Soil Science Previous Question & Answers

Question 1. What Is Soil Science?

Answer :

Soil science is the study of soil as a natural resource on the surface of the Earth including soil formation, classification and mapping; physical, chemical, biological, and fertility properties of soils; and these properties in relation to the use and management of soils.

Question 2. What Is Soil Classification?

Answer :

Soil classification deals with the systematic categorization of soils based on distinguishing characteristics as well as criteria that dictate choices in use.

Question 3. Do You Know What Kind Of Daily Work Do Soil Scientists Do?

Answer :

Some soil scientists are involved in the daily activities of food production. They test the soil in which the crops are grown and make fertilizer recommendations, as well as managing irrigation scheduling in regions where irrigation is practiced. They also work to conserve the soil resources, developing methods to protect the soil from wind and water erosion. In dryland regions, soil scientists help develop management systems (tillage and crops) that store rainfall in the soil for future crops.

Question 4. What Are Three Soil Science Meanings Of The Term "clay"?

Answer :

Clay is a particle size e.g. <2 mm
Clay is a texture class name
Clay is a name for a specific group of alumino-silicate minerals

Question 5. What Is Isomorphous Substitution In A Clay Mineral?

Answer :

It is the process that substitutes one atom for another in the structure of clay minerals at the time the clay minerals form. This leads to net negative charge in the mineral. Examples are the substitution of Al3+ for Si4+ in the tetrahedra and Mg2+, Fe2+, Fe3+, and others for Al3+ in octahedra within clay minerals.

Question 6. Give Two Examples Of Why Isomorphous Substitution Is Important In Agriculture And/or Environmental Protection.

Answer :

The importance of isomorphous substitution is that it produces a net negative charge in clays. This charge must be balanced by positive charged ions from solution. This is important to retention of plant nutrients (soil fertility) and the retention of charged polutants.

Question 7. Explain Why Some 2:1 Clay Minerals Have High Shrink-swell Capacity While 1:1 Clay Minerals Do Not.

Answer :

The 2:1 clays that shrink and swell have an interlayer that can be penetrated by water and hydrated ions. Two layers of oxygen atoms face each other across the interlayer space. They are slightly negative and repel each other, making it possible for the clays to shrink and swell. The 1:1 clays are built differently. In these, a layer of hydroxyl molecules faces a layer of oxygen atoms across the interlayer space. The hydrogen atoms from the hydroxyl and the oxygen atoms in the opposite sheet hydrogen bond, resulting in strong interaction and lack of shrinking and swelling.

Question 8. What Was The Effect On Water Flow Rate Of Raising The Mariotte Bottle, Relative To Your Soil Column In Your Column Experiment? Explain The Effect Based On Your Knowledge Of Darcy's Law.

Answer :

As you raise the Mariotte bottle, the pressure head on the inflow side of the column increases and the water flows out faster. Total head, which is the gravity head plus pressure head in this system is higher when the Mariotte bottle is raised. According to Darcy's law, the rate of flow is a function of the cross sectional area, the hydraulic conductivity, and the potential gradient. By increasing the gradient (the difference in head at the inflow and outflow ends of the column) we increase the flow rate.

Question 9. What Is Soil Morphology?

Answer :

Soil morphology is the field observable attributes of the soil within the various soil horizons and the description of the kind and arrangement of the horizons. C.F. Marbut championed reliance on soil morphology instead of on theories of pedogenesis for soil classification because theories of soil genesis are both ephemeral and dynamic.

Question 10. What Is The Definition Of "soil Colloid"?

Answer :

Soil colloids are extremely small particles of soil with particle sizes of 2 micrometers in diameter or smaller suspended in a soil with larger particles. Soil colloids are typically found in clay or humus soils

Question 11. What Is Soil Texture?

Answer :

soil texture is defined by the size of the particles that make up the soil. Soil texture typically is categorized into three types: sand, silt and clayey.

Question 12. What Factors Affect Soil Permeability?

Answer :

Factors that affect soil permeability include grain size, void ratio, water impurities and the volume of air or organic matter entrapped with the soil. Permeability is approximately proportional to the square of the grain size. Soil quality and permeability may vary greatly from one layer of soil to another.

Question 13. What Is The Difference Between Sand And Silt?

Answer :

Sand and silt are both examples of granular materials, which are collections of separate particles and distinct particles, such as raw flour in a container or jellybeans in a jar.

The most common forms of sand and silt are composed of tiny fragments of quartz. Quartz is a mineral that forms from volcanic activity deep beneath the crust of the Earth. Through erosion and weathering, quartz crystals are slowly broken up over millions of years. These fragmented crystals are deposited by rivers and oceans onto beaches and riverbanks, which becomes the sandy shore. Quartz crystals that are weathered even further sink to the bottom of riverbeds and the ocean floor to form a silt lining.

Other granular materials include gravel, which is composed of particles that are larger and coarser than sand, and clay, which is made up of particles finer than silt.

Geologists precisely measure the diameter of particles to determine their group. They use standards, such as the Udden-Wentworth scale, to determine the category for a collection of particles.

Question 14. How Does Contour Plowing Conserve Soil?

Answer :

Contour plowing conserves soil by following the lay of the land and creating ridges that form a water break to prevent soil erosion. Furrows that do not follow the lay of the land cause rapid runoff during rainfall by forming a convenient channel for the water to flow downhill.

Question 15. What Causes Salinization Of Soil?

Answer :

By definition, soil salinization is "the process by which a nonsaline soil becomes saline, as by the irrigation of land with brackish water," according to Dictionary.com. The dissolved salts in irrigation water are the primary source of this problem.

Question 16. What Are The Four Basic Types Of Soil?

