectively as labelled (front group).
3	Add 1 drop of 2-5% (0.2ml/10ml -0.5ml/10ml) cell suspension of the donor or patient to each tube containing anti-A, anti-B and anti-AB.
4	Label 4 more tubes: <ul style="list-style-type: none"> • Tube 4- A cells • Tube 5- B cells • Tube 6-O Cells • Tube 7-ABOAcc
5	Add 2 drops of donor or patient serum or plasma to each tube labelled A cells, B cells, O cells and ABO Acc cells.
6	Add 1 drop of the respective blood grouping cells to tubes labelled A cells, B cells, O cells and (ABO Acc cells from the donor or patient, accordingly)
7	Mix contents of the tubes by gently tapping the base of each tube with your finger
8	Leave all the 7 tubes at approximately 25°C for 5 minutes
9	Centrifuge at 3 000 revolutions per minute for 15 seconds
10	Take out the 7 tubes from the centrifuge and place them in the rack in same positions as before centrifuging
11	Read results macroscopically by tapping gently the base of each tube, looking for either agglutination or haemolysis. Grade as shown in Table 2
12	Record results in the ABO Blood Group Record Sheet (Table 3) as follows: <ol style="list-style-type: none"> a. Positive (+) if there is agglutination or haemolysis b. Negative (-) if there is no agglutination or haemolysis c. Weak positive (+w) <p>Refer to Table 4 for grading of agglutination reactions</p>
13	Read microscopically for tubes where agglutination or haemolysis is NOT seen as follows: <ol style="list-style-type: none"> a. Pipette 1 drop of sample from the negative tube and place the drop on a clean glass slide. b. Put cover slip. c. Read at x10 or x20 microscope objective lens
14	Complete and interpret ABO Blood group results as shown on Table 4. (20 marks)

Table 2: Grading Agglutination reactions

Grade	Description		
	erythrocyte aggregates	Erythrocytes	Supernatant
Negative	None	free floating	
Mixed field	Few isolated	mostly free-floating	red
Weak	Tiny and barely visible macroscopically	many free	turbid and reddish
1+	few small just visible macroscopically	many free	turbid and reddish
2+	Medium size	some free	Clear
3+	Several large	some free	clear supernatant
4+	All combined into one solid		clear

Table 3a: ABO Blood Group Record Sheet (for Mrs Nyabeze)

Patient / Sample identification	Tube 1 Anti-A	Tube 2 Anti-B	Tube 3 Anti-AB	Tube 4 A ₁ cells	Tube 5 B cells	Tube 6 O cells	Tube 7 ABOAcc Cells	ABO blood group

Table 3b: ABO Blood Group Record Sheet (for Baby Mutsa)

Patient / Sample identification	Tube 1 Anti-A	Tube 2 Anti-B	Tube 3 Anti-AB	Tube 4 A ₁ cells	Tube 5 B cells	Tube 6 O cells	Tube 7 ABOAcc Cells	ABO blood group

Table 4: Interpretation of ABO Blood grouping results [20 marks]

Patient	Tube 1 Anti-A	Tube 2 Anti-B	Tube 3 Anti-AB	Tube 4 A ₁ cells	Tube 5 B cells	Tube 6 O cells	Tube 7 ABOAcc	RhD	ABO blood group
1	+	-	+	-	+	-	-	+	
2	-	+	+	+	-	-	-	-	
3	+	+	+	-	-	-	+	+	
4	-	-	-	+	+	+	-	-	

2. Two patients' samples labeled (P1) and (P2) are provided for you to perform an antibody screen using procedure B.
 - a. Perform an antibody screen for patient 1 and comment on your results (P1) [20marks].
 - b. Perform an antibody screen for patient 2 and comment on your results (P2) [20marks].

BLOOD BANK SLS 201 STANDARD OPERATING PROCEDURES

Procedure B: Antibody Screen / detection method

1. Label 3 tubes SI, SII and Acc for each patient.
2. Put 2 drops of patient's plasma in each of the tubes in step 1 above.
3. Add 1 drop of 2-5 % red blood cell suspension as follows:
 - a. Screen cells SI into tube labelled SI
 - b. Screen cells SII into tube labelled SII
 - c. Patient / donor own cells into tube labelled Acc
4. Centrifuge at 3000 rpm for 15 seconds, check for haemolysis /agglutination. Record results in **Table 5**
5. **If negative** in step 4 above, add 2 drops of LISS
6. Incubate for 15 minutes at 37° C
7. Centrifuge at 3000 rpm for 15 seconds, check for haemolysis/agglutination. Record results in **Table 5**. Proceed to step 8 if results are negative in step 7.
8. Wash the cells three times with normal saline
9. Add 2 drops of polyspecific AHG serum to washed cells
10. Centrifuge at 3000 revolutions per minute (pm) for 15 seconds
11. Read and record your results in **Table 5**
12. If negative, add 1 drop of OSC to each tube
13. Centrifuge at 1 000 rpm for 30 seconds and read visually. Record results in **Table 5**

Table 5a: Antibody screen results (for patient 1)

Patient / Sample	Acc				SI				SII				Antibody screen test Result
	RT- IS	LISS 37°C	AHG	OSC	RT- IS	LISS 37°C	AHG	OSC	RT- IS	LISS 37°C	AHG	OSC	

Table 5b: Antibody screen results (for patient 2)

Patient / Sample	Acc				SI				SII				Antibody screen test Result
	RT- IS	LISS 37°C	AHG	OSC	RT- IS	LISS 37°C	AHG	OSC	RT- IS	LISS 37°C	AHG	OSC	

3. You are provided with two samples labeled Rh1 and Rh2 for you to perform Rhesus D typing using procedure C below.
 - a. Perform a Rhesus D typing on the sample labelled Rh1 and comment on the meaning of your results [20 marks].
 - b. Perform a Rhesus D typing on the sample labelled Rh2 and comment on the meaning of your results [20 marks].

Procedure C: Rhesus D (Rh D) Typing method.

1. Label two tubes, D and Alb
2. Add 2 drops of anti-D and two drops 22% Bovine serum albumin to tubes labelled D and Alb respectively.
3. Add 1 drop of 3% red blood cells suspended in saline to both tubes.
4. Centrifuge at 3000 revolutions per minute for 15 seconds and read macroscopically and microscopically if negative.
5. If negative, test for Weak Rh D by performing steps 5 to 13 of the **Antibody screen method**.
6. **Record ALL results in Table 6 below.**

Table 6a: Rh Blood Group Results (for the sample labelled Rh1)

Patient / Sample	Anti-D	22% Bovine Albumin	Rh group

Table 6b: Rh Blood Group Results (for the sample labelled Rh2)

Patient / Sample	Anti-D	22% Bovine Albumin	Rh group

Key to abbreviations and other terms

Abbreviation	Meaning
Acc	Auto-control for Coombs test
AHG	Anti-human globulin reagent sera
LISS	Low ionic strength solution
Negative	No haemolysis / agglutination seen
OSC	Group O Rh Positive IgG sensitised red blood cells
Positive	Haemolysis / agglutination seen
Rpm	Revolutions per minute
RT-IS	Room temperature immediate spin
SI	Selectogen I antibody screen cells
SII	Selectogen II antibody screen cells
ABOAcc	Auto control cells used in ABO blood grouping