CHAPTER 4: IGNEOUS ROCKS

Most rocks in the Fells are igneous rocks. This chapter will introduce you to specific types of igneous rocks and how they form. For more detail on the formation of igneous rocks I suggest Winter (2010) and Jerram (2021).

(Note: Terms in red and italics appear as entries in the companion glossary.)

Igneous rocks have several important characteristics that give us clues about where, when, and how they have formed. Knowing the chemical constituents of the rock, i.e., what minerals are in it, and whether it is intrusive or extrusive tells us about how and where magma was generated, the magma's flow as a liquid, and the conditions (temperature, pressure, water content, depth, etc.) under which the magma crystallized. Another important consideration about igneous rocks in the Fells is how the different units might be related to each other. For example, were they from the same magma chamber or formed at about the same time? We will have to make observations about mineral types, composition, and textures (grain size and grain arrangement) to get meaningful information about igneous rocks.

4.1 IS IT IGNEOUS?

One thing that distinguishes most igneous rocks from other rock types is that they are made of silicate and aluminosilicate minerals (see section 3.3.1) that form *interlocking crystols*. It is unusual for other types of minerals to be abundant, except for some secondary oxides and sulfides. The *interlocking texture* means that the mineral grains grow against each other and at least partly surround each other, fitting together like the pieces of a jigsaw puzzle (Fig. 4.1). Many times, we can see flat boundaries on some of the mineral grains where they are in contact with each other. These are crystal faces, and they represent the shape of the mineral grains as they grew in the magma (see Fig. 2.5). These relationships may be difficult to see in an outcrop or in hand specimens unless the mineral grains are coarse, but it becomes much clearer in sawed rock slabs or in microscope views (see Figs. 2.2-2.4). A hand lens is very helpful in this regard. Although igneous rock recognition is not difficult, it takes a little practice, especially in the Fells, where igneous rocks can be hard to identify in the field. To get useful information, we will have to go beyond simply identifying a rock as igneous and learn some specific igneous rock types.

Figure 4.1 — Thin section view with crossed polarizers showing interlocking crystals of pyroxene (colorful grains), biotite (dark brown) and plagioclase feldspar (white to black striped grains) in a coarse-grained igneous rock. See also Figure 2.5.



Chapter 4 - Igneous Rocks

Rocks Introduction Ch 4 And 5 1 Answer Key

G Psacharopoulos

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Homework Helpers: Earth Science Phil Medina, 2025-09-12 Homework Helpers Earth Science covers all of the topics typically included in a high school or undergraduate course including How to understand the language of rocks The events that we see in the sky and how they affect us Earthquakes and what they can tell us about the inside workings of our world How to understand the weather and what the weatherman is saying Homework Helpers Earth Science is loaded with practical examples using everyday experiences Every topic includes a number of simple tricks to make even the toughest ideas understandable and memorable Each chapter ends with practice questions and explanations of answers As a reference tool Homework Helpers Earth Science can be used as a preview of tomorrow's class or a reinforcement of today s It will leave students with a firm grasp of the material and the confidence that will inspire a deeper understanding Rock Art and Regional Identity Jamie Hampson, 2016-06-16 This unique volume demonstrates that there are archaeological and anthropological ways of accessing the past in order to investigate and explain the significance of rock art motifs and highlights the importance of regional rock art studies and regional variations Rock Indentation Chivukula Murthy, 2021-08-29 This book focusses on rock indentation and importance of specific drilling cutting energy as a performance indicator for drilling rock cutting It aids in designing of drill bits and cutting picks through performance evaluation for a given geometry It further covers stress distribution along three axes in rock during load application correlation of specific energy with properties of rocks and statistical modelling to generate mathematical equation to estimate the specific energy indentation including performance prediction by artificial neural network modelling Presented models can be used to assess the specific energy in rock indentation from the physic mechanical properties of rocks Presents synthesis of rock indentation experiments and analyses Deals with statistical modeling to generate mathematical equations to estimate the specific energy indentation from the rock parameters properties Discusses how to find the performance of drill and cutting bits during drilling or cutting operations through indentation test Covers numerical modeling to explain stress distribution in rock during rock indentation Includes artificial neural network concepts used in field of rock mechanics This book is aimed at researchers and graduate students in mining geological engineering and mechanical engineering

Introduction to Ore-Forming Processes Laurence Robb,2020-10-19 A comprehensive account of ore forming processes revised and updated The revised second edition of Introduction to Ore Forming Processes offers a guide to the multiplicity of geological processes that result in the formation of mineral deposits The second edition has been updated to reflect the most recent developments in the study of metallogeny and earth system science This second edition contains new information about global tectonic processes and crustal evolution that continues to influence the practice of economic geology and maintains the supply of natural resources in a responsible and sustainable way The replenishment of depleted natural resources is becoming more difficult and environmentally challenging There is also a change in the demand for mineral

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