

國立中山大學 104 學年度轉學考招生考試試題

科目名稱：有機化學【海資系三年級】

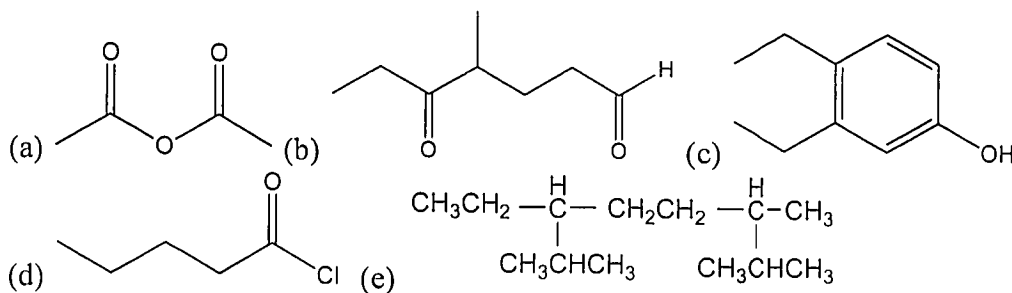
題號：752003

※本科目依簡章規定「不可以」使用計算機

共 3 頁第 1 頁

1. Provide IUPAC names for the following compounds. (30 points, 3 each)

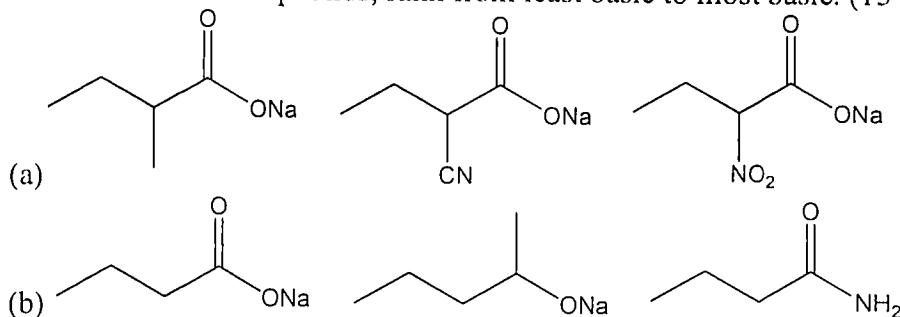
a.



b. Provide the structure of each of the following compounds.

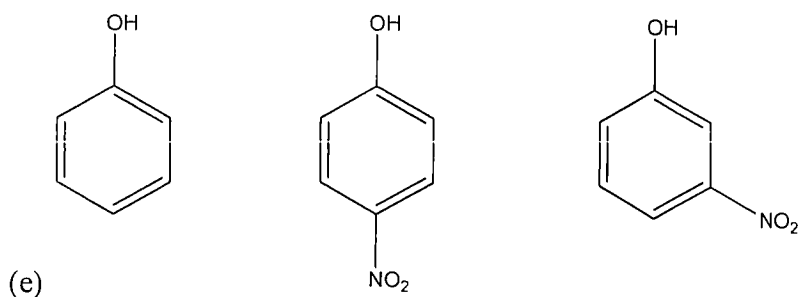
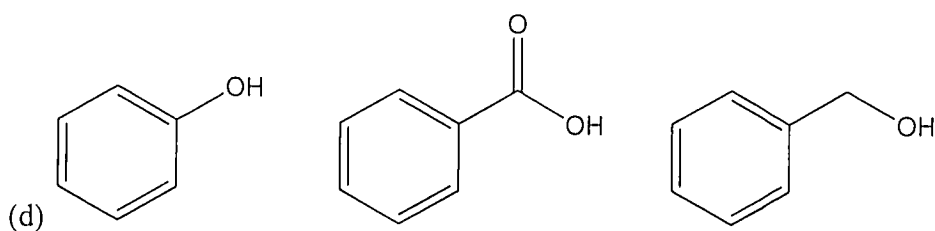
(a) tetrahydropyran (b) pyridine (c) aniline (d) ethylene oxide (e) lactone

