

# 國立中山大學九十二學年度轉學生招生考試試題

科目：普通生物（上）【生科系二年級】

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單選題：請選擇最適當的答案，填入答案卷內。每題兩分。

1. Which of the following would be found in an animal cell but NOT in a bacterial cell?  
(A) ribosomes (B) DNA (C) plasma membrane (D) endoplasmic reticulum  
(E) cell wall
2. The extracellular matrix is thought to participate in regulation of animal cell behavior by communicating via (A) DNA and RNA. (B) the nucleus. (C) lipoproteins in the membrane. (D) plasmodesmata. (E) integrins.
3. The net movement of uncharged molecules from a lower concentration to a higher concentration is described by which of the following? (A) active transport  
(B) osmosis (C) exocytosis (D) facilitated diffusion (E) diffusion
4. One of the functions of cholesterol in animal cell membranes is to (A) speed diffusion.  
(B) store energy. (C) maintain membrane fluidity. (D) facilitate transport of ions.  
(E) phosphorylate ADP.
5. Muscle cells in oxygen deprivation convert pyruvate to \_\_\_\_\_ and in this step gain \_\_\_\_\_. (A) lactate; ATP (B) alcohol; ATP (C) ATP;  $\text{NAD}^+$  (D) alcohol;  $\text{CO}_2$   
(E) lactate;  $\text{NAD}^+$
6. The primary function of the light reactions of photosynthesis is (A) to use ATP to make glucose. (B) to produce NADPH used in respiration. (C) to produce energy-rich glucose from carbon dioxide and water. (D) to produce ATP and NADPH.  
(E) to convert light energy to the chemical energy of PGAL.
7. The chemiosmotic process in chloroplasts involves the (A) establishment of a proton gradient. (B) oxidation of water to produce ATP energy. (C) reduction of carbon dioxide to glucose by NADPH and ATP. (D) diffusion of electrons through the thylakoid membrane. (E) movement of water by osmosis into the thylakoid space from the stroma.
8. Cytokinesis usually, but not always, follows mitosis. If cells undergo mitosis and not cytokinesis, this would result in (A) a cell with two or more nuclei. (B) death of the cell line. (C) a cell with a single large nucleus. (D) cells with abnormally small nuclei. (E) feedback responses that prevent mitosis.
9. The centromere is a region in which (A) chromatids are attached to one another. (B) metaphase chromosomes become aligned. (C) chromosomes are grouped during telophase. (D) new spindle microtubules form. (E) the nucleus is located prior to mitosis.
10. Which of the following events occurs during prophase I of meiosis? (A) synapsis and crossing over (B) segregation of alleles of linked genes (C) reduction in chromosome number (D) duplication of chromatids (E) segregation of alleles of unlinked genes
11. Which of the following is an example of polygenic inheritance? (A) pink flowers in snapdragons (B) skin pigmentation in humans (C) sex-linkage in humans (D) the ABO blood groups in humans (E) white and purple color in sweet peas
12. A 9 purple to 7 white phenotype in sweet peas in the F<sub>2</sub> generation most likely is due to (A) trisomy 21. (B) epistasis. (C) linkage. (D) pleiotropy. (E) crossing over.
13. Skin color in a fish is inherited via a single gene with four different alleles. How many different genotypes would be possible in this system? (A) 16 (B) 6 (C) 8 (D) 3 (E) 10
14. The frequency of crossing over between any two linked genes is (A) the same as if they were not linked. (B) higher if they are recessive. (C) determined by their relative dominance. (D) difficult to predict. (E) proportional to the distance between them.
15. Prions are infectious particles that are unique in that they are believed to lack (A) proteins. (B) DNA. (C) RNA. (D) a membrane. (E) any nucleic acid.

