

高雄醫學大學 105 學年度學士後醫學系招生考試試題

科目：英文

考試時間：80 分鐘

說明：一、「選擇題」用2B鉛筆在「答案卡」上作答，修正時應以橡皮擦擦拭，不得使用修正液（帶），未遵照正確作答方法而致電腦無法判讀者，考生自行負責。

二、「非選擇題」部分以「答案卷」作答，作答時不得使用鉛筆，違者該科答案卷不予計分；限用黑色或藍色墨水的筆書寫。

三、試題、答案卡及答案卷必須繳回，不得攜出試場。

I. Vocabulary: 20 points

【單選題】每題 1 分，共 20 題，答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

A. Please choose the **BEST** answer to match with each underlined word.

- While France has stuck closely to the colors of its flag, another country dealing with red, white and blue has taken a different **tack**. Australia, for instance, has opted for a more subdued combination of red, white and blue.
(A) face (B) turn (C) method of doing (D) nail (E) choice
- Mount Everest, the highest peak on earth, located in the mountain range between Nepal and Tibet, is just below 30,000 feet. Climbing the peak poses dangers such as **altitude** sickness, frost-bite, and hazards from avalanches to icefall.
(A) attitude (B) weather (C) thin air (D) cold (E) height above sea level
- Most people's ideas of Hollywood stars were of sun-bathing by a pool in **exotic** surroundings and in exotic company.
(A) excitingly unusual (B) beautiful (C) extreme (D) familiar (E) happy
- Human nature is just the same everywhere: a lot of gossip, a lot of scandal and a lot of people **preoccupying** with who is in love with whom and that kind of things.
(A) talking (B) chatting (C) engaging preferentially
(D) running beforehand (E) threatening
- George Washington's words are marked by **maxim** (e.g., "honesty is the best policy") and allusion.
(A) great effort (B) sensitive proverb (C) good amount (D) something that is huge
(E) rule for good behavior
- For years I wanted to talk naturally in front of my class. I still feel stiffed and **mechanical** when speaking to a large audience.
(A) dull (B) merchant-like (C) freely (D) spectacular (E) auto
- Frankie registered for the course, made **phenomenal** progress and three months later handed in an admirable term paper.
(A) smiling (B) remarkable (C) few (D) difficult (E) slow
- Ice ages **overwhelmed** the earth, bringing glaciers close to the equator. They melted away only after volcanoes released enough carbon dioxide to warm the atmosphere.
(A) defeated (B) covered (C) replaced (D) dominated (E) spilt over
- In chimpanzee society, males can take advantage of reciprocal **altruism** while females cannot. Males spend their whole lives in the band while females leave when they reach adulthood.
(A) patriotism (B) alternative (C) happiness (D) maturity (E) unselfishness
- The rising storm waters across Paris have forced thousands of people out of their homes, while museums **scramble** to protect world-famous artworks and artifacts from the worst flooding seen in decades.
(A) struggle (B) order (C) prepare (D) try (E) hasten

B. Please choose the **BEST** answer to complete each sentence.

- Hawaii has been trying to keep critical parts of its ocean clear of marine _____, removing 57 tons of it from the Northwestern Islands in 2014.
(A) food (B) biology (C) debris (D) boats (E) animals
- At the University of Missouri, a graduate student's hunger strike prompted the football team to announce a _____, compelling in turn the resignations of the university president and chancellor.
(A) tournament (B) walkout (C) competition (D) election (E) rivalry
- In all my excursions through the Valley of Nile, I never saw any of these _____ enormities.
(A) alleged (B) generated (C) provoked (D) wonderful (E) rare

14. The Civil War in the United States was fought to _____ the slaves.
 (A) emasculate (B) enmesh (C) effeminate (D) emancipate (E) extinguish
15. After the bloody attacks in Paris, French President Francois Hollande called for a war to _____ ISIS.
 (A) assimilate (B) annihilate (C) avow (D) acclaim (E) acknowledge
16. One of the most unexpected things about having children is how the _____ to mold perfect little humans ultimately becomes a project of making yourself a better person.
 (A) quest (B) question (C) quota (D) dilemma (E) dialogue
17. The labor reform is the boldest any French government, left or right, has tried in years and has _____ daily, often-violent protests from wine country to the troubled suburbs.
 (A) enhanced (B) enchanted (C) uttered (D) unleashed (E) upward
18. Two former students from Burkina Faso have designed a mosquito-repellent soap, which they hope could be a simple and _____ solution in the fight to end malaria in poverty-stricken Africa.
 (A) affordable (B) moderate (C) beating (D) alternative (E) tidy
19. With the sudden death of the company's CEO, Geird Leipold will be the _____ international executive director for the next 6 months.
 (A) interim (B) intern (C) resident (D) permanent (E) exclusive
20. Katie wore a beautiful dress to the ball, and she looked more _____ than usual. In fact, she looked like a super star.
 (A) elegant (B) humble (C) ragged (D) arrogant (E) ugly

II. Grammar and Structure: 10 points

【單選題】每題 1 分，共 10 題，答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

A. Please choose the **BEST** answer to complete each sentence.

21. It has been reported that the distribution of wealth is very uneven in the highly capitalist countries. Most of the wealth is in the hands of a privileged few, _____ the majority are stricken with poverty.
 (A) whereas (B) if (C) because (D) as well as (E) since
22. The young guests are socializing on the lawn in the backyard with each one of them holding a glass and _____ relaxingly.
 (A) chat (B) chats (C) chatting (D) chatted (E) to chat
23. _____ dogs capable of rescue task begins with handlers looking for energetic dogs that enjoy playing Frisbee.
 (A) Selected (B) To select (C) Selecting (D) Selective (E) Select
24. The ageing population is expected to increase rapidly, not gradually, with people over 70 _____ to be 35% by 2050.
 (A) estimate (B) estimating (C) has been estimated (D) estimated (E) to be estimated
25. _____ her parents, Chloe agreed to return to Houston and manage the family business, even though it meant giving up a highly paid job in New York.
 (A) By virtue of (B) In deference to (C) With the exception of
 (D) On the verge of (E) Look forward to

B. For each sentence, please choose one underlined part that contains **FAULTY** English.

26. When the North and South Korea decided to hold a summit meeting, the entire world was wondering what was behind the
 (A) (B) (C)
incredibly huge progress toward peace for the two traditional enemies.
 (D) (E)
27. To help herself better prepare the application for admission into a prestigious graduate institute, my niece asked me to give
 (A) (B) (C) (D)
 her a mock interview.
 (E)
28. According the National Academy of Sciences, the Earth's surface temperature has risen by one degree Fahrenheit
 (A) (B) (C)
in the past century, with accelerated warming during the past two decades.
 (D) (E)
29. Before sunset every Saturday, the newly-wed couple take a stroll near the campus's famous hundred-year-old banyan tree,
 (A) (B) (C)
where they first met and finally fall in love with each other.
 (D) (E)

30. Like Christian art, which influences people to have religious feelings, the goal of traditional art in many African countries
(A) (B)
is to influence spiritual powers to enter people's lives.
(C) (D) (E)

III. Reading Comprehension: 40 points

【單選題】每題 2 分，共 20 題，答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

Please read the following chart/excerpts/passages closely and then choose the **BEST** answer for each of the questions according to the contents.

In 1839 Charles Darwin published *Journal of Researches into the Natural History and Geology of the Countries Visited During the Voyage of HMS Beagle Round the World, Under the Command of Capt. FitzRoy, R.N.* It was a huge success in Britain and cemented Darwin's fame as a naturalist. By then Charles and Emma had been married three years and had two children, and they decided it was time to leave London. They were tired of the crime, the coal dust that blackened their clothes, the horse dung that clung to their shoes. They wanted to raise their children in the countryside, where they had grown up. They picked out an estate called Down House, an 18-acre farm in Kent, 16 miles from London. Darwin became a gentleman farmer, planting flowers, buying a horse and a cow. He stopped mingling in the scientific societies altogether. He got whatever information he needed by letter or from carefully selected weekend guests.

31. By publishing *Journal of Researches into the Natural History and Geology* . . . Charles Darwin has made himself a _____.
(A) historian (B) nature lover (C) famous person (D) field biologist (E) nature writer
32. Darwin and his wife did not like London because _____.
(A) of its crime and dirty environments
(B) they like the countryside better
(C) they like their children to be healthy
(D) their children were too young
(E) they were more used to living in the countryside
33. Having retired to an estate in Kent, Darwin was _____.
(A) no longer a scientist
(B) turned into an educated farmer
(C) a gentleman but not scientist
(D) being avoided by his peers
(E) planting flowers and growing crops
34. Having retired to an estate in Kent, Darwin did not socialize with his peer and friends in London _____.
(A) but spent his weekends in London
(B) but kept contact with the field via selected friends
(C) and devoted himself to farming
(D) and determined to stay unaffected
(E) none of the above
35. After becoming famous in London, Darwin decided to move to the countryside because _____.
(A) he wanted people to pursue after him
(B) that was a better way to establish himself
(C) he wanted to be away from the jealous scientific community
(D) he wanted to write another book
(E) he wanted to raise his family in a healthy environment

When Harry Carson, a hall of fame linebacker for the New York Giants, heard that an NFL official had acknowledged, for the first time, a link between football and the degenerative brain disease chronic traumatic encephalopathy (CTE), he felt vindicated. Carson, who was diagnosed with postconcussion syndrome in 1990, has long argued that football contributed to his condition. "This is what players have been waiting for," he says. "Just tell the truth." The truth hurts. A Boston University neuropathologist who examined the brains of 94 ex-NFL players found 90 showed signs of CTE. Asked at a congressional hearing on March 14 whether there is a link between football and brain diseases like CTE, Jeff Miller, NFL executive vice president of health and safety policy, could no longer put the question away. "The answer to that question is certainly yes."

36. What had NFL (National Football League) been doing about the link between CTE and football?
 (A) Making new rules to enhance safety for football players.
 (B) Denying the connection.
 (C) Fighting for compensation from insurance companies.
 (D) Conducting medical studies to verify the assumption.
 (E) Changing the regulations for games.
37. Who has not really shown concerns for the issue reported in the passage?
 (A) NFL football player. (B) Lawmaker. (C) NFL. (D) Academia. (E) The medical professional.
38. According to the passage, we can infer that football players tend to contract brain diseases because of _____.
 (A) frequent clashes (B) frequent workouts (C) frequent pitches (D) frequent punches (E) frequent training
39. Which of the following terms is a synonymy for the underlined word *vindicated*?
 (A) convinced (B) conceived (C) vowed (D) justified (E) judged
40. According to the passage, which of the following statements is **NOT** true?
 (A) The Capitol has investigated the issue about NFL players' safety.
 (B) NFL has adopted a safety policy to cut the risk for football players to be afflicted with CTE.
 (C) Harry Carson has surmised a connection between his profession and disease.
 (D) The link between CTE and football has been confirmed.
 (E) There is a high risk for football players to become CTE victims.