2. a. For each set of compounds, rank from least basic to most basic. (15 points, 3 each)



b. Rank in order of acidity

(c)  $\text{CH}_3\text{SH}$   $\text{CH}_3\text{OH}$   $\text{CH}_3\text{NH}_2$



背面有題

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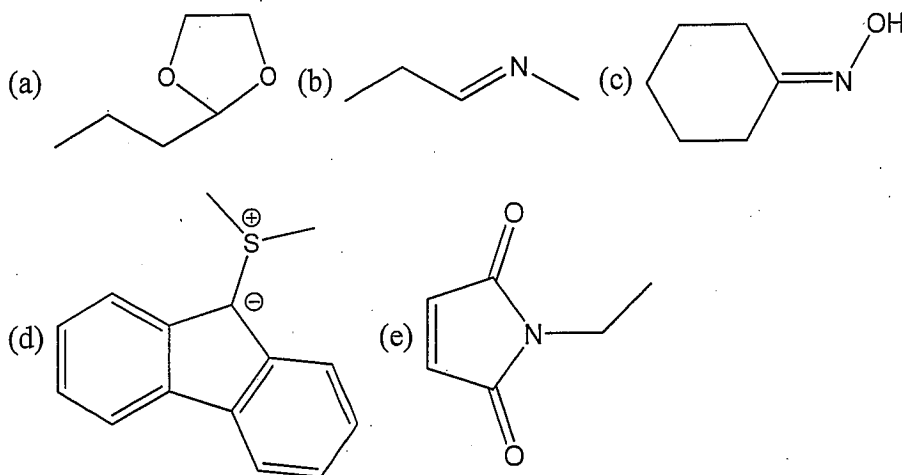
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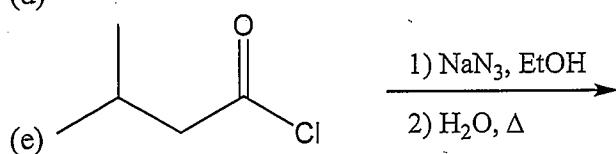
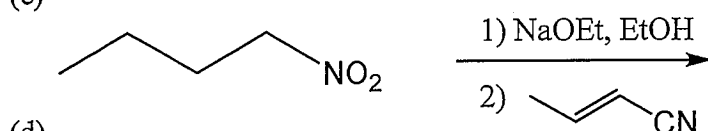
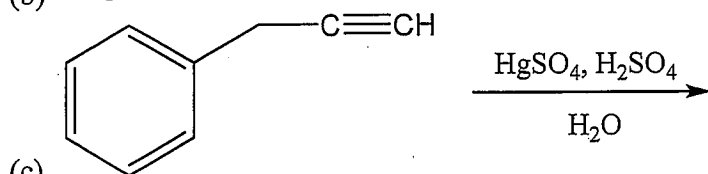
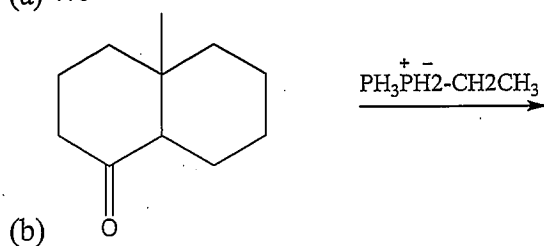
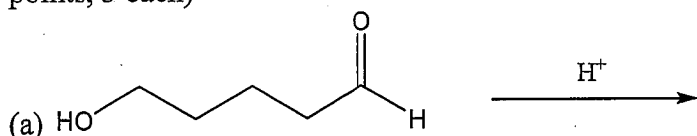
共 3 頁 第 2 頁

3. (10 points, 2 each) Match the given structures to the appropriate functional group name by writing the matching letter in the box under the structure



A. Acetal	F. Hemiacetal	K. Lactone
B. Amide	G. Hydrazone	L. Nitrile
C. Amine	H. Imide	M. Oxime
D. Cyanohydrin	I. Imine	N. Thioester
E. Enamine	J. Lactam	O. Ylide

4. Draw the structure of the major product of the following reaction, if there is no reaction, writ "NR" (15 points, 3 each)



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5. Explain the following terms (30 points, 5 each)。

- (a) Aldol reaction
- (b) Gauche conformation
- (c) Claisen condensation
- (d) Markovnikov's rule
- (e) McLafferty rearrangement
- (f) Diels-Alder reaction

# 國立中山大學 103 學年度轉學考招生考試試題

科目名稱：普通生物學【海資系三年級】

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共 4 頁第 1 頁

第一部份、單選題(共60分，每題1.5分，不倒扣)

