

Oceanography Midterm Exam Study Guide

Knowing the Ocean World

- 1) The Scientific Method
- 2) Ancient Seagoing Civilizations Contributions to Marine Exploration
- 3) Age of Discovery – Beginnings of Oceanography
- 4) Modern Oceanography
- 5) Modern-Day Oceanographic Institutes

Origins

- 1) Condensation/Accretion Theory for Solar Systems
- 2) Origin of the Earth and Ocean
- 3) Origin and evolution of Earth's Atmosphere and Ocean
- 4) Origin of Life

Earth Structure and Plate Tectonics

- 1) Layering of the Interior of the Earth
- 2) Wegener and the Theory of Continental Drift
- 3) Theory of Plate Tectonics
- 4) Seafloor Spreading and Subduction
- 5) Types of Plate Boundaries
 - a) Divergent
 - b) Convergent
 - c) Transform
- 6) Terrane Accretion and Ophiolites

Continental Margins and Ocean Basins

- 1) Techniques for Mapping of the Seafloor
- 2) Composition and Structure of Oceanic Seafloor
- 3) Marine Provinces and Water Depths
- 4) Continental Margins
 - a) Shelves, Slopes, and Rises
 - b) Active Margins
 - c) Passive Margins
 - d) Submarine Canyons and Turbidity Currents
- 3) Deep Ocean Basins
 - a) Mid-Ocean Ridges
 - b) Abyss

- c) Hydrothermal Vents
- d) Seamounts and Guyots

Marine Sediments

- 1) Classification of Sediments by Source
- 2) Classification of Sediment by Composition, Texture, and Depositional Setting
- 3) The Sediments of Shoreline and Shelf
- 4) The Sediments of Deep-Ocean Basins
- 5) Distribution of Marine Sediments

The Properties of Water

- 1) Covalent Bonding and Geometry of the Water Molecule
- 2) Water and Inter-molecular Hydrogen Bonding
- 3) Water and Heat Capacity
- 4) Water and the Latent Heat of Fusion and Vaporization
- 5) Water's Light and Sound Properties
- 6) Thermal Properties of Water and Earth's Climate Regulation

Seawater Chemistry and Ocean Structure

- 1) Water as a Universal Solvent
- 2) Seawater Salinity
 - a) Major, Minor and Trace Components: Composition and Abundance
- 3) Measuring Salinity
- 4) Salinity Sources and Sinks
- 5) Temperature Variation in the Ocean: by Latitude and by Depth
- 6) Salinity Variation in the Ocean: by Latitude and by Depth
- 7) Temperature Variation in the Ocean: by Latitude and by Depth
- 8) Thermohaline Control on Seawater Density
- 9) Density Zones of the Ocean and Pycnoclines
- 10) Ocean Water Masses
- 11) Dissolved Gases in the Ocean
- 12) Seawater pH and the Carbonate Buffer System

Circulation of the Atmosphere

- 1) Composition of the Atmosphere
- 2) Coriolis Effect
- 3) Global Convection Cells
 - a) Hadley, Ferrel, and Polar
- 4) Global Surface Wind Circulation
 - a) Trades, Westerlies, Polar Easterlies
- 5) Global Pressure Systems
- 6) Adiabatic Heating and Cooling

- 7) Air Masses
 - a) Marine and Continental
 - b) Tropical, Subtropical, Temperate, Subpolar. Polar
- 8) Tropical Storm Systems
- 9) Extratropical Storm Systems/Fronts

Circulation of the Ocean

Shallow Ocean Circulation

- 1) Surface Wind Forcing Factor
- 2) Ekman Spiral and Ekman Transport
- 3) Geostrophic Gyres
 - a) Western Boundary Currents
 - b) Eastern Boundary Currents
 - c) Transverse Currents
- 4) Monsoonal and High Latitude Currents
- 5) Upwelling and Downwelling
- 6) El Nino and ENSO
- 7) Common Water Masses

Deep Ocean Circulation

- 1) Seawater density and thermohaline factors
- 2) Processes that alter seawater density (change temperature/salinity)
- 3) Surface locations of deepwater formation
- 4) Major Deepwater Masses
 - b) Intermediate water masses
 - c) Deep water masses
 - d) Bottom waters
- 5) Deep water mass mixing and Caballing
- 6) Ocean's Global Conveyor Belt Heat Transfer System