First discovered in Uganda's Zika forest in 1947, the virus was long thought to be relatively benign, especially compared with deadly mosquito-borne diseases like malaria. But since its invasion in Brazil last year, the Zika virus has torn through Latin America, likely infecting millions. It certainly has caused more than 1,000 confirmed cases of the birth defect microcephaly. Zika also appears to be linked to neurological and autoimmune disorders like the paralyzing Guillain-Barre syndrome, and experts recently determined that it can also be transmitted through sex—a first for a mosquito-borne disease. Some scientists suspect the virus has mutated and that is why it can now cause neurological problems, while others say these tragic side effects may have gone unnoticed for years.

41. Which of the following statements is **NOT** true about the Zika virus?
 (A) Its devastating power is far beyond our previous surmise.
 (B) It has become more killing now because it has undergone mutation.
 (C) It is the first mosquito-borne disease which can disseminate by sex.
 (D) Pregnant women would suffer most stress because of this virus.
 (E) Scientists used to think the virus is not that malignant.
42. Which of the following terms conveys the equivalent medical meaning for the underlined word *invasion*.
 (A) alternate (B) alien (C) assault (D) alleviate (E) allocate
43. What can the readers infer from the passage?
 (A) Scientists have learned more about the Zika virus and thus vaccine is on the way.
 (B) The Zika virus still poses as a mystery for scientists.
 (C) People in Latin America are more vulnerable to the Zika virus because of their hereditary autoimmune disorder.
 (D) Africans are more resistant to the power of the Zika virus.
 (E) There is a medical suggestion about being abstain from sex.
44. Which of the following ways is **NOT** the confirmed way of transmitting Zika?
 (A) copulation (B) birth (C) mosquito (D) blood transfusion (E) sexual activity
45. Which of the following terms serves as an antonym for the underlined word *benign*?
 (A) malignant (B) benevolent (C) gentle (D) kind (E) caring

I believe that international terrorism is a modern form of warfare against liberal democracies. I believe that the ultimate but seldom stated goal of these terrorists is to destroy the very fabric of democracy. I believe that it is both wrong and foolhardy for any democratic state to consider international terrorism to be "someone else's" problem.

If you believe as I do, then you must join me in wondering why the community of liberal democracies has not banded together more effectively to oppose these international murderers and to loudly and vigorously expose those states which cynically provide terrorists with comfort and support. One of the great cover-ups of this century is the effort by Western governments, who know better, to muffle the facts about Soviet bloc support for international terrorism.

I am not talking about individual acts of madmen. I am talking about highly organized groups with international connections and support who systematically rely on major acts of violence as a political instrument. I am thinking of the Basque and Puerto Rican terrorists, the European terrorist groups, the PLO (Palestine Liberation Organization) attacks, or threats of attack, against moderate Arab states which might be motivated to support the Egyptian-Israeli peace agreement and the inhuman IS (Islamic State) atrocities. Such acts of terrorism are part of a broad campaign aimed at the disintegration of democratic societies through undermining the confidence of their citizenry in their governments.

46. What did the writer believe about international terrorism?
- (A) It destroys democracy warfare.
 - (B) It is a war against citizens.
 - (C) It is not other people's problem.
 - (D) It destroys other people's problem.
 - (E) It is the ultimate democracy.
47. On terrorism, the writer thinks that many Western governments are _____.
- (A) turning blind to the phenomenon
 - (B) concealing the Soviet bloc's involvement
 - (C) covering up their own fault
 - (D) failing to group up
 - (E) losing faith
48. According to the passage, the international terrorism has _____.
- (A) international connections and political strategies
 - (B) major financial support
 - (C) many individual madmen
 - (D) effective violence
 - (E) none of the above
49. International terrorism mostly takes place in _____.
- (A) Western countries
 - (B) the Middle East
 - (C) former European colonies
 - (D) where there is political turmoil
 - (E) friends of the United States
50. The ultimate purpose of international terrorism is to _____.
- (A) let the world understand the Soviet bloc
 - (B) show that the terrorists have power
 - (C) destroy the confidence of citizens of Western democracies
 - (D) disrupt the financial stability of the West
 - (E) none of the above

IV. Essay Writing: 20 points

Please write a well-organized essay with at least 200 words to express your opinions on **Human Dignity and Medical Rights**.

高雄醫學大學 105 學年度學士後醫學系招生考試試題

科目:有機化學

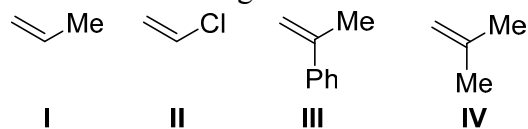
考試時間: 80 分鐘

說明:一、選擇題用 2B 鉛筆在「答案卡」上作答,修正時應以橡皮擦擦拭,不得使用修正液(帶),未遵照正確作答方法而致電腦無法判讀者,考生自行負責。
二、試題及答案卡必須繳回,不得攜出試場。

Choose one best answer for the following questions

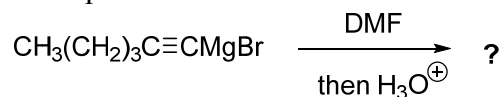
【單選題】每題 1 分,共計 60 分,答錯 1 題倒扣 0.25 分,倒扣至本大題零分為止,未作答,不給分亦不扣分。

1. Rank the following monomers in order of **increasing** reactivity toward cationic polymerization (least reactive to most reactive).



- (A) III, IV, I, II (B) II, I, IV, III (C) I, II, IV, III (D) IV, III, I, II (E) I, II, III, IV

2. What product would be obtained for the following reaction?

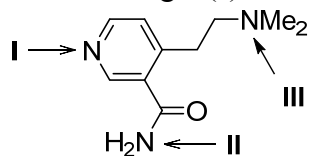


- (A) $\text{CH}_3(\text{CH}_2)_3\text{C}\equiv\text{CCH}_2\text{OH}$ (B) $\text{CH}_3(\text{CH}_2)_3\text{C}\equiv\text{CCHO}$ (C) $\text{CH}_3(\text{CH}_2)_3\text{C}\equiv\text{CH}$
(D) $\text{CH}_3(\text{CH}_2)_3\text{C}\equiv\text{CNMe}_2$ (E) None of the above.

3. Which two have the **same** molecular geometry?

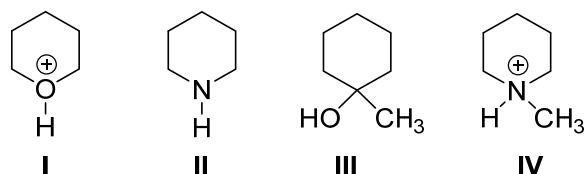
- I. CO_2 II. NO_2^\ominus III. PF_3 IV. $\text{SO}_4^{2\ominus}$ V. NO_2^\oplus
(A) I, II (B) III, IV (C) I, V (D) II, V (E) IV, V

4. Which nitrogen(s) have **more** basic?



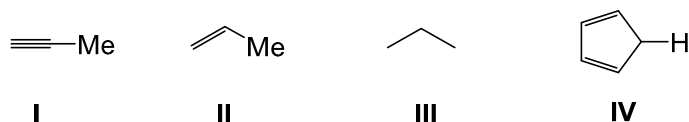
- (A) I (B) II (C) III (D) I, II, and III are acidic (E) None of the above.

5. Rank the acidity of the following compounds.



- (A) I > IV > III > II (B) I > III > IV > II (C) IV > II > I > III (D) II > I > IV > III (E) None of the above.

6. What is the order of **increasing** acidity for the following compounds?

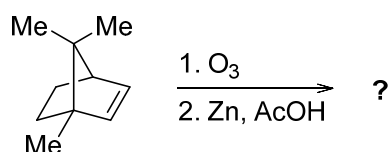


- (A) IV < I < II < III (B) III < II < I < IV (C) III < II < IV < I (D) IV < II < I < III (E) I < IV < II < III

7. Which of these substances contains both covalent and ionic bonds?

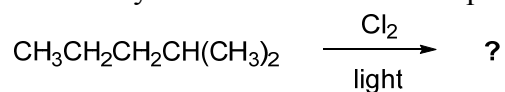
- (A) HN_3 (B) NH_4Cl (C) H_2O_2 (D) XeF_2 (E) PCl_5

8. Choose the **correct** product of the following reaction?



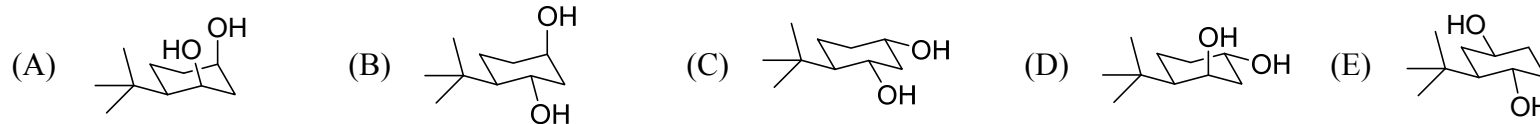
- (A) (B) (C) (D) (E)

9. How many monochloro substituted products $C_6H_{13}Cl$ you might obtain by reaction of 2-methylpentane with Cl_2 ?



- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

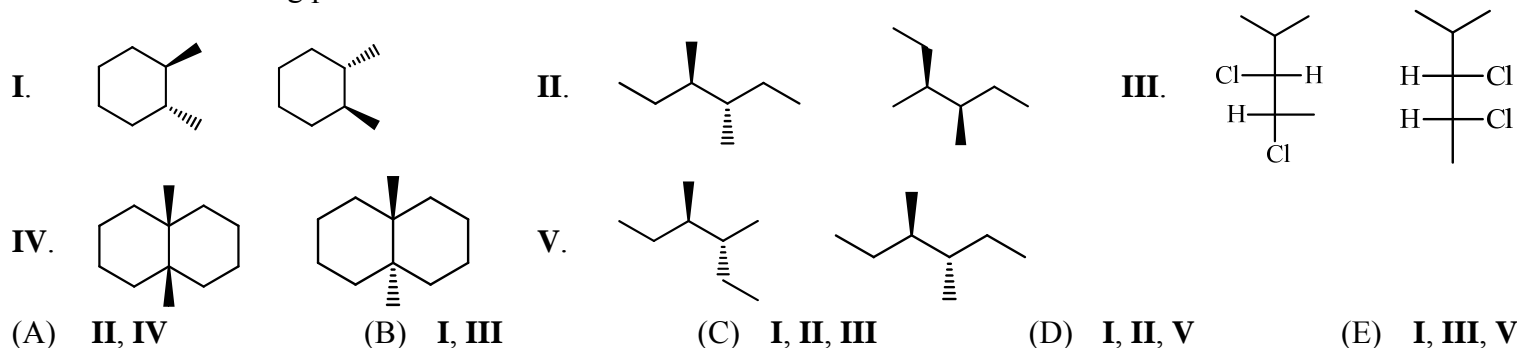
10. There are some isomers of 4-*t*-butylcyclohexane-1,3-diol. Which isomer reacts readily with acetone and an acid catalyst to form an acetal, but other stereoisomers do not react?



