Fundamentals of Geology Practice Exam (Sample)

Study Guide

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Questions

1. What is the primary rock type that forms from the solidification of magma?

A. Metamorphic rock

B. Igneous rock

C. Sedimentary rock

D. Quartzite

2. What is a single mineral deposit that contains commercially viable amounts of a particular mineral called?

A. Resource

B. Ore deposit

C. Mineral vein

D. Quarry

3. Which of the following is NOT typical of glacial deposits?

A. Stratified serpentine-shaped deposits

B. Unstratified, unsorted mixture of sediment

C. Elongated ellipsoidal hillsides

D. Pile of rocks at the base of a steep slope

4. What process leads to the formation of sinkholes?

A. Erosion by wind

B. Dissolution of soluble rock by groundwater

C. Earthquakes

D. Glacial activity

5. What type of geological feature is formed by the deposition of rock debris by a glacier?

A. Moraine

B. Delta

C. Alluvial fan

D. Talus slope

6. What geophysical method is most effective for mapping deeply buried bedrock pediments at a depth of 1500 feet?

A. Magnetic surveying

B. Seismic reflection

C. Electrical resistivity

D. Gravity survey

7. What condition does a braided stream usually indicate about its sediment load?

A. Lower load than capacity

B. Greater load than capacity

C. Consistent sediment load

D. High flood risks

8. How is quartz classified in terms of mineral composition?

A. Ionic mineral

B. Oxide mineral

C. Silicate mineral

D. Carbonate mineral

9. Which layer of the Earth is composed primarily of liquid iron and nickel?

A. Crust

B. Outer core

C. Inner core

D. Mantle

10. Which type of rock is typically formed by the accumulation of sediment over time?

A. Igneous rock

B. Metamorphic rock

C. Sedimentary rock

D. Volcanic rock

Answers

1. B
2. B
3. D
4. B
5. A
6. B
7. B
8. C
9. B
10. C

Explanations

1. What is the primary rock type that forms from the solidification of magma?

A. Metamorphic rock

B. Igneous rock

C. Sedimentary rock

D. Quartzite

Igneous rock is formed through the solidification of magma, which is molten rock located beneath the Earth's surface. The process begins when magma cools and crystallizes, either within the Earth, leading to intrusive igneous rocks, or on the surface after a volcanic eruption, resulting in extrusive igneous rocks. This rock type is characterized by its crystalline texture, which reflects the cooling rate of the magma; slower cooling allows for larger crystals to form, whereas rapid cooling creates smaller crystals. In contrast, metamorphic rocks are formed from the alteration of existing rocks due to temperature, pressure, or chemically active fluids, rather than from the solidification of magma. Sedimentary rocks originate from the compaction and cementation of sediments, which can be derived from the erosion of pre-existing rocks or the accumulation of organic material. Quartzite, specifically, is a type of metamorphic rock that forms from the recrystallization of sandstone under heat and pressure, and is not a primary rock type formed from magma. Therefore, igneous rock is distinct in its origin and formation process related to magma.

2. What is a single mineral deposit that contains commercially viable amounts of a particular mineral called?

A. Resource

B. Ore deposit

C. Mineral vein

D. Quarry

A single mineral deposit that contains commercially viable amounts of a particular mineral is referred to as an ore deposit. This term specifically denotes a concentration of minerals that can be extracted profitably. Ore deposits often contain not just the target mineral but also other materials that can be of economic interest. An ore deposit is characterized by its grade, which is the amount of the desired mineral found within a specific volume of material. It is this economic potential—based on factors such as concentration, accessibility, and the current market demand—that distinguishes it as an ore deposit rather than just any mineral accumulation. While "resource" refers broadly to naturally occurring materials that can potentially be extracted, it does not specifically imply that the material is currently economically viable. A "mineral vein" typically describes a fissure or fracture in rock filled with minerals but does not carry the implication of being commercially viable in the way an ore deposit does. A "quarry," on the other hand, is a type of mine from which stone or other materials are extracted but does not specifically relate to a mineral deposit characterized by its value. Thus, the definition and economic implications involved point clearly to "ore deposit" being the appropriate term for a commercially viable mineral deposit.