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16. Vermilion eyes is a sex-linked recessive characteristic in fruit flies. If a female having vermilion eyes is crossed with a wild-type male, what proportion of the F1 males will have vermilion eyes? (A) 100% (B) None (C) 50% (D) 25% (E) 75%
17. All of the following were determined directly from X-ray diffraction photographs of crystallized DNA EXCEPT (A) the helical shape of DNA. (B) the specificity of base pairing. (C) the linear distance required for one full turn of the double helix. (D) the width of the helix. (E) the diameter of the double helix.
18. A particular eukaryotic protein is 300 amino acids long. Which of the following could be the number of nucleotides in the DNA that codes for this protein? (A) 300 (B) 900 (C) 1800 (D) 100 (E) 3
19. Which of the following DNA mutations is the most potentially damaging to the protein it specifies? (A) a codon substitution (B) a point mutation (C) a codon deletion (D) a base-pair deletion (E) a substitution in the last base of a codon
20. In which of the following would you expect to find the most methylation of the DNA? (A) pseudogenes (B) tandem arrays for ribosomal genes (C) globin genes (D) Barr bodies (E) transposons
21. Muscle cells and nerve cells in one kind of animal owe their differences in structure to (A) having different chromosomes. (B) expressing different genes. (C) having different genes. (D) having unique ribosomes. (E) using different genetic codes.
22. The polymerase chain reaction is important because it allows us to (A) make DNA from RNA transcripts. (B) make many copies of DNA. (C) incorporate genes into viruses. (D) insert eukaryotic genes into prokaryotic plasmids. (E) insert regulatory sequences into eukaryotic genes.
23. Karen Smith is a scientist studying how different genes are expressed in different tissues. She is most likely to use which technique? (A) in situ hybridization (B) use of antisense nucleic acids (C) DNA microarray assays (D) in vivo mutagenesis (E) RFLP analysis
24. "The development of spatial organization in which the tissues and organs are all in their characteristic places" is a definition for (A) development. (B) induction. (C) morphogenesis. (D) differentiation. (E) pattern formation.
25. The term homeobox refers to (A) glycoproteins that assist cells during morphogenetic movements. (B) peptide sequences of 60 amino acids that turn other genes on or off. (C) zones of polarizing activity commonly present during limb formation. (D) a specific nucleotide sequence of some genes that regulate development. (E) a group of genes that determine polarity during development.
26. Which of the following solutions has the greatest concentration of hydrogen ions  $[H^+]$ ? (A) gastric juice at pH 2 (B) vinegar at pH 3 (C) tomato juice at pH 4 (D) black coffee at pH 5 (E) household bleach at pH 12
27. The naturalist who synthesized a concept of natural selection independently of Darwin was (A) Charles Lyell. (B) Gregor Mendel. (C) Alfred Wallace. (D) Rev. John Henslow. (E) Thomas Malthus.
28. Which of the following is the unit of evolution? In other words, which of the following can evolve in the Darwinian sense? (A) gene (B) chromosome (C) individual (D) population (E) species
29. Natural selection is most closely related to (A) diploidy. (B) gene flow. (C) genetic drift. (D) assortative mating. (E) differential reproductive success.
30. The origin of a new plant species by hybridization coupled with nondisjunction is an example of (A) allopatric speciation. (B) sympatric speciation. (C) autopolyploidy. (D) heterochrony. (E) a ring species.