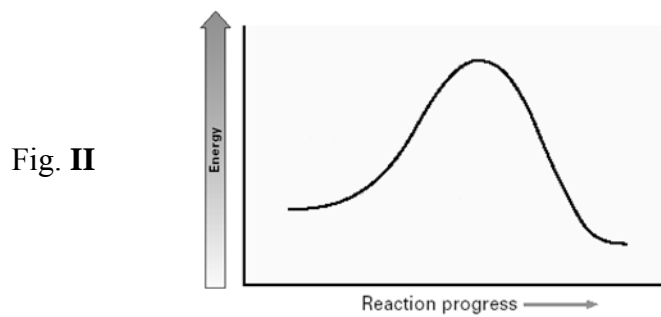
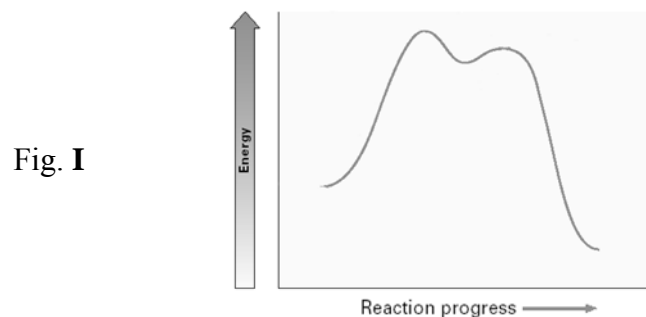
11. Which of the following **correctly** describes a molecule that is achiral?

- (A) Non-superimposability of the molecule on its mirror image (B) Superimposability of the molecule on its mirror image
(C) Contains a carbon atom with four different substituents (D) Does not have a plane of symmetry
(E) Both (B) and (D).

12. Which of the following pairs are enantiomers?



13. Consider the two energy diagrams Fig. I and Fig. II given below.



Which of the following is **correct** with respect to these diagrams?

- (A) Fig. I represents an S_N2 reaction (B) Fig. II represents an S_N1 reaction (C) Fig. II represents an S_N2 reaction
(D) Fig. I represents an S_N1 reaction (E) Both (C) and (D).

14. Find the energy cost of a 1,3-diaxial interaction for the following compounds, which has most 1,3-diaxial interaction energy? Assume the following 1,3-diaxial strains.

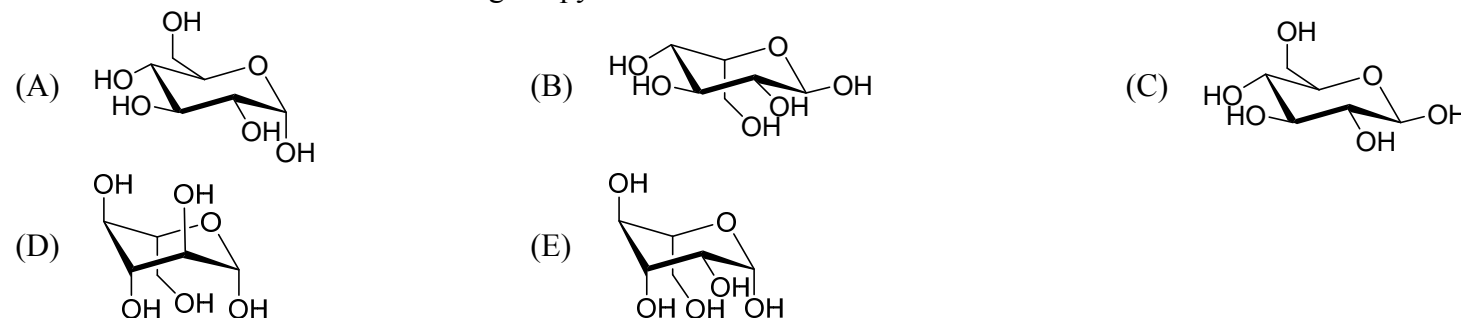
$CH(CH_3)_2$: 4.2 kJ/mol	F: 1.0 kJ/mol
CN: 0.8 kJ/mol	Cl: 1.0 kJ/mol
CH_3 : 3.8 kJ/mol	

- (A) Isopropylcyclohexane (B) Fluorocyclohexane (C) Cyclohexanecarbonitrile
(D) *cis*-1-Chloro-2-methylcyclohexane (E) *trans*-1-Chloro-2-methylcyclohexane.

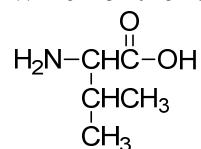
15. Which of the following species is the **least** nucleophilic?

- (A) Me_3CO^\ominus (B) H_2O (C) Me_3N (D) BF_3 (E) $^\ominus CN$

16. What is the **correct** structure for α -D-glucopyranose?



17. Which of the following is a correct representation of the amino acid below?

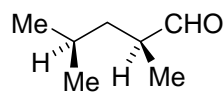


- (A) Isoleucine (B) Ile (C) I
(D) All of these represent this amino acid (E) Either (A), (B), or (C) represent this amino acid.

18. In humans, most steroids function as:

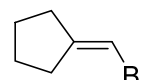
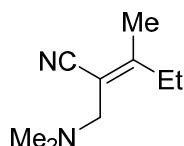
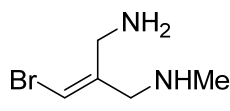
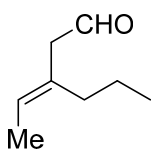
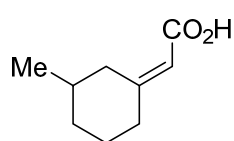
- (A) Enzymes (B) Hormones (C) Nucleic acids (D) Proteins (E) Saccharides.

19. What is the IUPAC name of the following compound?



- (A) (2*S*,4*R*)-Dimethylpentanal (B) (2*S*,4*S*)-Dimethylpentanal (C) (*R*)-2,4-Dimethylpentanal
(D) (*S*)-2,4-Dimethylpentanal (E) (2*R*,4*R*)-Dimethylpentanal.

20. How many *E* configuration are there in the following compounds?



- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

21. If silver nitrate is converted into silver nanoparticles, the **most** possible process for such a conversion is?

- (A) Exposure to oxygen (B) Exposure to heat (C) Exposure to water
(D) Exposure to alcohol compound (E) Exposure to acid compound.

22. A compound with the following molecular formula contains two double bonds. What is the correct subscript for H in the formula? $\text{C}_{10}\text{H}_7\text{ClN}_2\text{O}$

- (A) 19 (B) 22 (C) 18 (D) 20 (E) 21

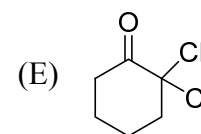
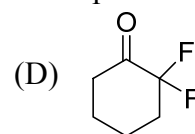
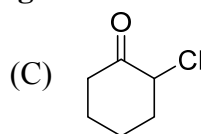
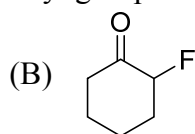
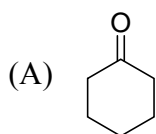
23. When butane undergoes free radical bromination, the product mixture contains 98% 2-bromobutane and 2% 1-bromobutane. How many times more susceptible to hydrogen atom abstraction is a secondary hydrogen in butane than is a primary hydrogen?

- (A) 100 (B) 73.5 (C) 50 (D) 8.7 (E) 1.5

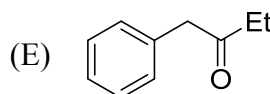
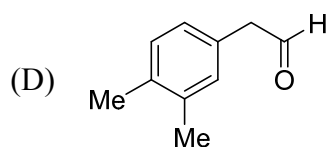
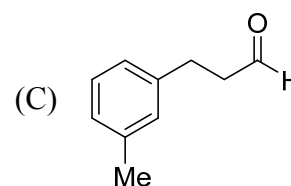
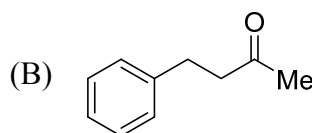
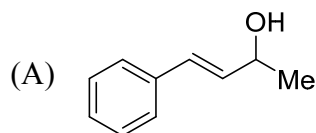
24. Which of the following is **not** a property of a protecting group?

- (A) Change the reactivity of a functional group (B) Inert to reaction conditions
(C) Becomes a permanent part of the product (D) Alters the mechanism of the desired reaction
(E) All of these are properties of a protecting group.

25. Which of the following carbonyl groups exhibits the **highest** wavenumber in infrared spectroscopy?



26. Compound **X** has the molecular formula $\text{C}_{10}\text{H}_{12}\text{O}$. The IR spectrum of **X** has a strong band near 1710 cm^{-1} . Compound **X** forms a phenylhydrazone, but gives a **negative** Tollens' test and a **positive** iodoform test. What is the structure of the compound **X**?



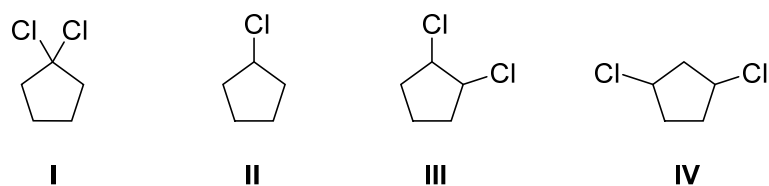
27. For the mass spectrum of compound **Y**, we found 3 lines in the molecular ion region (M^+ , M^++2 , M^++4), shows the peak heights in the ratio of 9 : 6 : 1. What would the compound **Y** be?

- (A) *cis*-1,2-Dichlorocyclohexane (B) 2-Chloropentane (C) *cis*-1,2-Dibromocyclohexane
(D) Bromobenzene (E) 1,2-Dibromopentane.