- 1) All of the following are part of a prokaryotic cell EXCEPT \_\_\_\_\_.  
A) an endoplasmic reticulum B) a plasma membrane C) ribosomes D) a cell wall
- 2) Which structure is common to plant *and* animal cells?  
A) central vacuole B) cell wall C) chloroplast D) mitochondrion
- 3) A cell with an extensive area of smooth endoplasmic reticulum is specialized to \_\_\_\_\_.  
A) synthesize large quantities of lipids B) play a role in storage  
C) import and export protein molecules D) actively export protein molecules
- 4) The liver is involved in detoxification of many poisons and drugs. Which of the following structures is primarily involved in this process and, therefore, abundant in liver cells?  
A) rough ER B) nuclear envelope C) Golgi apparatus D) smooth ER
- 5) Cells require which of the following to form cilia or flagella?  
A) tubulin B) actin C) intermediate filaments D) laminin
- 6) Ions can travel directly from the cytoplasm of one animal cell to the cytoplasm of an adjacent cell through \_\_\_\_\_.  
A) desmosomes B) plasmodesmata C) gap junctions D) tight junctions
- 7) Which of these are NOT embedded in the hydrophobic portion of the lipid bilayer at all?  
A) peripheral proteins B) integral proteins C) transmembrane proteins D) All of these are embedded in the hydrophobic portion of the lipid bilayer.
- 8) What kinds of molecules pass through a cell membrane most easily?  
A) large polar B) ionic C) large and hydrophobic D) small and hydrophobic
- 9) The sodium-potassium pump is called an electrogenic pump because it \_\_\_\_\_.  
A) contributes to the membrane potential  
B) is used to drive the transport of other molecules against a concentration gradient  
C) pumps equal quantities of Na<sup>+</sup> and K<sup>+</sup> across the membrane  
D) ionizes sodium and potassium atoms
- 10) The voltage across a membrane is called the \_\_\_\_\_.  
A) osmotic potential B) electrochemical gradient C) membrane potential D) chemical gradient
- 11) Which of the following is characteristic of a steroid hormone action? \_\_\_\_\_.  
A) protein phosphorylation B) internal receptor binding  
C) second messenger activation D) cell-surface receptor binding
- 12) Caffeine is an inhibitor of phosphodiesterase. Therefore, the cells of a person who has recently consumed coffee would have increased levels of \_\_\_\_\_.  
A) cAMP B) activated G proteins C) adenylyl cyclase D) phosphorylated proteins
- 13) Viagra causes dilation of blood vessels and increased blood flow to the penis, facilitating erection. Viagra acts by inhibiting \_\_\_\_\_.  
A) the hydrolysis of cGMP to GMP B) the removal of GMP from the cell  
C) the dephosphorylation of cGMP D) the hydrolysis of GTP to GDP

背面有題

國立中山大學 103 學年度轉學考招生考試試題

科目名稱：普通生物學【海資系三年級】

題號：752004

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共 4 頁第 2 頁

- 14) Apoptosis involves all but which of the following? 14) \_\_\_\_\_  
A) digestion of cellular contents by scavenger cells  
B) activation of cellular enzymes  
C) lysis of the cell  
D) fragmentation of the DNA
- 15) Which of the following has both endocrine and exocrine activity?  
A) the pancreas    B) the pituitary gland    C) salivary glands    D) parathyroid glands
- 16) Fight-or-flight reactions include activation of the \_\_\_\_\_.  
A) pancreas, leading to a reduction in the blood sugar concentration  
B) adrenal medulla, leading to increased secretion of epinephrine  
C) anterior pituitary gland, leading to cessation of gonadal function  
D) parathyroid glands, leading to increased metabolic rate
- 17) Which of the following organs is correctly paired with its function? 17) \_\_\_\_\_  
A) small intestine — starch digestion    B) pancreas — starch digestion  
C) stomach — protein digestion    D) large intestine — bile production
- 18) After surgical removal of an infected gallbladder, a person must be especially careful to restrict dietary intake of \_\_\_\_\_.  
A) fat    B) sugar    C) water    D) protein
- 19) Countercurrent exchange in the fish gill helps to maximize \_\_\_\_\_.  
A) osmosis    B) blood pressure    C) active transport    D) diffusion
- 20) Which of the following is the correct sequence of blood flow in birds and mammals?  
A) vena cava → right atrium → right ventricle → pulmonary vein  
B) pulmonary vein → left atrium → left ventricle → pulmonary circuit  
C) left ventricle → aorta → lungs → systemic circulation  
D) vena cava → right atrium → right ventricle → pulmonary artery
- 21) The body fluids of an osmoconformer would be \_\_\_\_\_ with its \_\_\_\_\_ environment  
A) hyperosmotic; saltwater    B) isoosmotic; saltwater    C) hypoosmotic; saltwater    D) isoosmotic; freshwater
- 22) Urea is produced in the \_\_\_\_\_.  
A) kidneys from glycerol and fatty acids    B) bladder from uric acid and water  
C) liver from NH<sub>3</sub> and carbon dioxide    D) liver from glycogen
- 23) As cleavage continues during frog development, the size of the blastomeres \_\_\_\_\_.  
A) decreases as the number of the blastomeres decreases  
B) decreases as the number of the blastomeres increases  
C) increases as the number of the blastomeres decreases  
D) increases as the number of the blastomeres increases
- 24) Which of the following correctly displays the sequence of developmental milestones?  
A) blastula → gastrula → cleavage    B) cleavage → blastula → gastrula  
C) gastrula → blastula → cleavage    D) cleavage → gastrula → blastula
- 25) Which of the following choices includes all of the others in creating global terrestrial climates?

