Advanced Volcanology and Physics of Eruptions

Volcanology · Answer Key · 7 Questions

1. Which physical property primarily distinguishes 'A'a lava flows from Pahoehoe lava flows of identical basaltic composition?

A) Higher flow velocity
B) Lower temperature and higher strain rate
C) Complete absence of dissolved gases
D) Higher sodium and potassium concentration

2. The Volcanic Explosivity Index (VEI) measures eruption magnitude. By what factor does the volume of erupted material increase with each step up on the VEI scale above VEI 1?

A) Factor of 2
B) Factor of 5
C) Factor of 10
D) Factor of 100

3. Which structural mechanism differentiates the formation of a volcanic caldera from a standard volcanic crater?

A) Explosive blasting away of the mountain summit
B) Sub-aerial erosion by rainfall over centuries
C) Collapse of the surface structure into an emptied underground magma chamber
D) Gradual accumulation of basaltic lava rings

4. Volcanoes emit a variety of volatile gases. Which gas typically accounts for 70% to 90% of total volcanic emissions by volume?

A) Carbon dioxide (CO_2)
B) Sulfur dioxide (SO_2)
C) Water vapor (H_2O)
D) Hydrogen sulfide (H_2S)

5. What defines a phreatomagmatic volcanic eruption?

A) Direct explosive interaction between magma and external ground or surface water
B) Eruption driven purely by expanding trapped magmatic gases without water
C) Submarine eruption of lava directly onto the abyssal plain
D) Slow extrusion of viscous silica-rich lava forming a dome

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6. Which volcanic rock texture indicates underwater basaltic extrusion characterized by rapid surface cooling?

A) Pillow basalt
B) Columnar jointing
C) Welded tuff
D) Pumice raft

7. What is the primary mechanism that generates electrical charges leading to volcanic lightning in dense ash plumes?

A) Radioactive decay of radon gas in the vent
B) Triboelectric charging from high-velocity friction between colliding ash particles
C) Ionization of volcanic gases by extreme heat
D) Interaction between magmatic liquid and atmospheric moisture

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