28. Which of the following would **not** produce nuclear magnetic resonance?

- (A) ^2H (B) ^{14}N (C) ^{16}O (D) ^{19}F (E) ^{11}B

29. Which compounds have 3 signals in the ^{13}C NMR spectrum?

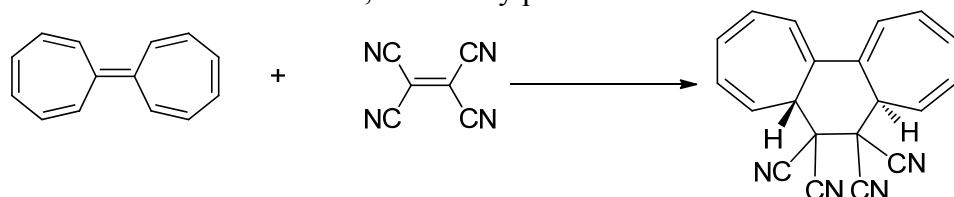


- (A) I, II (B) III, IV (C) I, II, III (D) I, III, IV (E) I, II, III, IV

30. Using a 300 MHz ^1H NMR instrument, if a H shows a triplet at δ 4.02, 4.00, 3.98 ppm, please calculate its coupling constant. And where will this triplet peak show up at a 600 MHz ^1H NMR instrument?

- (A) 6 Hz; δ : 4.01, 4.00, 3.99 ppm (B) 6 Hz; δ : 4.02, 4.00, 3.98 ppm (C) 6 Hz; δ : 4.00, 3.98, 3.96 ppm
(D) 2 Hz; δ : 4.02, 4.00, 3.98 ppm (E) 2 Hz; δ : 4.00, 3.98, 3.96 ppm.

31. Consider the reaction below, how many pairs of electrons are involved in this pericyclic reaction?

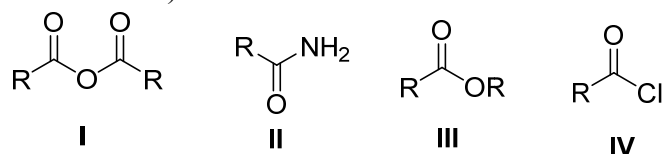


- (A) 2 (B) 4 (C) 8 (D) 16 (E) 10

32. Which of the following reaction types are pericyclic reactions?

- (A) Diels-Alder reaction (B) Cope rearrangement (C) Claisen rearrangement
(D) Stork reaction (E) All except (D) are pericyclic reactions.

33. What is the order of **decreasing** reactivity towards nucleophilic acyl substitution for the carboxylic acid derivatives? (most reactive first)

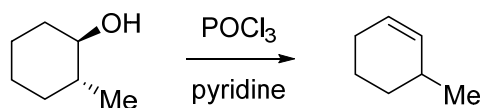


- (A) I, III, II, IV (B) II, III, I, IV (C) III, II, I, IV (D) IV, I, III, II (E) IV, III, I, II

34. Consider the elimination reaction: 2-bromohexane was treated with sodium methoxide in methanol. The product(s) of the reaction is(are):

- (A) (B)
(C) An equimolar mixture of (A) and (B) (D) A mixture of the major product (A) with the minor product (B)
(E) A mixture of the major product (B) with the minor product (A).

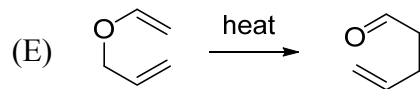
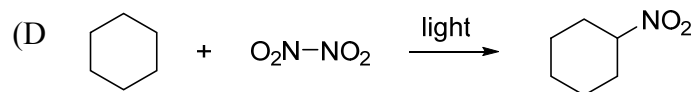
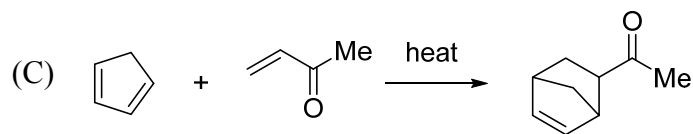
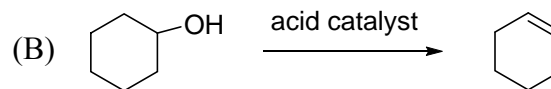
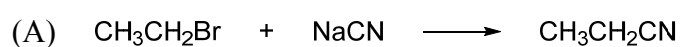
35. To answer the following question, consider the reaction below:



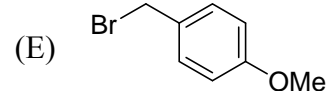
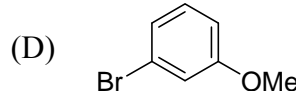
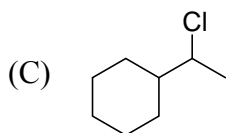
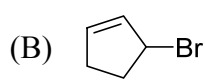
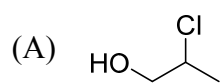
The dehydration of alcohol by reaction with POCl_3 in pyridine is an example of:

- (A) E1 process (B) $\text{S}_{\text{N}}1$ process (C) E2 process (D) $\text{S}_{\text{N}}2$ process (E) None of above.

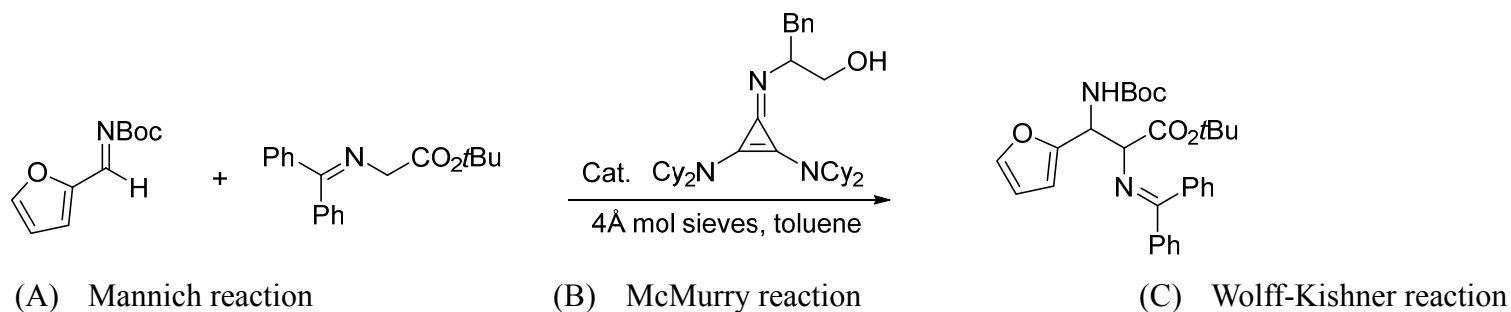
36. Which is addition reaction in the following reactions?



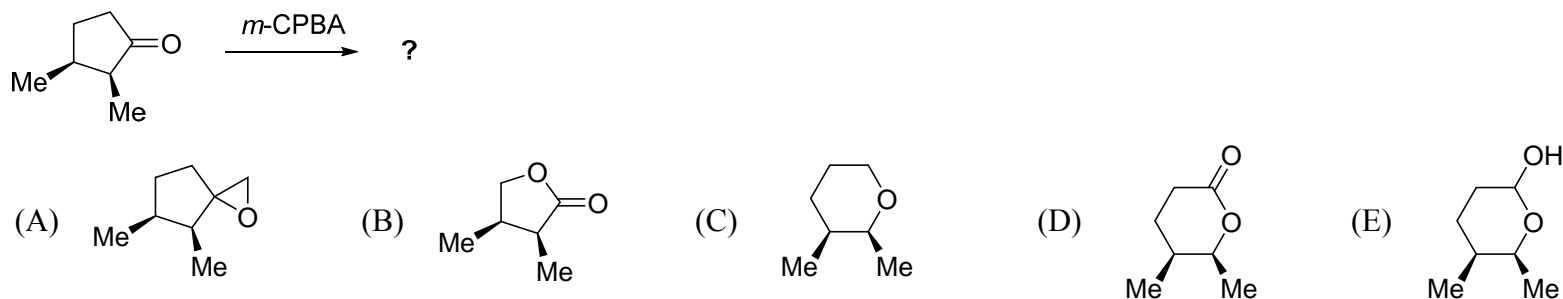
37. Which of the following substrates will **not** form a Grignard reagent when treated with Mg/diethyl ether?



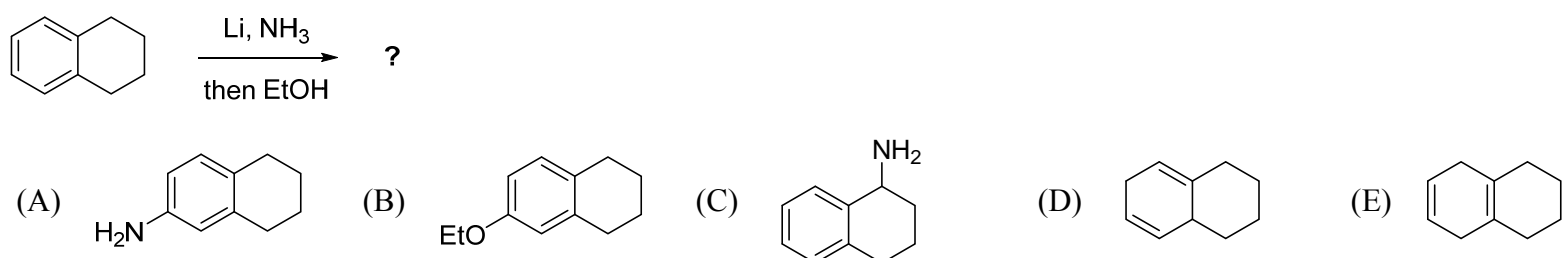
38. Which is the name reaction in the following reaction?



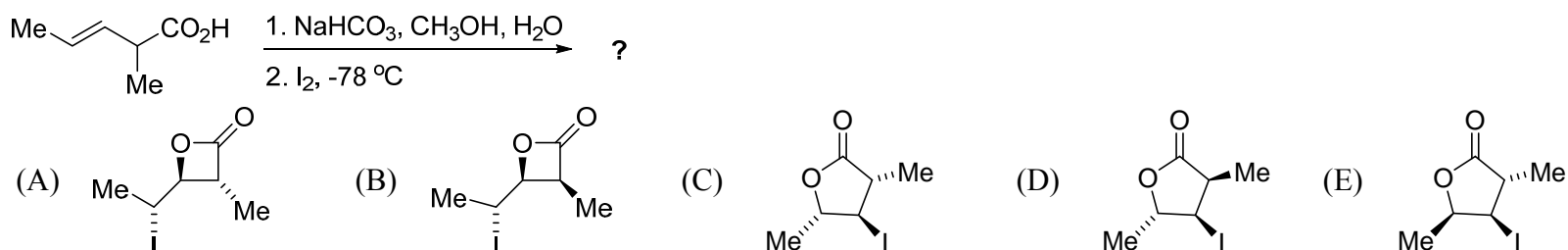
39. What is the **major** product of the following reaction?