3. Which of the following is NOT typical of glacial deposits?

A. Stratified serpentine-shaped deposits

B. Unstratified, unsorted mixture of sediment

C. Elongated ellipsoidal hillsides

D. Pile of rocks at the base of a steep slope

Glacial deposits are formed from the erosion and sediment transport by glaciers, and they exhibit characteristic features based on the processes involved. A stratified serpentine-shaped deposit refers to drumlins or similar formations that glaciers shape as they move. These deposits often display stratification, reflecting the layered nature of sediments deposited by meltwater. An unstratified, unsorted mixture of sediment is typical of glacial till, which glaciers transport and deposit as they advance and retreat. This characteristic signifies that glaciers do not sort the sediments they carry, leading to a jumbled mix of various particle sizes. Elongated ellipsoidal hillsides, such as those created by drumlins, are also a common result of glacial activity. These landforms typically represent the accumulation of till that has been streamlined by the moving ice. The feature described as a pile of rocks at the base of a steep slope, often referred to as a talus slope or debris slope, typically results from processes such as gravity and erosion, which are not directly related to glacial actions. While glaciers do contribute to the creation of loose rock through weathering and erosion, the arrangement of rocks at the base of a slope in a pile does not reflect the unique characteristics associated with primary glacial

4. What process leads to the formation of sinkholes?

A. Erosion by wind

B. Dissolution of soluble rock by groundwater

C. Earthquakes

D. Glacial activity

The formation of sinkholes is primarily driven by the process of dissolution of soluble rock by groundwater. This occurs in areas where underlying bedrock, such as limestone, gypsum, or salt, is susceptible to chemical weathering. When rainwater, which is slightly acidic due to dissolved carbon dioxide, percolates through soil and rock, it interacts with the soluble minerals in the bedrock. Over time, this leads to the gradual dissolution of the rock, creating underground voids or cavities. As these cavities expand, the structural integrity of the overlying material can become compromised. If the roof of a cavity becomes too weak to support its weight, it can collapse suddenly, resulting in a sinkhole. This process is particularly prevalent in karst landscapes, where the presence of significant amounts of soluble rock magnifies the likelihood of sinkhole formation. Erosion by wind, earthquakes, and glacial activity do not contribute to the unique geological processes that create sinkholes. Instead, these processes lead to other forms of landscape changes and geological features.

5. What type of geological feature is formed by the deposition of rock debris by a glacier?

A. Moraine

B. Delta

C. Alluvial fan

D. Talus slope

A moraine is a geological feature created by the accumulation and deposition of rock debris, dirt, and sediment that a glacier has transported. As glaciers move, they erode the surrounding landscape and pick up various materials, including loose rocks and soil. When the glacier advances or retreats, it deposits this accumulated debris at its edges or terminus, forming a ridge-like structure known as a moraine. This feature can vary in size and shape, depending on factors like the glacier's movement and the types of materials involved. In contrast, a delta forms at the mouth of a river where it meets a standing body of water, such as an ocean or lake, due to sediment carried by the river being deposited as the flow velocity decreases. An alluvial fan forms in arid regions when a river emerges from a narrow canyon onto a broader, flatter area, depositing sediment in a fan-shaped pattern. A talus slope is a collection of rock debris that accumulates at the base of a cliff or steep slope due to weathering and gravity, but it is not associated with glacial activity. Each of these other features reflects different geological processes and environments distinct from the formation of moraines by glacial action.

6. What geophysical method is most effective for mapping deeply buried bedrock pediments at a depth of 1500 feet?

A. Magnetic surveying

B. Seismic reflection

C. Electrical resistivity

D. Gravity survey

Seismic reflection is particularly effective for mapping deeply buried bedrock pediments because this method utilizes the reflection of seismic waves generated by an energy source, such as a small explosion or a hammer strike. As these waves travel through the earth, they encounter different geological layers, including bedrock, which reflect some of the waves back to the surface. Analyzing these reflected waves allows geophysicists to create detailed images of subsurface geology at significant depths, making it possible to identify and map structures like bedrock pediments located 1500 feet below the surface. In contrast, while magnetic surveying can detect variations in the Earth's magnetic field caused by different rock types, it is not as effective for deep subsurface mapping as it primarily focuses on relatively shallow targets. Electrical resistivity can provide valuable information about subsurface materials based on their conductivity but generally works best for shallower targets and may have limitations when assessing deeper geological formations due to increased complexity in the data. Gravity surveys measure variations in the Earth's gravitational field which can indicate subsurface density changes, but they are less precise than seismic reflection for identifying specific geological layers like bedrock and its depth.