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- A) global wind patterns B) Earth's rotation on its axis C) differential heating of Earth's surface D) ocean currents
- 26) Coral reefs can be found on the southeast coast of the United States but not at similar latitudes on the southwest coast. Differences in which of the following most likely account for this?  
A) salinity B) day length C) precipitation D) ocean currents
- 27) The proximate causes of behavior are interactions with the environment, but behavior is ultimately shaped by \_\_\_\_\_.  
A) the nervous system B) pheromones C) evolution D) hormones
- 28) Which of the following is true of innate behaviors? Innate behaviors \_\_\_\_\_.  
A) are limited to invertebrate animals  
B) occur in invertebrates and some vertebrates but not mammals  
C) are expressed in most individuals in a population  
D) are only weakly influenced by genes
- 29) If two species are close competitors, and one species is experimentally removed from the community, the remaining species would be expected to \_\_\_\_\_.  
A) become the target of specialized parasites B) change its fundamental niche  
C) decline in abundance D) expand its realized niche
- 30) Approximately how many kilograms (kg) of carnivore (secondary consumer) biomass can be supported by a field plot containing 1000 kg of plant material?  
A) 1000 B) 100 C) 10 D) 1
- 31) In eukaryotic cells, chromosomes are composed of \_\_\_\_\_.  
A) DNA and proteins B) DNA and RNA C) DNA only D) DNA and phospholipids
- 32) Which of the following defines a genome?  
A) the complete set of an organism's polypeptides  
B) the complete set of a species' polypeptides  
C) the complete set of an organism's genes and other DNA sequences  
D) a karyotype
- 33) Healthy corals are brightly colored because they \_\_\_\_\_.  
A) host symbionts with colorful photosynthetic pigments  
B) secrete colorful pigments to attract mates  
C) build their skeletons from colorful minerals  
D) secrete colorful pigments to protect themselves from ultraviolet light
- 34) All arthropods \_\_\_\_\_. 1) undergo complete metamorphose 2) have jointed appendages 3) molt  
4) have segmented bodies 5) have an exoskeleton or cuticle  
A) 3 and 5 B) 1, 4, 5 C) 1, 2, and 4 D) 2, 3, 4, 5
- 35) Transpiration in plants requires \_\_\_\_\_. I) adhesion of water molecules to cellulose II) cohesion between water molecules III) evaporation of water molecules IV) active transport through xylem cells  
V) transport through tracheids  
A) I, II, III, and IV B) I, III, IV, and V C) I, II, III, and V D) I, II, IV, and V

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- 36) Cinnabar eyes is a sex-linked, recessive characteristic in fruit flies. If a female having cinnabar eyes is crossed with a wild-type male, what percentage of the F1 males will have cinnabar eyes?  
A) 50% B) 25% C) 100% D) 0%
- 37) Recombination between linked genes comes about for what reason?  
A) Nonrecombinant chromosomes break and then rejoin with one another.  
B) Crossovers between these genes result in chromosomal exchange.  
C) Linked genes travel together at anaphase.  
D) Independent assortment sometimes fails.
- 38) A cell is considered to be differentiated when it \_\_\_\_\_.  
A) produces proteins specific to a particular cell type  
B) appears to be different from the surrounding cells  
C) replicates by the process of mitosis  
D) loses connections to the surrounding cells
- 39) Sponges \_\_\_\_\_.  
A) have a nerve net but not a central nervous system  
B) are the simplest diploblastic animals  
C) have larvae which are motile and move via the motion of cilia  
D) have feeding cells called dinoflagellates
- 40) The water vascular system of echinoderms \_\_\_\_\_.  
A) is analogous to the gastrovascular cavity of flatworms  
B) functions in locomotion and feeding  
C) is bilateral in organization, even though the adult animal is not bilaterally symmetrical  
D) functions as a circulatory system that distributes nutrients to body cells

第二部份、解釋名詞(共40分，每題4分)

1. Red tide
2. Mangroves
3. Single nucleotide polymorphism (SNP)
4. System biology
5. Ecosystem ecology
6. Endosymbiont theory
7. Small interfering RNA (RNAi)
8. Tetrapod
9. Cnidarians
10. Metabotropic receptor