40. Predict the structure of the **expected** product for the following reaction.

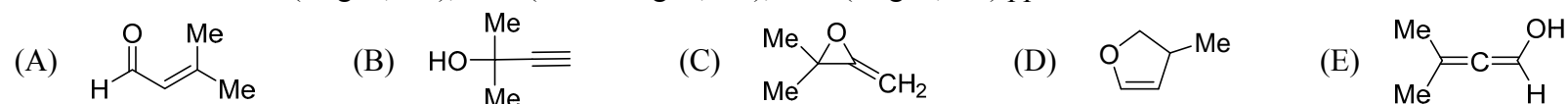


41. What product would be obtained from the following reaction?

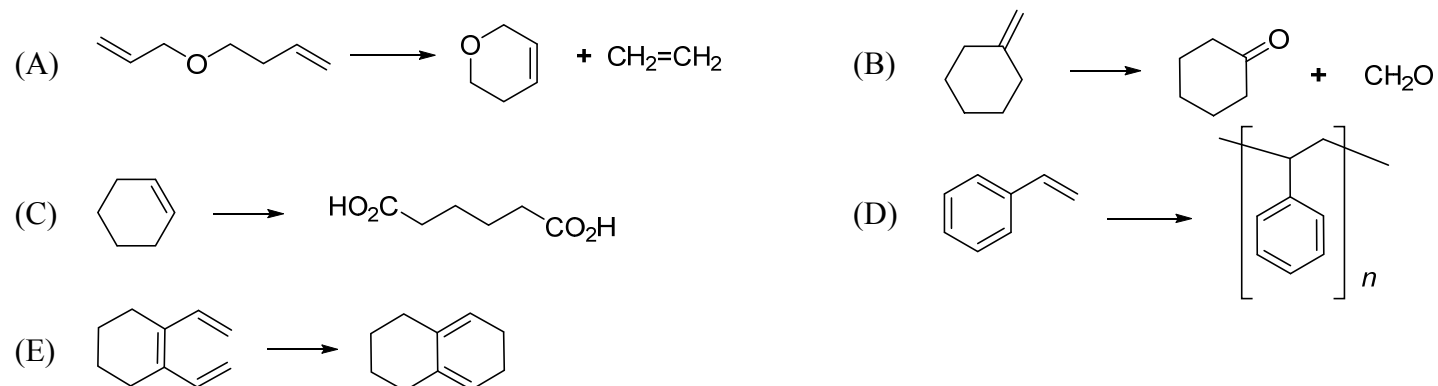


42. Which structure for the compound **A** (formula C_5H_8O) that fit the following proton NMR data?

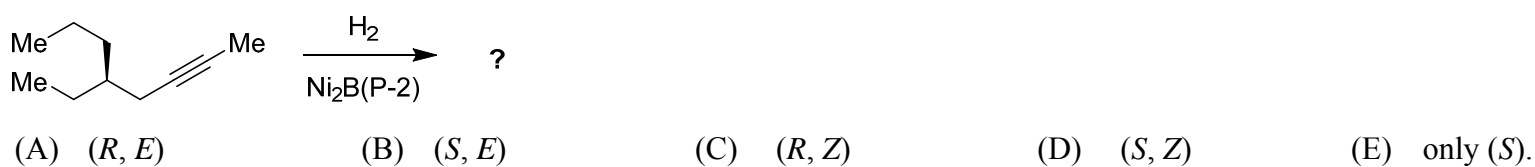
Chemical shift δ : 1.55 (singlet, 6H), 2.27 (broad singlet, 1H), 2.46 (singlet, 1H) ppm.



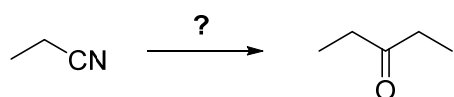
43. Which of the following reactions is often called olefin metathesis?



44. For the reaction shown below, the resulting stereochemistry of the **expected** product is best described as:

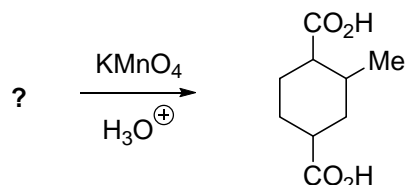


45. How would you prepare the following carbonyl compound from a nitrile?



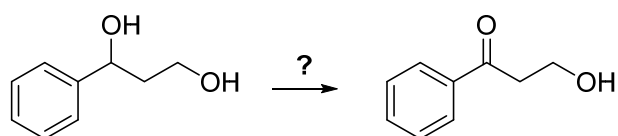
- (A) 1) EtMgBr; 2) NaOH, H₂O (B) 1) EtMgBr; 2) LiAlH₄; 3) H₃O⁺ (C) 1) EtMgBr; 2) H₂O
 (D) 2) EtMgBr; 2) CO₂; 3) H₃O⁺ (E) 1) EtMgBr; 2) PCC

46. Which one is the reactant of the following reaction?



- (A) (B) (C) (D) (E)

47. Which is the **best** reagent for following reaction?

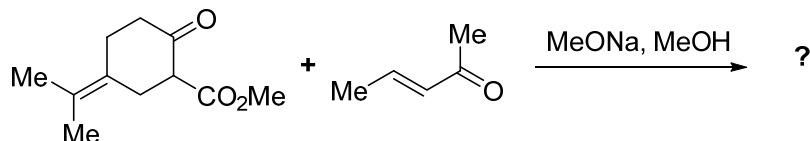


- (A) PCC (B) Jones reagent (C) MnO₂ (D) Ag₂O (E) KMnO₄

48. An epoxide compound may undergo the ring-opening reaction with water to generate

- (A) Triol (B) Peroxide (C) Glycol (D) Glycol ether (E) Ethylene oxide.

49. Show how you might use an annulation reaction to synthesize the following compound. Draw the structure of final product.

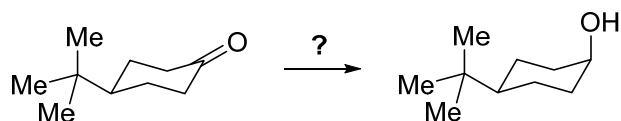


- (A) (B) (C) (D) (E)

50. Which of the following ethers **can't** be prepared by a Williamson ether synthesis?

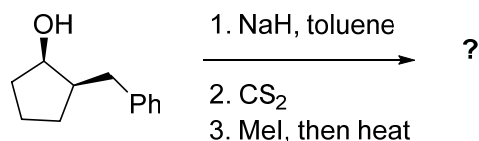
- (A) *t*-Butyl phenyl ether (B) Isopropyl methyl ether (C) Anisole
 (D) *t*-Butyl methyl ether (E) None of the above.

51. Which of the following reagents is **suitable** for the following transformation ?



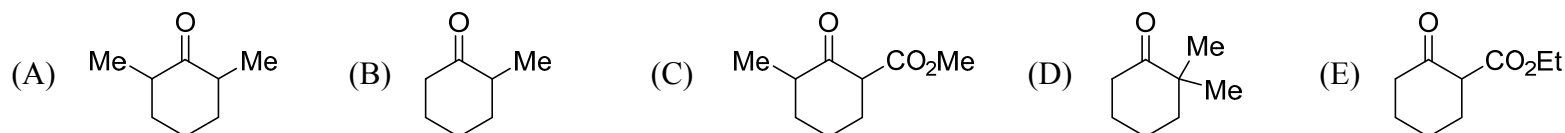
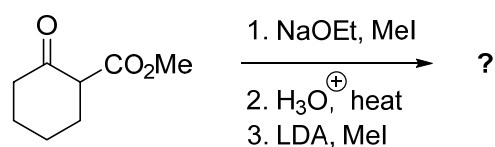
- I. LiAlH₄ II. LiAl(*t*-BuO)₃H III. LiB(*s*-Bu)₃H
 (A) I (B) II (C) III (D) I, II (E) II, III

52. What product would be obtained from the following reaction?

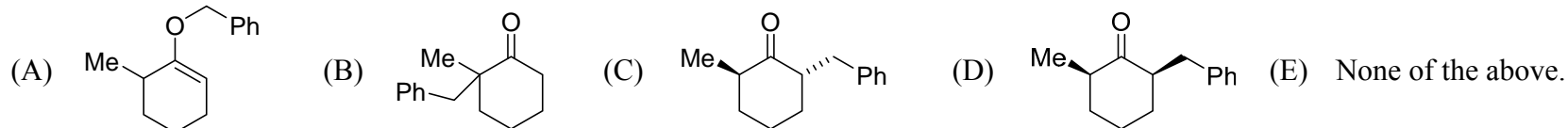
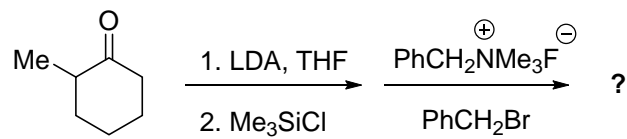


- (A) (B) (C) (D) (E)

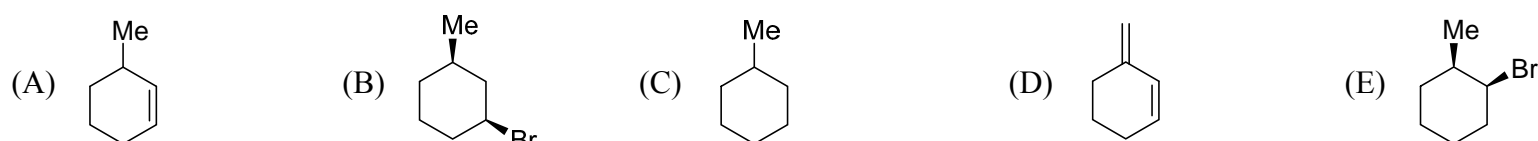
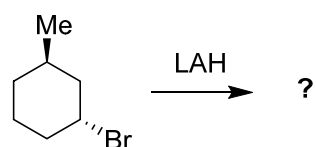
53. What is the product of this reaction?



