

單複選混合考題 (30%)： ※ 本大題請於試卷內之「選擇題作答區」依序作答。

- 1) Which element have the lowest average concentration found in the ocean?
(a) Ca (b) K, (c) Na, (d) Cl, (e) Mg
- 2) Please select the methods that can be used for salinity measurement?
(a) Evaporation, (b) Refractivity, (c) Conductivity, (d) Transmittance, (e) Titration
- 3) What is the average circulation time of water in the Ocean?
(a) ~1,500 years, (b) ~35,000 years, (c) ~3,700 years, (d) ~150 years, (e) $\sim 1.5 \times 10^4$ years
- 4) A thermocline is the depth profile in the ocean where?
(a) salinity changes rapidly, (b) temperature changes rapidly, (c) the density changes rapidly, (d) the density remain constant, (e) calcium carbonate dissolve rapidly
- 5) What is the Redfield ratio? Given as C:N:P mole ratio by A. Redfield, 1934.
(a) 1:16:106, (b) 16:1:106, (c) 106:1:16, (d) 106:16:1 (e) 116:1:16
- 6) Which gas will change the pH of seawater?
(a) Helium (b) Oxygen, (c) Nitrogen, (d) Carbon Dioxide, (e) Argon
- 7) What is the abbreviation of "CCD" stands for in oceanography?
(a) carbonate compensation depth, (b) conductivity compensation depth, (c) conductivity, temperature, depth, (d) carbon compensation depth, (e) conductivity calculation depth
- 8) What are the causes for dissolved oxygen value change in the ocean?
(a) Sedimentation, (b) Plankton Photosynthesis, (c) Bacterial Respiration, (d) Migration, (e) Colloidal Pumping
- 9) Which of the elements are the 'Nutrient Type' distribution in the ocean?
(a) Iron, (b) Thorium, (c) Zinc, (d) Copper, (e) Lead
- 10) A "trace element" is an element with a specific concentration usually in the range of what value/unit?
(a) mg/kg, (b) mg/L, (c) $\mu\text{g/L}$, (d) ppm, (e) g/kg
- 11) Which element is the central atom of 'Chlorophyll-*a*' in marine phytoplankton?
(a) Na, (b) Mg, (c) Fe, (d) Pb, (e) Ca
- 12) What is the half-life of radioactive isotope of carbon, ^{14}C ?
(a) $8,730 \pm 40$ years, (b) $15,730 \pm 40$ years, (c) $5,730 \pm 40$ years, (d) $1,730 \pm 40$ years, (e) $50,730 \pm 40$ years
- 13) Which of the elements are not used for determination of the sedimentation rate in the ocean?
(a) Sr, (b) Th, (c) Cs, (d) Pu, (e) Pb
- 14) What is the indicator used in Chlorinity titration for Salinity determination of seawater?
(a) AgNO_3 , (b) K_2CrO_4 , (c) $\text{Na}_2\text{S}_2\text{O}_3$, (d) MnSO_4 , (e) KI
- 15) During early diagenesis, which of the elements will undergo re-dox reactions in marine sediments?
(a) Fe, (b) Mn, (c) Na, (d) Cl, (e) S

問答考題 (70%)： ※ 注意：請於試卷內之「非選擇題作答區」作答，並應註明作答之題號。

- 1). What is the definition for "Salinity" and "Chlorinity" ?
- 2). Please draw the typical vertical distribution pattern of Nitrate and Nitrite in the North Pacific Ocean? Please include range of concentrations in $\mu\text{mol/L}$.
- 3). Please describe "Marcet's Principle"?
- 4). What is "HNLC" stand for in Oceanography?
- 5). What are the sources of Sediments in the marine environments?
- 6). Please explain what is "Biological Pump" & "Solubility Pump"?
- 7). In 1990s a biologist named John Martin proposed the following idea to the academic:
"Give me half a tanker of iron and I will give you an ice age."
Please rationalize the sentence above from the perspective of marine biogeochemistry.

試題隨卷繳回