ESS 110: Introduction to Geology Dr. Woltemade Minerals Lab	**Name:** _____ **Section (circle):** **8:00 AM** **9:30 AM** **11:00 AM**

Introduction

The identification of minerals (and later, rocks) is an integral part of understanding our physical environment. In order to comprehend and explain certain aspects of geology, it is necessary to be familiar with the characteristics of minerals and rocks. Minerals exhibit a number of diagnostic properties that are used for identification.

A mineral is a naturally occurring inorganic substance with a characteristic chemical composition and definite crystal structure. The composition and crystalline structure determine the properties of a mineral. The main mineral properties used for identification are color, streak, hardness, specific gravity, cleavage and fracture.

Mineral Identification Process

Color — The color of a mineral serves to narrow down the number of possible choices, but, because most minerals may exhibit a variety of colors, color is not a reliable diagnostic property. "Light" versus "dark" mineral colors can be a useful indicator.

Streak — The color of the powdered mineral is the streak. Rub the mineral on a piece of unglazed porcelain (streak plate) to obtain the streak.

Hardness — Hardness is a measure of resistance to scratching. The hardness of a mineral is based upon comparisons of scratching tests.

Mohs Hardness Scale

1 - Talc
2 - Gypsum
3 - Calcite
4 - Fluorite
5 - Apatite
6 - Orthoclase feldspar
7 - Quartz
8 - Topaz
9 - Corundum
10 - Diamond

Hardness of Test Materials

2.5 - Fingernail
3.5 - Copper penny
5.5 - Masonry nail
5.5 - Glass

Example of hardness determination: An unknown mineral that can be scratched by a masonry nail but not by a penny has a hardness of 3.5 - 5.5.

Cleavage Certain minerals have a tendency to break along smooth flat surfaces due to weaknesses in the crystal structure. An example is mica: it cleaves along one plane thus it has one direction of cleavage. Galena breaks into cubes -- three directions of cleavage that intersect at 90 degree angles.

Fracture Mineral surfaces that are not broken along cleavage planes exhibit "fracture." Quartz shows no cleavage when it is broken; instead it fractures in a smooth, curved shape known as conchoidal fracture. Other minerals exhibit cleavage planes in some directions and fracture along other surfaces. Common types of fracture include conchoidal, splintery, fibrous and irregular.

Luster The degree or manner in which the surface of a mineral reflects light is luster. Terms used to describe luster include earthy, glossy, metallic, pearly, greasy, waxy, and vitreous (glassy).

Specific gravity The weight of a mineral compared to the weight of an equal volume of water is called the specific gravity. Gold has a specific gravity of 19, thus a cubic centimeter of gold weighs 19 times as much as a cubic centimeter of water. (One cm^3 of water weighs 1.0 grams.) A relative comparison (light, average, heavy) is satisfactory for this assignment.

Directions For Mineral Identification

On your worksheet, identify the following:

Color: The visible color.

Streak: The color of the powdered mineral by grinding it on the streak plate.

Hardness: The approximate hardness by comparing scratch tests. Report a range based on your lab results (such as 2.5 – 3.5). The only materials you should use in testing hardness are: finger nail (2.5), penny (3.5), masonry nail (5.5), glass (5.5).

Cleavage: The number of directions of cleavage planes (0, 1, 2, or 3) and the angle of intersection, if two or more cleavage planes occur.

Fracture: The type of fracture, if it occurs.

Specific Gravity: The relative weight of the mineral (light, average, heavy).

The unknown minerals are: quartz, galena, augite, hornblende, muscovite mica, kaolinite, olivine, calcite, and dolomite