

選擇考題（每題3分，共60分）：※ 注意：請於試卷內之「選擇題作答區」依序作答。

- 1) What is the indicator used for chemical titration during the determination of dissolved oxygen in seawater?
(a) Potassium Chromate, (b) Potassium Dichromate, (c) Starch, (d) Silver Chloride
- 2) Which gas will change the alkalinity in water columns of the ocean?
(a) Helium (b) Argon, (c) Nitrogen, (d) Carbon Dioxide
- 3) What substance cause the bitter taste of seawater ?
(a) $MgSO_4$, (b) NaCl, (c) KCl, (d) KOH,
- 4) What is the Redfield ratio ? Given as C:N:P by Redfield, 1934.?
(a) 1:16:106, (b) 16:1:106, (c) 106:1:16, (d) 106:16:1
- 5) Which of the following physical properties of seawater can not be used for salinity measurement?
(a) Fluorescence, (b) Refractivity, (c) Conductivity, (d) Density
- 6) What is not the major factors controlling primary production in the surface ocean?
(a) Light, (b) Phosphate, (c) Oxygen, (d) Temperature
- 7) Which element display the "conservative type" vertical distribution in the ocean?
(a) Iron, (b) Phosphorous, (c) Silicon, (d) Calcium
- 8) What is the residence time of water in the Ocean?
(a) ~5,700 years, (b) ~37,000 years, (c) ~3,700 years, (d) ~570 years,
- 9) What is the common filter pore size that oceanographer used to separate dissolved and particulate matters ?
(a) $10\mu m$ (b) $0.3\mu m$ (c) $1\mu m$ (d) $0.45\mu m$ (e) $0.8\mu m$
- 10) What will not cause dissolved oxygen concentration change in seawaters?
(a) Zooplankton Grazing, (b) Plankton Photosynthesis, (c) Bacterial Respiration, (d) Water Mass Mixing
- 11) Which ocean's deep water mass have the highest dissolved nitrate concentration?
(a) NADW, (b) AABW, (c) NPDW, (d) IODW
- 12) What is the average depth of euphotic zone in the open ocean?
(a) 10 m, (b) 50 m, (c) 150 m, (d) 300 m
- 13) What is the average concentration of dissolved organic carbon in deep ocean?
(a) $40\mu M$, (b) 80 nM , (c) $80\mu M$, (d) 40 nM , (e) $200\mu M$
- 14) What is the mixing time of water in the Ocean?
(a) ~1,600 years, (b) ~16,000 years, (c) ~16 years, (d) ~160 years
- 15) The halocline is the depth in the ocean where
(a) the salinity changes rapidly, (b) the temperature changes rapidly, (c) the density changes rapidly, (d) the density remain constant
- 16) What is the central atom of chlorophyll molecule in phtoplankton?
(a) Calcium, (b) Manganese, (c) Iron, (d) Magnesium,
- 17) Which element does not regulate phytoplankton productivity in the ocean?
(a) Iron, (b) Phosphorous, (c) Nitrogen, (d) Barium
- 18) Which isotope can be used for sedimentation rate measurement?
(a) ^{222}Rn , (b) ^{40}K , (c) ^{210}Pb , (d) ^{87}Sr
- 19) The solubility product of CuI is 1.1×10^{-12} . The formation constant K for the reaction of CuI with I^- to give CuI_2^- is 7.9×10^4 . Please calculate the molar solubility of CuI in a $1.0 \times 10^{-4} M$ solution of KI?
(a) $9.0 \times 10^{-8} \text{ mol/L}$, (b) $8 \times 10^{-8} \text{ mol/L}$, (c) $7 \times 10^{-8} \text{ mol/L}$, (d) $6 \times 10^{-8} \text{ mol/L}$
- 20) If a water is in equilibrium with calcite at 25°C , what is the calcium concentration in mg/L, if the CO_3^{2-} is 5 mg/L ? Assume activity equals molality, K_{sp} for calcite is 4.27×10^{-9} .
(a) 3.15 mg/L, (b) 3.05 mg/L, (c) 2.05 mg/L, (d) 4.05 mg/L

問答考題（每題10分，共40分）：

- 1). Please describe "Solubility Pump" and "Carbonate Compensation Depth, CCD"?
- 2). What is "AOU"?
- 3). What is "Marcet Principle" ?
- 4). Strontium 90 is a radioactive element which has a half-life of 29 years. How long would a given amount of ^{90}Sr become 0.1% in quantity?