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31. Which of the following can be used to determine the absolute age of fossils?  
(A) index fossils (B) racemization (C) cladistics (D) sedimentary strata  
(E) the half-life of isotopes
32. The most recent common ancestors of all land plants were most likely similar to modern-day members of which group? (A) Cyanobacteria (B) Red algae  
(C) Charophyceae (D) Brown algae (E) Golden algae
33. Plant spores give rise directly to (A) sporophytes. (B) gametes.  
(C) gametophytes. (D) zygotes. (E) seeds.
34. Sporophylls can be found in which of the following? (A) mosses (B) liverworts  
(C) hornworts (D) pteridophytes (E) charophyceans
35. Which of the following most closely represents the male gametophyte of seed-bearing plants? (A) ovule (B) microspore mother cell (C) pollen grain (D) embryo sac  
(E) fertilized egg
36. Which of the following flower parts develops into a fruit? (A) stigma (B) style  
(C) ovule (D) ovary (E) receptacle
37. Which of the following are not found in angiosperms? (A) vessel elements  
(B) triploid endosperm (C) fruit (D) flagellated sperm (E) carpels
38. Mushrooms and toadstools are classified as (A) basidiomycetes. (B) ascomycetes.  
(C) deuteromycetes. (D) zygomycetes. (E) chytridiomycetes.
39. What is a characteristic of all fungi? (A) heterotrophic nutrition (B) saprobic  
lifestyle (C) multicellularity (D) dikaryotic hyphae (E) parasitism
40. The vegetative (nutritionally active) bodies of most fungi are (A) composed of  
hyphae. (B) referred to as a mycelium. (C) usually underground. (D) Only A  
and B (E) A, B, and C
41. The vascular bundle in the shape of a single central cylinder in a root is called the  
(A) cortex. (B) stele. (C) endodermis. (D) periderm. (E) pith.
42. Which of the following root tissues gives rise to secondary roots? (A) endodermis  
(B) phloem (C) cortex (D) epidermis (E) pericycle
43. The photosynthetic cells in the interior of a leaf are what kind of cells?  
(A) parenchyma (B) collenchyma (C) sclerenchyma (D) phloem (E) endodermis
44. What is the main cause of guttation in plants? (A) root pressure (B) transpiration  
(C) pressure flow in phloem (D) plant injury (E) condensation of atmospheric water
45. The greatest proportion of the water taken up by plants is (A) split during  
photosynthesis. (B) lost through stomata during transpiration. (C) absorbed by  
central vacuoles during cell elongation. (D) returned to the soil by roots. (E) stored  
in the xylem.
46. Based on studies of plant evolution, which flower part is not a modified leaf?  
(A) stamen (B) carpel (C) petal (D) sepal (E) receptacle
47. In flowering plants, pollen is released from the  
(A) anther. (B) stigma. (C) carpel. (D) sepal. (E) pollen tube.
48. Which plant hormone is most closely associated with cell division? (A) ethylene  
(B) cytokinin (C) abscisic acid (D) phytochrome (E) brassinosteroids
49. Which of the following hormones would be most useful in causing the rooting of plant  
cuttings? (A) oligosaccharins (B) abscisic acid (C) cytokinins (D) gibberellins  
(E) auxins
50. In order to flower, what does a short-day plant need? (A) a burst of red light in  
the middle of the night (B) a burst of far-red light in the middle of the night  
(C) a day that is longer than a certain length (D) a night that is longer than a  
certain length (E) a higher ratio of Pr:Pfr