Answer :

The four basic types of soil are sand, silt, clay and loam. Loam, considered a perfect soil, is a mixture of silt, clay and sand. Sand is gritty and contains small particles of minerals and rocks, where silt is smoother than sand and is more fertile

Question 17. What Three Mineral Particles Is Soil Composed Of?

Answer :

Soil contains particles of clay, silt and sand. Clay particles are tiny and porous, allowing them to absorb water and nutrients. Silt increases the soil's liquid capacity, while sand permits the drainage of excess water.

Question 18. Where Is Gypsum Found?

Answer :

Gypsum is found in sedimentary rock formations across the world in over 85 countries and mined in 17 states. Gypsum is also known as calcium sulfate dihydrate.

Question 19. Where Are Sedimentary Rocks Found?

Answer :

Sedimentary rocks are found covering a majority of the Earth's upper crust. Formed from the deposition of mud and sand that is buried and compressed to form solid rock, sedimentary rocks usually begin their life underwater, rising to the Earth's surface as the waters dry up

Question 20. What Are Granite And Gabbro?

Answer :

Granite and gabbro are igneous rocks formed through the cooling and crystallization of magma in the Earth's crust. They are identified by their specific mineral content and composition.

Question 21. What Are Some Facts About Igneous Rocks?

Answer :

Some facts about igneous rocks include that they are glassy in nature, that pumice igneous rock is the lightest type of rock on Earth, and that the moon is made of igneous rocks. Igneous rocks come from molten magma and have two main versions: basalt and pumice

Question 22. What Type Of Igneous Rock Is Rich In Iron And Magnesium?

Answer :

Mafic, or basaltic, igneous rocks contain a greater portion of iron and magnesium than silica, and they are often much darker in color, typically black, dark brown or dark gray, compared to the lighter-colored igneous rocks which contain a high silica content. Mafic igneous rocks include basalt, gabbro, scoria, dolerite and tachylite. Like all igneous rocks, mafic rocks are formed from magma.

Question 23. What Is Edaphology?

Answer :

Edaphology is one of two main divisions of soil science, the other being pedology. Edaphology is concerned with the influence of soils on living things, particularly plants. The term is also applied to the study of how soil influences humankind's use of land for plant growth as well as man's overall use of the land. General subfields within edaphology are agricultural soil science, known by the term agrology in some regions and environmental soil science. Pedology deals with pedogenesis, soil morphology, and soil classification.

Question 24. What Is Agrophysics?

Answer :

Agrophysics is a branch of science bordering on agronomy and physics, whose objects of study are the agroecosystem - the biological objects, biotope and biocoenosis affected by human activity, studied and described using the methods of physical sciences. Using the achievements of the exact sciences to solve major problems in agriculture, agrophysics involves the study of materials and processes occurring in the production and processing of agricultural crops, with particular emphasis on the condition of the environment and the quality of farming materials and food production.

Question 25. Tell Me What Is Pedology In Soil?

Answer :

Pedology soils is the study of soils in their natural environment. It is one of two main branches of soil science, the other being edaphology.

Question 26. What Is Soil Horizon?

Answer :

A soil horizon is a layer generally parallel to the soil crust, whose physical characteristics differ from the layers above and beneath. Each soil type usually has three or four horizons. Horizons are defined in most cases by obvious physical features, chiefly colour and texture. These may be described both in absolute terms particle size distribution for texture, for instance and in terms relative to the surrounding material (i.e., "coarser" or "sandier" than the horizons above and below).

The differentiation of the soil into distinct horizons is largely the result of influences, such as air, water, solar radiation and plant material, originating at the soil-atmosphere interface. Since the weathering of the soil occurs first at the surface and works its way down, the uppermost layers have been changed the most, while the deepest layers are most similar to the original parent material.

Question 27. What Is The Meaning Of Edaphology?

Answer :

Edaphology is one of two main divisions of soil science, the other being pedology. Edaphology is concerned with the influence of soils on living things, particularly plants.

Question 28. What Is Pedogenesis?

Answer :

Pedogenesis also termed soil development, soil evolution, soil formation, and soil genesis is the process of soil formation as regulated by the effects of place, environment, and history. Biogeochemical processes act to both create and destroy order (anisotropy) within soils. These alterations lead to the development of layers, termed soil horizons, distinguished by differences in color, structure, texture, and chemistry. These features occur in patterns of soil type distribution, forming in response to differences in soil forming factors.

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Question 29. Do You Know Where Did The First Soils Come From?

Answer :

The first soils began to form as soon as parent material was available, either through deposition of particles by wind, water, ice, or gravity, or through weathering of rocks. One of the most important processes in topsoil formation is the accumulation of humus (organic matter) that occurs as plants grow, die, and are decomposed, and as earthworms, termites, ants, and other organisms rework the material. A by-product of this process is that individual particles are joined together to form aggregates. Aggregates are groups of individual soil particles held together by organic matter or other forces, and are the foundation of soil structure. At first, these changes may be rapid, but they tend to slow as time progresses. Soil scientists would expect more dramatic differences in the first 10 years after deposition, than in the next 10 years, than in the last ten years of the first century after the deposition, etc.

Question 30. Tell Me How Long Does It Take To Make A Foot Of Soil?

Answer :

No one is old enough to have observed how long it took to form a foot of soil. With the right conditions, a foot of topsoil may form in less than one hundred (100) years. These conditions would include a fresh deposit of loose material (as might happen during or after a flood) in which the soil could form, a stable landscape position so that soil formation is not interrupted, and a favorable climate that encourages the growth of grass (plants with fibrous root systems form topsoil faster than trees with taproots). When the original material is bedrock, like sandstone or limestone, that must first weather into small particles before the soil can form, and the process is much slower.