

Student Surname: _____ **Initials:** _____

Student Number: _____



PROGRAM : B. Eng. Tech (ENGINEERING METALLURGY)

SUBJECT : METALLURGICAL GEOLOGY MICROSCOPE
MODULE 3 PRACTICAL TEST 2_MEMO.

CODE : GMESCB2

DATE : 20 NOVEMBER 2020

DURATION : First session (Group A of 1) 08:00 – 10:00
: Second Session (Group B of 1) 10:05 – 12:05
: Third Session (Group A of 2) 12:10 – 14:10
: Fourth Session (Group B of 2) 14:15 -16:15

TOTAL MARKS : ~~85~~ 75 95 *Cadded 20% to all tests
for late oxide ore samples)*

SECTION A

ANSWER THE QUESTIONS BELOW USING TABLES 1 AND 2 PROVIDED.

LABEL CLEARLY WHICH SAMPLE YOU ARE STUDYING.

- 1.1. Study the hand specimen of the rock and thin section. Record any important features that may assist you with the identification of the rock. List the observations of the hand specimen under the section hand specimen observations in your table. Observations made under the microscope have to be reported under the section Microscopic description of thin section. Information on the minerals visible, grain size, textures and relevant features or facts, the occurrence and percentage of opaque minerals should be recorded.
- 1.2. List all the minerals present in the thin section and give their approximate percentage occurrence in the thin section.
- 1.3. Record three main optical properties for each of the minerals listed in the table
- 1.4. Consider all the facts that you have gathered above about the rock and give the rock an accurate mineralogical name based on its mineral content and texture.
- 1.5 A minimum of 2 thin sections and corresponding rock specimen are required.

[40]

TABLE 1: ANSWER SHEET FOR ROCK AND THIN SECTION OBSERVATIONS, INDICATE THE TEXTURAL FEATURES AND STRUCTURE OF THE ROCK <WITH AN X IN THE CORRECT BOX>.

THIN SECTION NUMBER:		YOUR NAME:	
HANDSPECIMEN OBSERVATIONS(2): Cream – yellow rock with limonite staining. Gritty rock. Feels like sandpaper. Grains are rounded to sub rounded. Arenaceous rock			
MICROSCOPIC DESCRIPTION OF THIN SECTION			
MAIN MINERALS PRESENT	%(1 each)	MAIN OPTICAL PROPERTIES (List at least three major optical properties)	
Quartz(1)	96	Colourless, low Relief rounded to subrounded, occasional undulose extinction(1)	
Feldspar (plagioclase) (1)	2	Colourless, low Relief, twinning (Lamellae), 1 st order low up to grey(1)	
Feldspar (orthoclase) (1)	1	Colourless, low Relief, cross-hatch, 1 st order low up to white and cream(1)	
Mica and clay minerals(1)	0.5	Colourless, low-moderate relief, 2 nd order colours(1)	
Other (including opaque) (1)	0.5	Black in ppl and XPL, subhedral mostly angular(1)	
TEXTURAL FEATURES AND STRUCTURE OF THE ROCK <put a X in the correct box> (1)			
IGNEOUS		SEDIMENTARY	METAMORPHIC
Grain size > 2mm.		Grain size > 2mm.	Foliated texture
Grain size 0.5 - 2mm.		Grain size 0,5 - 2mm.	Non foliated texture
Grain size < 0,5 mm		Grain size < 0,5 mm	Schistose texture
Minerals altered		Angular clasts	Gneissic texture
Relatively fresh rock		Rounded clasts	Granoblastic texture
Acid Composition		Chemically formed	Grain size > 2mm.
Intermediate Composition		Mechanically formed	Grain size 0,5 - 2mm.
Basic Composition		Mature	Grain size < 0,5 mm
Ultra Basic Composition		Immature	
ROCK NAME	ROCK NAME Sandstone(1)		ROCK NAME
Other observations Size of opaque minerals , alteration of silicate minerals, typical opaque minerals that may occur in this rock. (1) Occasional perthitic textures observed in feldspar, occasional opaque minerals. Fine-grained texture Some grain boundaries appear to have undergone extremely low metamorphism or alteration seen in the presence of very fine grained micas and clay minerals.			

TABLE 2: ANSWER SHEET FOR ROCK AND THIN SECTION OBSERVATIONS, INDICATE THE TEXTURAL

FEATURES AND STRUCTURE OF THE ROCK <WITH AN X IN THE CORRECT BOX>.