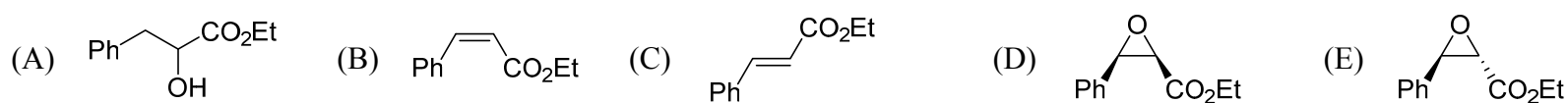
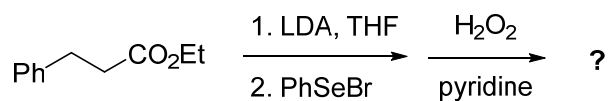
54. What is the **major** product would you obtain for the following reaction?



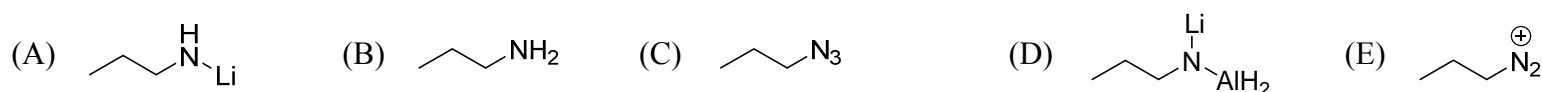
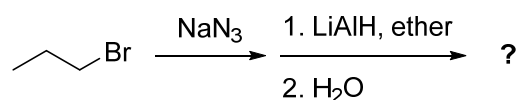
55. Provide the structure of the **major** organic product in the reaction shown below.



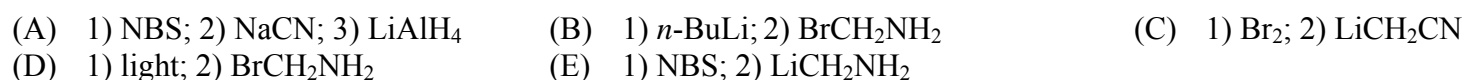
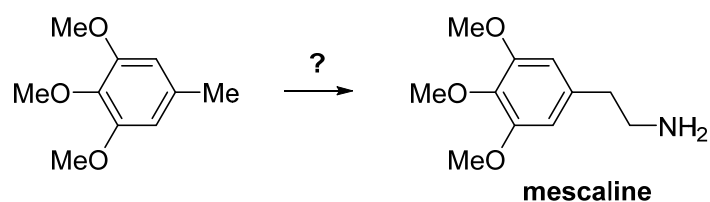
56. What product would be obtained for the following reaction?



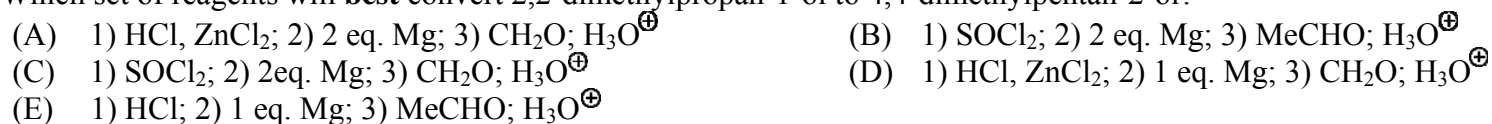
57. Please predict the product of the following reaction.



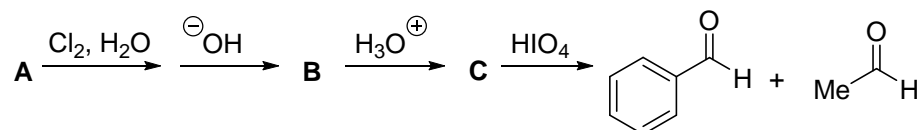
58. Mescaline is a hallucinogenic alkaloid isolated from peyote cactus. Synthesize mescaline from 3,4,5-trimethoxytoluene. Show all reagents toward the target compound.


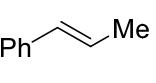
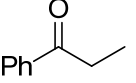
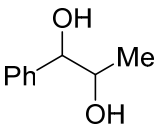
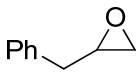


59. Which set of reagents will **best** convert 2,2-dimethylpropan-1-ol to 4,4-dimethylpentan-2-ol?



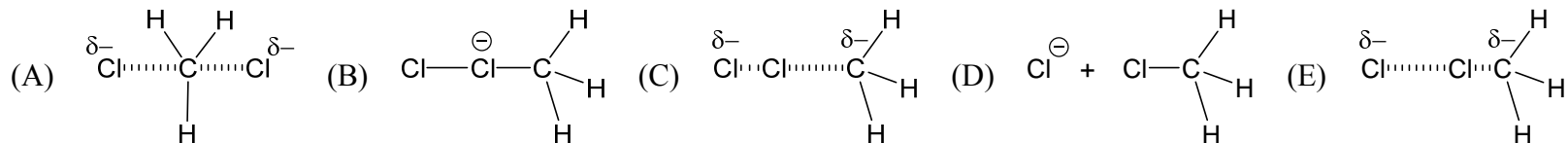
60. Compound **A** can make Br_2/CCl_4 become colorless. What is the structure of compound **B**?



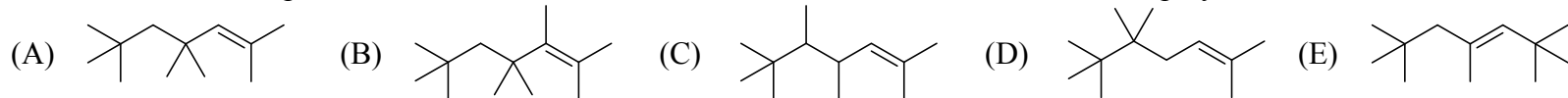
- (A)  (B)  (C)  (D)  (E) 

【單選題】每題 2 分，共計 40 分，答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

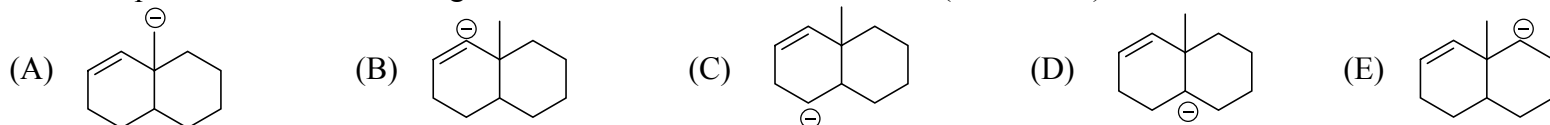
61. The reaction of Cl_2 with a methyl radical has a positive ΔH° . Which of these drawings is the **best** representation of the transition state of this reaction?



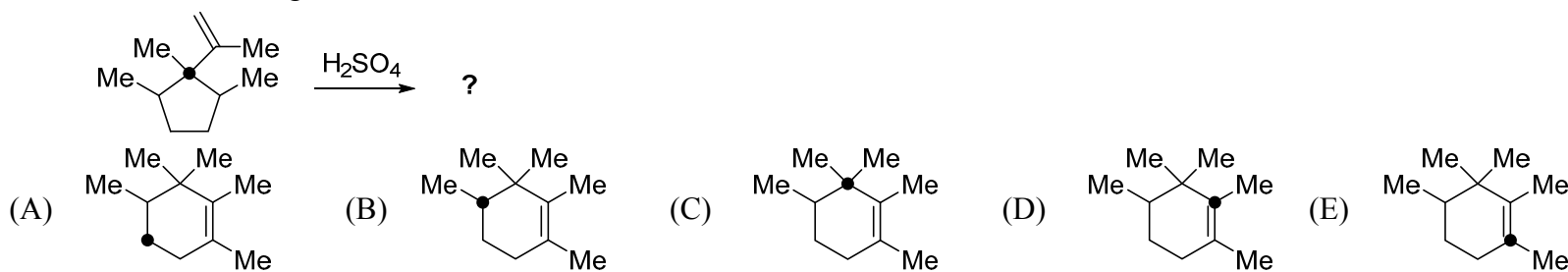
62. Which structure corresponds to the trimer of $\text{Me}_2\text{C}=\text{CH}_2$ formed under condition of cationic polymerization?



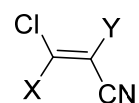
63. Remove a proton from the following structure to create the **most** reactive (least stable) carbanion.



64. The carbon marked by a dot (\bullet) is ^{13}C isotope. Which structure below shows the **correct** position of the ^{13}C in the product for the carbocation rearrangement shown above?



65. Choose substituents X and Y (listed in order below) for the following compound so as to make a Z isomer.



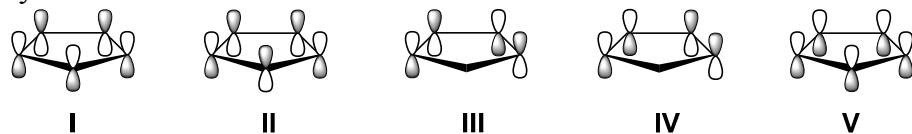
- (A) $-\text{Br}, -\text{NHMe}$ (B) $-\text{F}, -\text{CHO}$ (C) $-\text{I}, -\text{OMe}$ (D) $-\text{CO}_2\text{H}, -\text{CH}_2\text{NH}_2$ (E) $-\text{Br}, -\text{CO}_2\text{H}$

66. Rank the degree of unsaturation in each of the following compounds.

I. Cholesterol, $\text{C}_{27}\text{H}_{46}\text{O}$ **II.** DDT, $\text{C}_{14}\text{H}_9\text{Cl}_5$ **III.** Prostaglandin E1, $\text{C}_{20}\text{H}_{34}\text{O}_5$ **IV.** Caffeine, $\text{C}_8\text{H}_{10}\text{N}_4\text{O}_2$

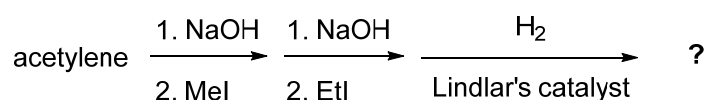
- (A) $\text{I} > \text{III} > \text{II} > \text{IV}$ (B) $\text{II} > \text{IV} > \text{I} > \text{III}$ (C) $\text{I} > \text{II} > \text{III} > \text{IV}$ (D) $\text{II} > \text{IV} > \text{III} > \text{I}$ (E) $\text{I} > \text{IV} > \text{II} > \text{III}$

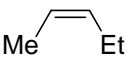
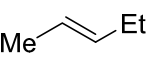
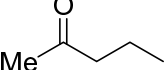
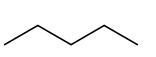
67. This cyclic carbocation has two sets of degenerate π -molecular orbitals. Choose the **correct** order MO's energies for this system?