單選題：請選擇最適當的答案，填入答案卷內。每題兩分。

1. The first genetic material was most likely (A) a protein enzyme. (B) an RNA polymer. (C) a protein. (D) a DNA oligonucleotide. (E) a DNA polymer.
2. Proton pumps of bacteria probably functioned first for (A) reduction of O<sub>2</sub>. (B) oxidation of food. (C) pH regulation. (D) ATP synthesis. (E) photosynthesis.
3. A biologist finds a new unicellular organism that possesses an endoplasmic reticulum, a simple cytoskeleton, and two small nuclei that are each surrounded by a membrane. The organism has neither mitochondria nor chloroplasts. This organism most probably is a(n) (A) diplomonad. (B) ciliate. (C) Chlamydomonas. (D) prokaryote. (E) apicomplexan.
4. Multicellular animals lacking true tissues are called the (A) protozoa. (B) parazoa. (C) metazoa. (D) eumetazoa. (E) hydrozoa.
5. All of the following animal groups have evolved terrestrial life forms EXCEPT (A) Crustacea. (B) Echinodermata. (C) Vertebrata. (D) Arthropoda. (E) Mollusca.
6. *Caenorhabditis elegans*, like the fly *Drosophila melanogaster*, has become a model research organism in developmental biology. To which phylum does it belong? (A) Arthropoda (B) Nematoda (C) Platyhelminthes (D) Annelida (E) Rotifera
7. Recent molecular evidence suggests that which of the following phyla are most closely related to the arthropods? (A) Mollusca (B) Nematoda (C) Echinodermata (D) Onychophora (E) Annelida
8. In which class did jaws first occur? (A) Agnatha (B) Osteichthyes (C) Placodermi (D) Chondrichthyes (E) Ostracodermi
9. What is one characteristic that separates chordates from all other animals? (A) bilateral symmetry (B) true coelom (C) segmentation (D) hollow dorsal nerve cord (E) blastopore, which becomes the anus
10. Bones are held together at joints by (A) negative feedback. (B) ligaments. (C) tendons. (D) Haversian systems. (E) loose connective tissue.
11. Which of the following is an advantage of a complete digestive system over a gastrovascular cavity? (A) Extensive branching is possible. (B) Food items are retained longer. (C) Intracellular digestion is easier. (D) Specialized regions are possible. (E) Digestive enzymes can be more specific.
12. Secretin (A) stimulates the gastric glands. (B) decreases the stomach's churning activity. (C) stimulates the release of alkaline products by the pancreas. (D) stimulates the release of digestive enzymes. (E) is released by the salivary glands.
13. At sea level, atmospheric pressure is 760 mm Hg. Oxygen gas is approximately 20% of the total gases in the atmosphere. What is the partial pressure of oxygen? (A) 0.2 mm Hg (B) 508.0 mm Hg (C) 76.0 mm Hg (D) 152.0 mm Hg (E) 20.0 mm Hg
14. Breathing is usually regulated by (A) the concentration of red blood cells. (B) hemoglobin levels in the blood. (C) CO<sub>2</sub> and O<sub>2</sub> concentration and pH-level sensors. (D) erythropoietin levels in the blood. (E) the lungs and the larynx.
15. The clonal selection theory implies that (A) the body selects which antigens it will respond to. (B) only certain cells can produce interferon. (C) antigens activate specific lymphocytes. (D) memory cells are present at birth. (E) related people have similar immune responses.
16. Which hormone exerts antagonistic action to PTH (parathyroid hormone)? (A) thyroxin (B) glucagon (C) calcitonin (D) epinephrine (E) growth hormone
17. Which of the following glands is controlled directly by the hypothalamus or central nervous system and NOT the anterior pituitary? (A) ovary (B) adrenal medulla (C) testis (D) thyroid (E) adrenal cortex

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18. The function of CD4 and CD8 is to assist T cells in (A) binding of the MHC-antigen complex. (B) secretion of antibodies specific for each antigen. (C) activating B cells and other T cells. (D) enhancing secretion of proteins such as interferon. (E) recognition of self cells.
19. Which part of the vertebrate nephron consists of capillaries? (A) Bowman's capsule (B) collecting tubule (C) glomerulus (D) distal tubule (E) loop of Henle
20. The body fluids of an osmosconformer would be \_\_\_\_\_ with its \_\_\_\_\_ environment. (A) hyperosmotic; saltwater (B) isoosmotic; saltwater (C) hypoosmotic; saltwater (D) isoosmotic; freshwater (E) hyperosmotic; freshwater
21. The archenteron of the developing frog eventually develops into which structure? (A) digestive tract (B) reproductive organs (C) brain and spinal cord (D) the blastocoel (E) heart and lungs
22. Thalidomide was a chemical prescribed as a sedative in the early 1960s. If taken by women in their first trimester of pregnancy, the children born had deformities of the arms and legs. What developmental process was affected by this drug? (A) differentiation of bone tissue (B) early cleavage divisions (C) organogenesis (D) determination of the polarity of the zygote (E) morphogenesis
23. The threshold potential of a membrane (A) is the depolarization that is needed to generate an action potential. (B) is equal to about 35 mV. (C) is a graded potential that is proportional to the strength of a stimulus. (D) is equal to about 70 mV. (E) opens voltage-sensitive gates that result in the rapid outflow of sodium ions.
24. Saltatory conduction is a term applied to conduction of impulses (A) from one neuron to another. (B) along the postsynaptic membrane from dendrite to axon hillock. (C) along myelinated nerve fibers. (D) across electrical synapses. (E) in two directions at the same time.
25. The major inhibitory neurotransmitter of the brain is (A) norepinephrine. (B) GABA. (C) cholinesterase. (D) acetylcholine. (E) dopamine.
26. Ecology as a discipline directly deals with all of the following levels of biological organization except (A) population. (B) cellular. (C) organismal. (D) ecosystem. (E) community.
27. Which ecological unit or relationship is least related to abiotic factors? (A) community (B) ecosystem (C) population (D) species (E) symbiosis
28. Probably the most important factor affecting the distribution of biomes is (A) wind and water current patterns. (B) species diversity. (C) community succession. (D) climate. (E) day length and rainfall.
29. Where would an ecologist find the most phytoplankton in a lake? (A) profundal zone (B) benthic zone (C) limnetic zone (D) oligotrophic zone (E) aphotic zone
30. Feeding behavior that has a high energy intake-to-expenditure ratio is called (A) herbivory. (B) autotrophy. (C) heterotrophy. (D) search scavenging. (E) optimal foraging.
31. Learning to ignore unimportant stimuli is called (A) adapting. (B) spacing. (C) conditioning. (D) imprinting. (E) habituation.
32. The type of learning that causes specially trained dogs to salivate when they hear bells is called (A) insight. (B) imprinting. (C) habituation. (D) classical conditioning. (E) trial-and-error learning.
33. Which of the following is not a concept associated with sociobiology? (A) parental investment (B) inclusive fitness (C) associative learning (D) reciprocal altruism (E) kin selection

