

Plate Tectonics and the Formation of the Oceans and Continents (2 Chapters) – Chapter Questions

Note: There may be some terms used in this chapter that you don't yet know. Don't worry about them. There is more detail than you need to know. Focus on the questions below to know what material you're responsible for.

MAFIC – igneous rocks whose composition is low in Si and high in Fe, Mg, and Ca – usually found in oceanic volcanic settings like seafloor spreading centers and ocean hotspots. Example: Basalt.

FELSIC – igneous rocks whose composition is high in Si and low in Fe, Mg, and Ca – usually found in continental volcanic settings like subduction zone volcanic arcs, continental hotspots, or continental rifting. Example: Granite.

An **accretionary wedge** is a mass of sediment that derives from two sources: 1) sediment that is scraped off a subducting oceanic plate (might include pieces of ocean lithosphere as well), and 2) sediment that erodes off the volcanic arc behind the subduction zone (land). This thick sequence of sediment is folded and compressed between the trench and the volcanic arc, often creating compressional mountain ranges. A **terrane** is anything that has been accreted to the continent and is now a hardened attachment. Terranes include ophiolites (sections of complete ocean lithosphere), accretionary wedges, continental fragments.

1. **What is the difference between an accretionary wedge and a terrane? How do they form?
2. Describe the origins and evolution of continental crust. Through what two methods do continents grow?
3. Where in the world's oceans are the youngest rocks? Oldest rocks? How old are they? Explain why continents are about 20 times older than the oldest ocean basins. Where are the oldest continental rocks?
4. **What was Pangaea?
5. **What is a hot spot?
6. How are hotspots related to flood basalts?
7. How can you use a hotspot track to determine plate speed and direction?
8. **Describe the process of rifting of a continent. Where in the world is such activity happening today?
9. **Compare and contrast active and passive continental margins. What are the primary features of each?
10. Provide examples of each type of margin. Draw cross-sections through each.
11. Can a passive margin turn into an active margin? If so, how? Vice versa?
12. Central and Southern California is a passive margin. Why? (Note book says it is NOT passive. Why the difference?)
13. Describe the locations and causes of these features globally.

Feature	Location and cause	Feature	Location and cause
Earthquakes		Volcanism	
Trenches		Fracture zones	
Mid-ocean ridges		Accretionary wedges	
Rift valleys		Mountain building	

14. Define *ophiolite*. Be sure you can remember the exact stratigraphy of one. How do they form?
15. **What is a hydrothermal vent? Where are they found?
16. What processes occur at a hydrothermal vent?
17. What is Serpentinite? How is it formed, and why is it important in California?
18. **What kind of plate boundary exists in Northern California and the Pacific Northwest?
19. **What kind of plate boundary exists in Central and Southern California?

OPHIOLITE STRATIGRAPHY

Oceanic sediment	
Pillow basalts	
Sheeted basaltic dikes	
Massive Gabbro	
Depleted mantle rock	Moho

Sea bottom

Base of lithosphere – beginning of asthenosphere