- (A) $\text{V} = \text{I} < \text{IV} < \text{III} = \text{II}$ (B) $\text{V} < \text{IV} = \text{II} < \text{I} = \text{III}$ (C) $\text{III} = \text{II} < \text{I} = \text{IV} < \text{V}$
 (D) $\text{III} = \text{IV} < \text{II} < \text{I} = \text{V}$ (E) $\text{V} < \text{I} = \text{IV} < \text{II} = \text{III}$

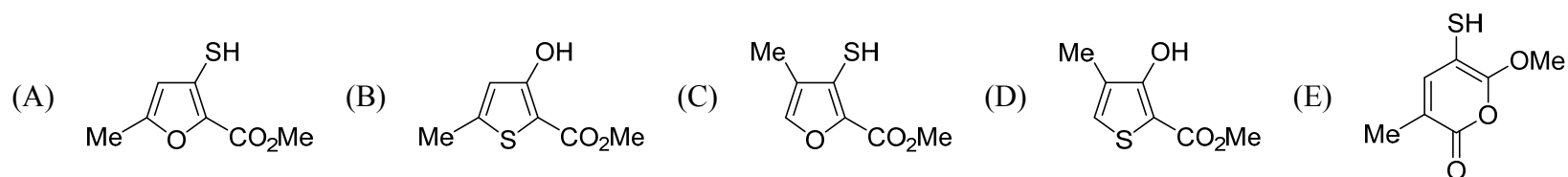
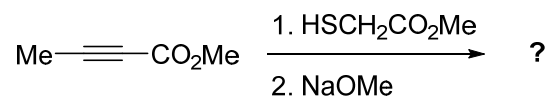
68. What product would be obtained for the following reaction?



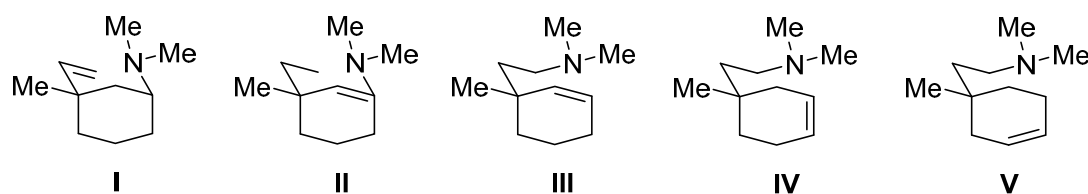
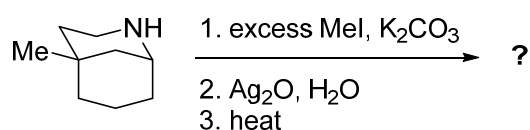
- (A)  (B)  (C)  (D)  (E) None of the above.

69. When 1-methyl-1-cyclohexene is respectively treated with the following reagent set, which will give the **same** product?
I. 1) BH_3 , THF; 2) H_2O_2 , NaOH, H_2O **II.** 1) $\text{Hg}(\text{OAc})_2$, H_2O , THF; 2) NaBH_4
III. 1) *m*-CPBA; 2) H_3O^+ **IV.** 1) OsO_4 ; 2) NaHCO_3 , H_2O
V. H_3O^+
 (A) **II, V** (B) **III, IV** (C) **II, III, V** (D) **I, V** (E) **I, III**

70. Predict the outcome of the following sequence of reactions.

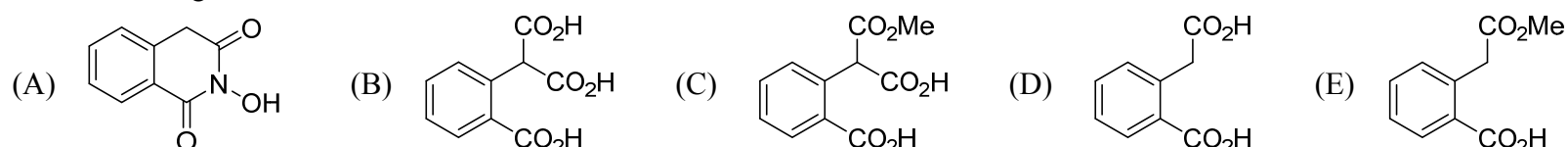
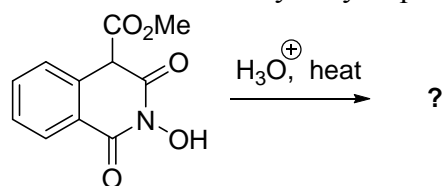


71. The following substrate is a starting material in the synthesis of compounds having opioid activity. Show **all** products that would result from the reaction below.

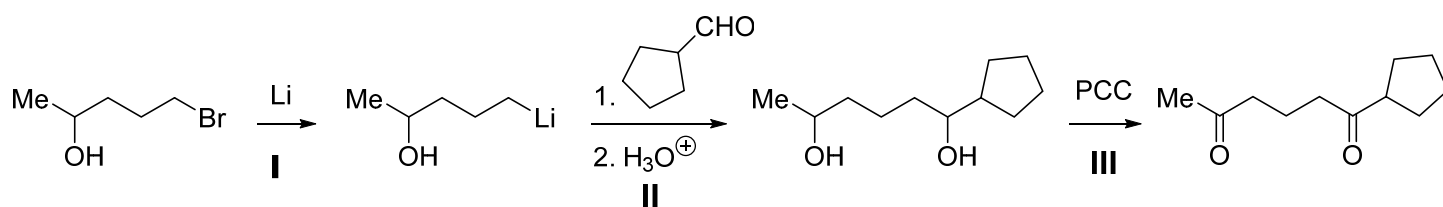


- (A) **I, II, III** (B) **I, III, IV** (C) **I, III, V** (D) **II, III, IV** (E) **II, IV, V**

72. Predict the structure of the hydrolysis product.

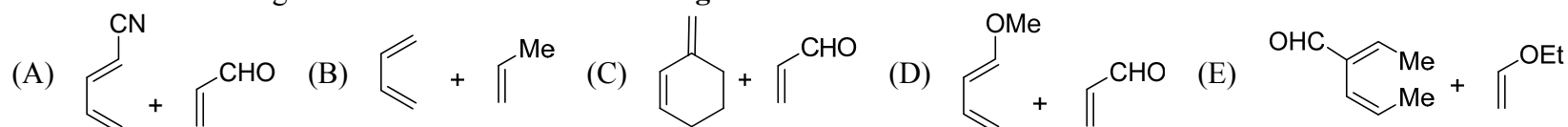


73. In order to synthesize the final product shown below, predict when should a protecting group be added and when should it be removed?

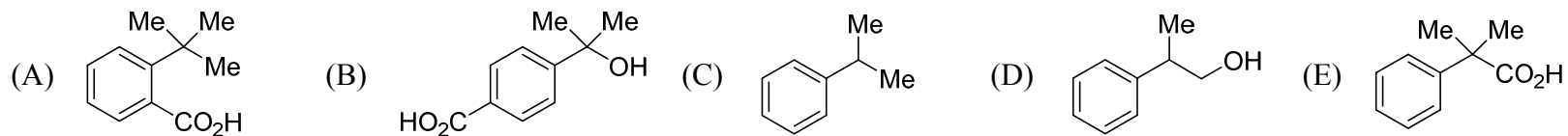
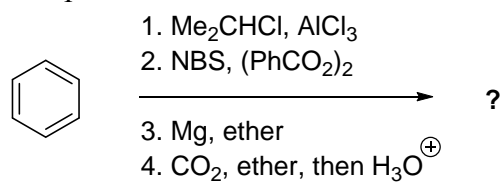


- (A) The hydroxyl group should be protected before step **I** and removed after step **I**
 (B) The hydroxyl group should be protected before step **I** and removed after step **II**
 (C) The hydroxyl group should be protected before step **I** and removed after step **III**
 (D) The hydroxyl group should be protected before step **II** and removed after step **III**
 (E) There is no need for a protecting group in this synthesis.

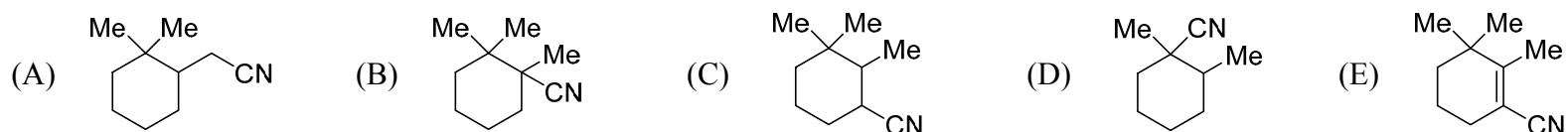
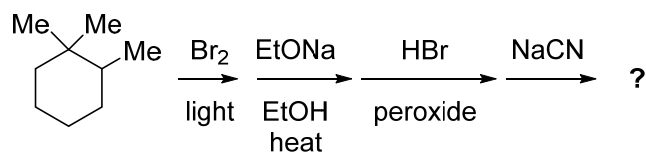
74. Which of the following Diels-Alder reactions has the **largest** reaction rate constant?



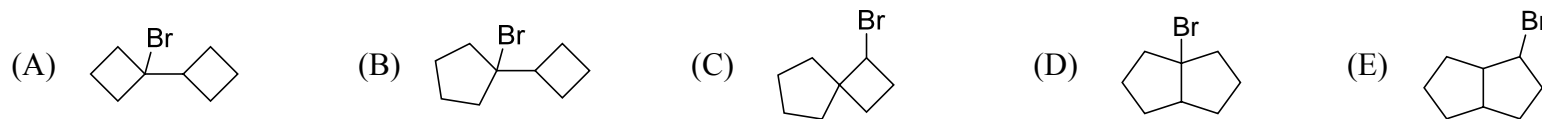
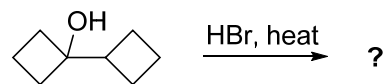
75. What is the product of this reaction?



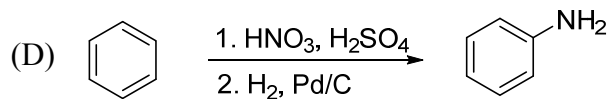
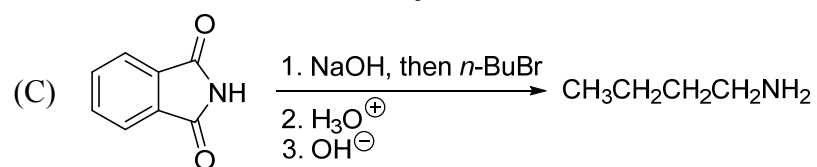
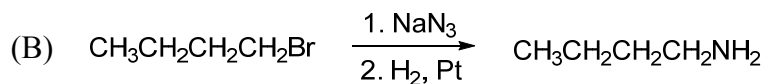
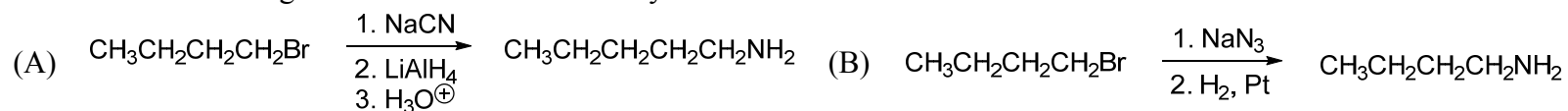
76. What is the **major** product obtained from the following reaction sequence?