34. All of the following phrases could characterize a population except (A) interacting individuals. (B) dispersion. (C) density. (D) several species. (E) boundaries.
35. The most common kind of dispersion in nature is (A) clumped. (B) random. (C) uniform. (D) indeterminate. (E) dispersive.
36. A table listing such items as age, observed number of organisms alive each year, and life expectancy is known as a(an) (A) life table. (B) mortality table. (C) survivorship table. (D) rate table. (E) insurance table.
37. All of the following act to increase species diversity except (A) competitive exclusion. (B) keystone predators. (C) patchy environments. (D) moderate disturbances. (E) migration of populations.
38. According to the competitive exclusion principle, two species cannot continue to occupy the same (A) habitat. (B) niche. (C) territory. (D) range. (E) biome.
39. An insect that has evolved to resemble a plant twig will probably be able to avoid (A) parasitism. (B) symbiosis. (C) predation. (D) competition. (E) commensalism.
40. With a few exceptions, most of the food chains studied by ecologists have a maximum of how many links? (A) two (B) three (C) five (D) ten (E) fifteen
41. What does the species richness of a community refer to? (A) the number of food chains (B) the number of different species (C) the energy content of all species (D) the relative numbers of individuals in each species (E) the total number of all organisms
42. To measure biodiversity in a community you need to know (A) the number of species. (B) the relative abundance of each species. (C) the physical size of each species. (D) both A and B. (E) A, B, and C.
43. A cow's herbivorous diet indicates that it is a(n) (A) primary consumer. (B) secondary consumer. (C) decomposer. (D) autotroph. (E) producer.
44. Which of the following organisms fix nitrogen in aquatic ecosystems? (A) cyanobacteria (B) chemoautotrophs (C) phytoplankton (D) legumes (E) fungi
45. Which of these ecosystems accounts for the largest amount of Earth's primary productivity? (A) tundra (B) savanna (C) salt marsh (D) open ocean (E) tropical rain forest
46. The total biomass of photosynthetic autotrophs present in an ecosystem is known as the (A) gross primary productivity. (B) standing crop. (C) net primary productivity. (D) secondary productivity. (E) trophic efficiency.
47. In general, the total biomass in a terrestrial ecosystem will be greatest for which trophic level? (A) producers (B) herbivores (C) primary consumers (D) tertiary consumers (E) secondary consumers
48. Which of the following most directly relates to the current biodiversity crisis? (A) increased atmospheric carbon dioxide (B) ozone depletion (C) the rate of extinction (D) introduced species (E) zoned reserves
49. Human use of prokaryotic organisms to help detoxify a polluted wetland would be an example of (A) ecosystem augmentation. (B) keystone species introduction. (C) biological control. (D) bioremediation. (E) population viability analysis.
50. Relatively small geographic areas with high concentrations of endemic species are known as (A) endemic sinks. (B) critical communities. (C) biodiversity hot spots. (D) endemic metapopulations. (E) bottlenecks.