THIN SECTION NUMBER:		YOUR NAME:	
HANDSPECIMEN OBSERVATIONS:0.5 Light grey to pinkish with dark green grains. It has an equigranular texture and is medium grained			
MICROSCOPIC DESCRIPTION OF THIN SECTION			
MAIN MINERALS PRESENT	%(1each)	MAIN OPTICAL PROPERTIES (List at least three major optical properties)	
Amphibole(1)	10	Greenish -slightly brown, weakly pleochroic, green-brown. Moderate to high relief, middle 2 nd order colours, two directional cleavage. (1)	
Biotite(1)	6	Deep green brown (pale), strong pleochroism, mica 1 directional cleavage, high order colours eg yellow(1)	
Plagioclase(1)	45	Colourless, Relief, twinning (Lamellae), 1 st order low up to grey(1)	
Muscovite(1)	4	Colourless, perfect 1directional cleavage moderate relief, 2 nd order colours (1)	
Orthoclase(1)	15	Colourless, low Relief, cross-hatch and Carlsbad twinning 1 st order low up to white and cream (1)	
Quartz(1)	20	Colourless, low Relief, subhedral, occasional undulose extinction (1)	
TEXTURAL FEATURES AND STRUCTURE OF THE ROCK <put a X in the correct box> (0.5)			
IGNEOUS		SEDIMENTARY	METAMORPHIC
Grain size> 2mm.	<input checked="" type="checkbox"/>	Grain size> 2mm.	<input type="checkbox"/>
Grain size 0.5 - 2mm.	<input type="checkbox"/>	Grain size 0,5 - 2mm.	<input type="checkbox"/>
Grain size< 0,5 mm	<input type="checkbox"/>	Grain size < 0,5 mm	<input type="checkbox"/>
Minerals altered	<input checked="" type="checkbox"/>	Angular clasts	<input type="checkbox"/>
Relatively fresh rock	<input checked="" type="checkbox"/>	Rounded clasts	<input type="checkbox"/>
Acid Composition	<input type="checkbox"/>	Chemically formed	<input type="checkbox"/>
Intermediate Composition	<input type="checkbox"/>	Mechanically formed	<input type="checkbox"/>
Basic Composition	<input checked="" type="checkbox"/>	Mature	<input type="checkbox"/>
Ultra Basic Composition	<input type="checkbox"/>	Immature	<input type="checkbox"/>
ROCK NAME Granite-Granodiorite (1)	ROCK NAME		ROCK NAME
Other observations Size of opaque minerals , alteration of silicate minerals, typical opaque minerals that may occur in this rock. Alteration in biotite to clay mineral chlorite			

SECTION B

ANSWER THE QUESTIONS BELOW USING TABLE 3 PROVIDED.

LABEL CLEARLY WHICH SAMPLE YOU ARE STUDYING.

Ensure that the blocks are polished cleaned and mounted on a metal plate before analysis.

- 1.1. Study the polished blocks provided. Record any important features that may assist you with the identification of the ore minerals. List the observations in Table 3 under the polished block observations in your table. Observations made under the microscope have to be reported under Reflected light Microscopic description of the ore minerals. Information of what is required is listed in Table 3.
- 1.2. List at least two sulphide minerals and two oxide minerals present in the resin block.
- 1.3. Record all optical properties for each of the minerals listed in the table
- 1.4. Consider all the facts that you have gathered above about the minerals and provide names for the minerals identified excluding pyrite.

[25]

TABLE 3: ANSWER SHEET FOR SULPHIDE ORE MINERAL OBSERVATIONS.

OPTICAL PROPERTIES	SAMPLE NAME: AS MINERAL NAME Arsenopyrite (1)	SAMPLE NAME: CLZ MINERAL NAME Copper minerals/Galena (1)	SAMPLE NAME: MINERAL NAME	SAMPLE NAME: MINERAL NAME
PLANE POLARISED LIGHT<ANALYSER OUT)				
COLOUR (1)	White with a weak yellow tint			
REFLECTIVITY (1)	High 51-52			
BIREFLECTANCE(1)	Weak along grain-boundaries			
INTERNAL REFLECTION(1)	Not present			
SHAPE(1)	Commonly euhedral to subhedral			
EXOLUTION/ALTERATION(1)	Not present			
SCRATCH AND POLISHING HARDNESS(1)	SH <Pyrite PH>Pyrrhotite<pyrite			
OTHER FEATURES(1)	May occasionally show lamellae twinning			
CROSSED POLARS<ANALYSER IN)				
ANISOTROPY(1)	Strong blue-red orange-green			

5 Marks for Microscope setup using pyrite, polishing, cleaning, and sample prep. (5)