Physical Science & Global Geography

Physical Science · Answer Key · 12 Questions

1. The unique geological formations of the Danakil Depression in Ethiopia are primarily a result of its location atop a divergent tectonic plate boundary, specifically the Afar Triple Junction. This geological activity influences the concentration of certain elements. Which of these elements, known for its highly reactive nature and prevalence in volcanic gases, is found in significant, commercially viable quantities in the Danakil Depression's salt flats?

A) Potassium
B) Magnesium
C) Sulfur
D) Nitrogen

2. The Cherenkov radiation observed in nuclear reactors, a blue glow caused by charged particles moving faster than the speed of light in a medium, is also a phenomenon studied in deep underground neutrino detectors. Which of the following locations, known for housing one of the world's deepest and most sensitive neutrino observatories, is situated in a former gold mine in South Africa?

A) IceCube Neutrino Observatory
B) Super-Kamiokande
C) Kamioka Observatory
D) Borexino

3. The extreme salinity of the Dead Sea, a hyper-saline lake bordering Jordan and Israel, is a consequence of its unique hydrological situation and high evaporation rates in a desert climate. This high salt concentration significantly impacts buoyancy. If a person were to float in the Dead Sea, how would their density relative to pure water's density be affected due to the dissolved minerals?

A) Their density would decrease significantly, making them float higher.
B) Their density would increase slightly, but they would still sink.
C) Their density would remain the same as in pure water.
D) Their density would increase significantly, making them float higher.

4. The Aurora Borealis, visible in high-latitude regions, is caused by charged particles from the sun interacting with Earth's atmosphere. While commonly associated with countries like Norway and Canada, the phenomenon is also observable in specific regions of Russia. Which Russian peninsula, located at a high latitude and known for its active volcanoes, experiences frequent auroral displays?

A) Yamal Peninsula
B) Taimyr Peninsula
C) Kamchatka Peninsula
D) Kola Peninsula

5. The Atacama Desert in Chile is one of the driest places on Earth, with some regions receiving virtually no rainfall for centuries. This extreme aridity makes it an ideal location for astronomical observation due to the clear skies and minimal light pollution. The lack of atmospheric water vapor in the Atacama significantly affects the absorption of what portion of the electromagnetic spectrum, making it particularly advantageous for certain telescopes?

A) Visible light
B) Ultraviolet radiation
C) Infrared radiation
D) Radio waves

6. Geothermal energy harnesses the Earth's internal heat. Iceland, situated on the Mid-Atlantic Ridge, is a prime example of a country heavily reliant on geothermal power due to intense volcanic and tectonic activity. The specific geological feature that contributes to Iceland's abundant geothermal resources is its location on what type of plate boundary?

A) Convergent plate boundary
B) Transform plate boundary
C) Divergent plate boundary
D) Subduction zone

7. The Great Barrier Reef, the world's largest coral reef system, is located off the coast of Queensland, Australia. Coral reefs thrive in specific oceanic conditions. What fundamental physical property of seawater, primarily influenced by the concentration of dissolved salts and temperature, is crucial for the survival of coral polyps and the formation of calcium carbonate skeletons?

A) Viscosity
B) Surface tension
C) Density
D) Salinity

8. The Andes Mountains, a vast mountain range along the western edge of South America, are characterized by high altitudes and significant geological activity, including volcanoes. The extreme altitude in regions like the Altiplano, with elevations often exceeding 3,700 meters (12,000 feet), leads to a significant decrease in atmospheric pressure. This reduced pressure directly impacts the boiling point of water. At an elevation of 4,000 meters, water boils at approximately what temperature?

A) 100°C
B) 90°C
C) 85°C
D) 75°C

9. The magnetic poles of the Earth are not static and shift over time. The North Magnetic Pole is currently drifting towards Siberia. The Earth's magnetic field, generated by the molten iron core, plays a vital role in deflecting harmful solar radiation. Which of the following countries is located at a latitude where the influence of the magnetosphere's protective shield is most pronounced, leading to its designation as a site for auroral research?

A) Brazil
B) Egypt
C) Antarctica
D) India

10. The Dead Sea's exceptionally high mineral content, particularly its concentration of magnesium chloride and bromide, has unique chemical properties. These properties influence its physical behavior and applications. If a sample of Dead Sea water were compared to a sample of distilled water, what significant difference in their chemical composition would be readily apparent?

A) Higher pH in Dead Sea water
B) Lower concentration of dissolved ions in Dead Sea water
C) Higher concentration of dissolved ions in Dead Sea water
D) Lower density in Dead Sea water

11. The Amazon rainforest, the largest tropical rainforest in the world, is located primarily in Brazil. The sheer volume of evapotranspiration from its vast vegetation contributes significantly to regional and global weather patterns. Evapotranspiration is the process by which moisture is carried through plants from roots to small pores on the underside of leaves, where it changes to vapor and is released to the atmosphere. This process is a form of what phase transition?

A) Condensation
B) Sublimation
C) Evaporation
D) Fusion

12. The Mariana Trench, the deepest oceanic trench on Earth, is located in the western Pacific Ocean. The immense pressure at the bottom of the trench, over 1,000 times the atmospheric pressure at sea level, affects the physical and chemical properties of water. For example, the adiabatic compression of water at such depths causes a slight increase in its temperature. This phenomenon is a direct consequence of which fundamental physical principle?

A) Archimedes' Principle
B) Newton's Third Law of Motion
C) The First Law of Thermodynamics
D) The Doppler Effect