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(I) 選擇題(每題只有一個答案，每題四分共計八十分)

- (1) Vitamin C contains the elements C, H, and O. It is known to contain 40.9 % C and 4.58 % H by mass. The molar mass of vitamin C has been found to be about 180. The molecular formula for vitamin C is:  
(a)  $C_2H_3O_2$  (b)  $C_3H_4O_3$  (c)  $C_4H_6O_4$  (d)  $C_6H_8O_6$
- (2) A 25.0 mL sample of 0.20 M  $K_2SO_4$  is added to 50.0 mL of 0.40 M KOH. Calculate the concentration of  $K^+$  ions in solution.  
(a) 0.20 M (b) 0.33 M (c) 0.40 M (d) 0.60 M (e) 0.66 M
- (3) If all of the chloride in a 5.000 g sample of an unknown metal chloride is precipitated as AgCl with 70.90 mL of 0.2010 M  $AgNO_3$ , what is the percentage of chloride in the sample? (Cl=35.453 g/mol)  
(a) 50.55 % (b) 10.10 % (c) 1.425% (d) 20.20 % (e) none of the above
- (4) Which one of the following molecules violates the octet rule?  
(a)  $COF_2$  (b)  $S_2Cl_2$  (c)  $Si(OH)_4$  (d)  $PBr_3$  (e)  $SF_4$
- (5) which one of the following molecules would exhibit the greatest polarity?  
(a)  $CH_4$  (b)  $CH_3F$  (c)  $CH_2F_2$  (d)  $CHF_3$  (e)  $CF_4$
- (6) What hybridization is present in  $PCl_5$ ?  
(a)  $sp^3d$  (b)  $p^3d^2$  (c)  $sp^3$  (d)  $d^2sp^3$  (e)  $sp^4$
- (7) How many bonding and antibonding electrons are there in the  $[O_2]^{2+}$  molecular ion?  
(a) 8 and 8 (b) 9 and 5 (c) 10 and 4 (d) 7 and 7 (e) 8 and 6
- (8) A mixture of KCl and  $KClO_3$  weighing 1.80 g was heated. After the reaction, the dry  $O_2$  generated occupied  $1.40 \times 10^2$  mL at STP. Calculated the percent of the original mixture that was  $KClO_3$ , which decomposes as follows: (K=39.098, Cl=35.453, O=15.999 g/mol)  
$$2 KClO_{3(s)} \longrightarrow 2 KCl_{(s)} + 3O_{2(g)}$$
  
(a) 28.4 % (b) 37.2 % (c) 42.6 % (d) 63.8 % (e) 72.6 %

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(9) For carbonic acid ( $\text{H}_2\text{CO}_3$ ),  $K_{a1} = 4.30 \times 10^{-7}$  and  $K_{a2} = 5.62 \times 10^{-11}$ . Calculate the pH of a 0.50 M solution of  $\text{Na}_2\text{CO}_3$ .

- (a) 3.33 (b) 2.03 (c) 10.67 (d) 11.97 (e) 8.31

(10) If 30 mL of  $5.0 \times 10^{-4}$  M  $\text{Ca}(\text{NO}_3)_2$  are added to 70 mL of  $2.0 \times 10^{-4}$  M  $\text{NaF}$ , will a precipitate occur?  $K_{sp}$  of  $\text{CaF}_2 = 4.0 \times 10^{-11}$

- (a) No, because the ion product is greater than  $K_{sp}$   
 (b) Yes, because the ion product is less than  $K_{sp}$   
 (c) No, because the ion product is less than  $K_{sp}$   
 (d) Not enough information is given  
 (e) Yes, because the ion product is greater than  $K_{sp}$

(11)  $\text{Cu}_2\text{O}_{(s)} + 1/2 \text{O}_{2(g)} \longrightarrow 2\text{CuO}_{(s)} \quad \Delta H^\circ = -144 \text{ KJ}$

$\text{Cu}_2\text{O}_{(s)} \longrightarrow \text{Cu}_{(s)} + \text{CuO}_{(s)} \quad \Delta H^\circ = +11 \text{ KJ}$

Calculate the standard enthalpy of formation of  $\text{CuO}_{(s)}$ .