7. What condition does a braided stream usually indicate about its sediment load?

A. Lower load than capacity

B. Greater load than capacity

C. Consistent sediment load

D. High flood risks

A braided stream typically forms when the sediment load is greater than the stream's capacity to transport it. In this context, a braided stream is characterized by multiple interweaving channels that split and rejoin, which occurs as sediment accumulates in bars and islands between the channel flow. This situation arises when a river carries an abundant supply of sediment, unable to transport it all effectively during periods of lower water flow. When the sediment supply exceeds the ability of the stream to carry it away, the excess material builds up and alters the flow path of the river, resulting in the braiding effect. This is often a response to rapid, variable discharge situations, such as glacial melt or heavy rainfall, which further enhances the sediment transport capacity. Hence, the correct answer reflects the understanding of how braided streams are indicative of a situation where the sediment supply is not just ample but exceeds what can be carried in a single, stable flow channel.

8. How is quartz classified in terms of mineral composition?

A. Ionic mineral

B. Oxide mineral

C. Silicate mineral

D. Carbonate mineral

Quartz is classified as a silicate mineral due to its chemical composition, which consists primarily of silicon and oxygen atoms. Silicate minerals contain the silicate tetrahedron, a structural unit composed of a silicon atom surrounded by four oxygen atoms, which can bond in various ways to form different types of structures. In the case of quartz, these tetrahedra are arranged in a three-dimensional framework, leading to the formation of quartz crystals. Quartz is one of the most abundant and important minerals within the Earth's crust, playing a significant role in various geological processes. Its silicate nature is essential for distinguishing it from other mineral groups. For instance, ionic minerals consist of charged particles and do not have the silicate structures that define quartz. Oxide minerals are characterized by the presence of oxygen ions bonded to metal ions, while carbonate minerals primarily contain carbonate groups (CO_3) in their chemical structure, which also differs from quartz's silicate composition. This classification as a silicate mineral underscores its widespread occurrence and importance in geology.

9. Which layer of the Earth is composed primarily of liquid iron and nickel?

A. Crust

B. Outer core

C. Inner core

D. Mantle

The outer core is composed primarily of liquid iron and nickel, making it a crucial layer of the Earth's structure. This layer lies beneath the mantle and above the inner core. Unlike the solid inner core, the outer core is in a molten state, which is vital for the generation of the Earth's magnetic field. The movement of the liquid iron and nickel creates electric currents, which in turn produce magnetic fields—a phenomenon known as the geodynamo. The distinction between the outer core and the other layers of the Earth is significant. The crust is the thin, solid outer layer of the Earth, primarily made up of silicate rocks. The mantle, located beneath the crust, is composed of solid rock that behaves plastically over geological time, allowing for convection currents that drive plate tectonics. The inner core, which is solid despite its high temperature, is made largely of iron and nickel but remains in solid form due to immense pressure. Understanding the composition and properties of the outer core is fundamental in geology, particularly in discussions around the Earth's magnetic field and its implications for geodynamics and tectonic activity.

10. Which type of rock is typically formed by the accumulation of sediment over time?

A. Igneous rock

B. Metamorphic rock

C. Sedimentary rock

D. Volcanic rock

Sedimentary rock is formed through the accumulation and compaction of sediments over time. These sediments can originate from the weathering and erosion of pre-existing rocks, the remains of organisms, or the precipitation of minerals from solutions. The process involves several stages: deposition, where sediments settle out of transport mediums like water, wind, or ice; compaction, where the weight of overlying materials compresses the sediments; and cementation, where minerals precipitate from groundwater and bind the sediments together. Sedimentary rocks are characterized by their layered appearance and often contain fossils, making them key indicators of past environmental conditions. They can also provide important resources, such as coal, oil, and natural gas, which are formed from organic material trapped within these rock layers. This rock type differs significantly from igneous and metamorphic rocks, which form through different processes involving cooling and crystallization of magma or alteration due to heat and pressure, respectively. The distinction is crucial in geological studies to understand the Earth's history and the processes that shape its surface.