- (a) -166 KJ (b) -299 KJ (c) +299 KJ (d) +155 KJ (e) -155 KJ

(12) Calculate the molar solubility of  $\text{Ba}_3(\text{PO}_4)_2$  in a 0.25 M  $\text{BaCl}_2$  solution.

$K_{sp} = 1.3 \times 10^{-29}$

- (a)  $1.7 \times 10^{-6}$  (b)  $3.4 \times 10^{-6}$  (c)  $1.7 \times 10^{-18}$  (d)  $1.4 \times 10^{-14}$  (e)  $3.4 \times 10^{-10}$

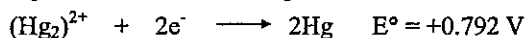
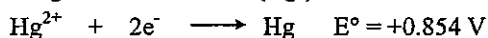
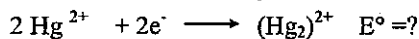
(13) Given the following unbalanced equation,



Calculate the number of grams of copper that precipitate if 15.8 mL of 0.220 M of  $\text{S}_2\text{O}_4^{2-}$  solution are required to quantitatively precipitate all of the copper from the tetraamine copper (II) solution. ( $\text{Cu} = 63.546 \text{ g/mol}$ )

- (a) 2.21 g (b) 0.221 g (c) 0.442 g (d) 4.42 g (e) 0.852 g

(14) Calculate the potential for the reduction of  $\text{Hg}(\text{II})$  to  $\text{Hg}(\text{I})$ . The potentials are known for the following reduction half-reactions:



- (a) +0.458 V (b) +0.916 V (c) -0.124 V (d) +0.124 V (e) -0.916 V

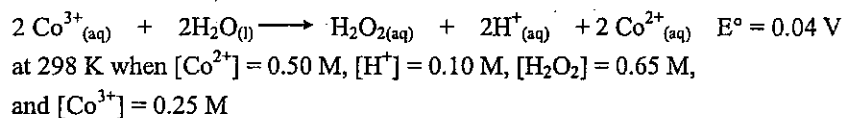


# 國立中山大學九十二學年度轉學生招生考試試題

科目：普通化學【生科系二年級】

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(15) Calculate the emf of the cell that utilized the reaction



(a) -0.087 V (b) 0.064 V (c) 0.09 V (d) -0.064 V (e) -0.007 V

(16) Which of the following has the smallest dissociation energy?

(a)  $\text{O}_2^{2+}$  (b)  $\text{O}_2^+$  (c)  $\text{O}_2$  (d)  $\text{O}_2^-$  (e)  $\text{O}_2^-$

(17) How many unpaired electrons are there in the complex ion  $[\text{Co}(\text{NO}_3)_6]^{4-}$ ? For this ion the nitrate ligands produce a very strong crystal field.

(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

(18) Hemoglobin is a complex of

(a)  $\text{Co}^{3+}$  (b)  $\text{Mg}^{2+}$  (c)  $\text{Fe}^{2+}$  (d)  $\text{Sc}^{3+}$  (e) none of these

(19) For which of the following compound(s) have cis and trans isomers possible?

(a) 2,3-dimethyl-2-butene (b) 3-methyl-2-pentene (c) 4,4-dimethylcyclohexanol  
(d) ortho-chlorotoluene (e) All can exhibit cis/trans isomers

(20)  $\text{CH}_3\text{C}\equiv\text{CCH}_2\text{CH}_2\text{Cl}$  is named:

(a) 1-chloro-3-pentyne (b) 5-chloro-2-pentene (c) 1-acetylenyl-3-chloropropane  
(d) 5-chloro-2-pentyne (e) 1-chloro-3-pentene

(II)問答題 (二十分)

Draw the molecular geometry and give approximate bond angles for each of the following molecules or ions.

(a)  $\text{BrF}_4^-$  (b)  $\text{NCS}^-$  (c)  $\text{BBR}_3$  (d)  $\text{XeF}_4$