77. What is the **major** product of the following reaction?

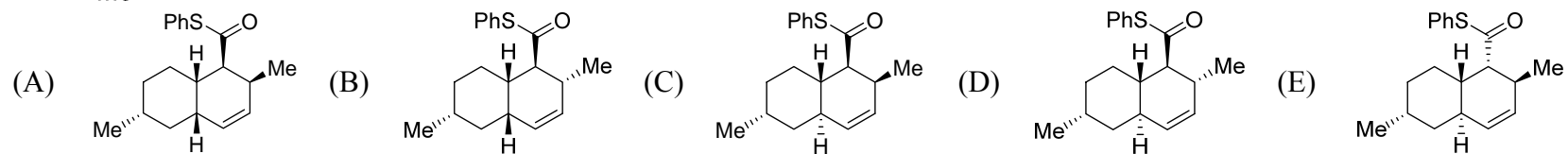
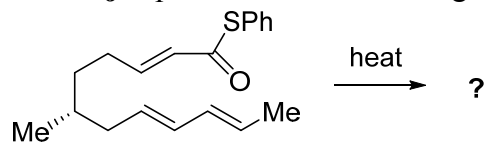


78. Which of the following reactions is called Gabriel synthesis?

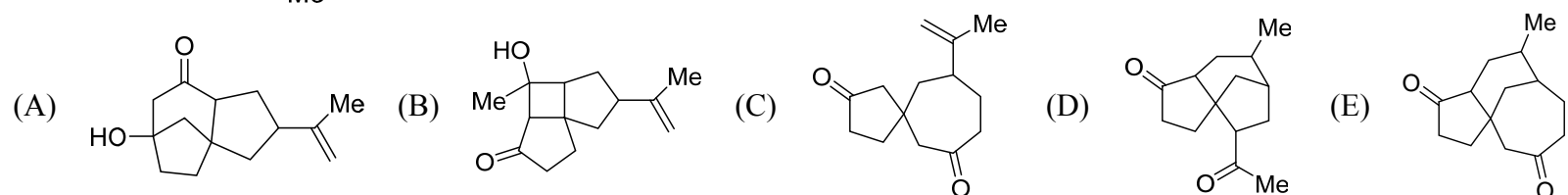
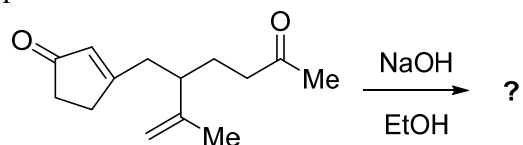


(E) None of the above.

79. What is the **major** product of the following triene to undergo the intramolecular Diels-Alder reaction?



80. The following reaction involves an intramolecular Michael reaction followed by an intramolecular aldol reaction. What is the **major** product of this reaction?



高雄醫學大學 105 學年度學士後醫學系招生考試試題

科目：普通生物學

考試時間：80 分鐘

說明：一、選擇題用 2B 鉛筆在「答案卡」上作答，修正時應以橡皮擦擦拭，不得使用修正液(帶)，未遵照正確作答方法而致電腦無法判讀者，考生自行負責。
二、試題及答案卡必須繳回，不得攜出試場。

I. 【單選題】1-60 題，每題 1 分，共計 60 分。答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

- Very rapid speciation occurred when cichlid fishes were isolated in Lake Victoria. Widespread extinction was dramatically seen when _____.
(A) hybridization stopped (B) fishing was prohibited (C) predatory fishes were added
(D) artificial selection stopped (E) insect larvae stocks were depleted
- Which one of the following statements about endosymbiosis and the origin of the eukaryotic cell are **FALSE**?
(A) Mitochondria are the descendents of purple nonsulfur bacteria.
(B) The chloroplasts of red and green alga are the descendents of cyanobacteria.
(C) Not all compartments of the eukaryotic cell are derived from the endomembrane system.
(D) The brown algae acquired their chloroplasts by engulfing a prokaryotic cell with chloroplasts.
(E) None of these choices are correct.
- Which of the following groups is most threatened by global extinctions?
(A) amphibians (B) birds (C) plants (D) mammals (E) fish
- Irregular dental hygiene and a high sugar diet may lead to tooth decay. Why?
(A) Bacteria consume calcium.
(B) Glucose forms a weak acid when dissolved in saliva.
(C) High concentrations of sugar soften the tooth enamel.
(D) Plaque degrades the tooth's protective mucosal layers.
(E) Lactic acid fermentation is used to generate ATP under anaerobic conditions.
- Which of the following regions of the human brain is critically important for controlling heart rate and breathing?
(A) medulla oblongata (B) hippocampus (C) cerebellum (D) cerebral cortex (E) thalamus
- Which of the following correctly indicates the hierarchy of skeletal muscle organization from "small" to "big"?
(A) muscle fiber, sarcomere, myofibril, motor unit
(B) myofibril, sarcomere, motor unit, muscle fiber
(C) sarcomere, myofibril, muscle fiber, motor unit
(D) myofibril, sarcomere, muscle fiber, motor unit
(E) sarcomere, muscle fiber, myofibril, motor unit
- The hormones epinephrine and norepinephrine constitute the "alarm" response of the body to stress. What secretes these hormones?
(A) pancreas (B) pineal gland (C) thyroid gland (D) adrenal medulla (E) anterior pituitary gland
- The bulk of the reabsorption of useful materials by the kidney takes place in the _____.
(A) loop of Henle (B) renal corpuscle (C) collecting ducts
(D) distal convoluted tubule (E) proximal convoluted tubule
- Increases in leptin levels will _____ appetite and _____ metabolic rate.
(A) decrease, decrease (B) decrease, increase (C) increase, decrease
(D) increase, increase (E) decrease, not change
- Humans cannot survive at sea by drinking salt water. However, marine vertebrates such as sea turtles and various sea birds can survive by drinking salt water. What do they have that humans do not?
(A) Salt glands.
(B) They use ammonia as their primary nitrogenous waste.
(C) Kidneys are extremely good at producing concentrated urine.
(D) Body fluid concentrations are similar to or greater than those of seawater.
(E) The ability to secrete salts and wastes into their intestinal contents like an insect.

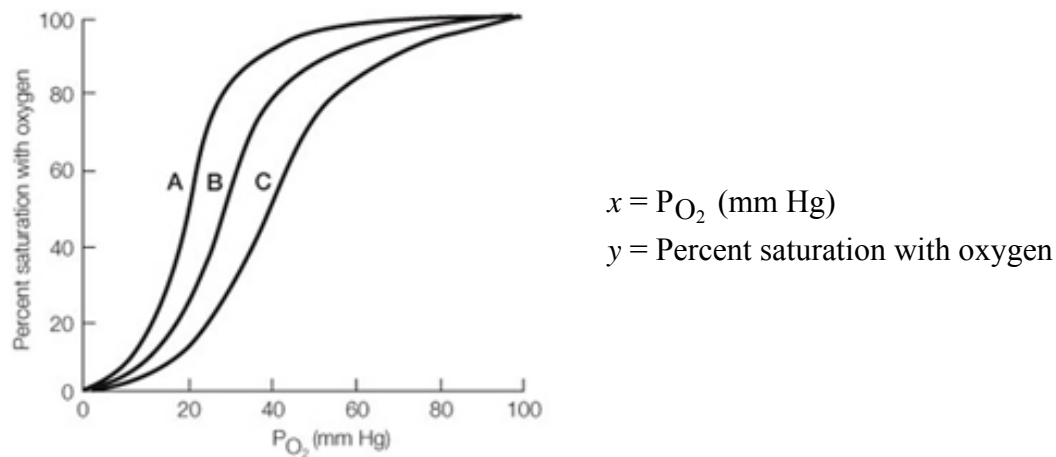
11. Otto Loewi performed an experiment in which he electrically stimulated the vagus nerve connected to one frog heart. Loewi also let the fluid bathing this first heart pass to a second chamber containing a second frog heart not connected to a nerve. What did Loewi observe?
- (A) There was no effect on the beating of either heart.
 (B) The first heart showed a decrease in beat rate and so did the second heart.
 (C) The first heart showed an increase in beat rate and so did the second heart.
 (D) The first heart showed a decrease in beat rate, but there was no change in the second heart.
 (E) The first heart showed an increase in beat rate, but there was no change in the second heart.
12. All of the following are primary functions of flowers **EXCEPT**:
- (A) meiosis (B) photosynthesis (C) egg production (D) pollen production (E) sexual reproduction
13. The series of metabolic events that occurs within tomato plants in response to wounding is _____.
- (A) a waterfall effect (B) the hypersensitive response (C) resistance to coevolution
 (D) a systemic response (E) a pathogen-specific response
14. The last common ancestor of all animals was probably a _____.
- (A) flagellated protist (B) unicellular yeast (C) unicellular chytrid
 (D) multicellular algae (E) multicellular fungus
15. Fire suppression by humans:
- (A) can change the species composition within biological communities.
 (B) will always result in an increase in species diversity in a given biome.
 (C) is necessary for the protection of threatened and endangered forest species.
 (D) will result ultimately in sustainable production of increased amounts of forest products for human use.
 (E) is a management goal of conservation biologists to maintain the healthy condition of forest communities.
16. A person has his/her gall bladder removed and as a result:
- (A) can only eat liquid meals. (B) can only eat very small meals. (C) can only eat small amounts of fat.
 (D) can now eat as much fat as desired and not absorb it. (E) none of these choices are correct.
17. The primary difference between estrous and menstrual cycles is that:
- (A) most estrous cycles are of much longer duration compared to menstrual cycles.
 (B) behavioral changes during estrous cycles are much less apparent than those of menstrual cycles.
 (C) season and climate have less pronounced effects on estrous cycles than they do on menstrual cycles.
 (D) copulation normally occurs across the estrous cycle, whereas in menstrual cycles copulation only occurs during the period surrounding ovulation.
 (E) the endometrium shed by the uterus during the estrous cycle is reabsorbed, whereas the shed endometrium of menstrual cycles is excreted from the body.
18. When light strikes the rod cell, it becomes _____ and glutamate release onto bipolar cells _____.
- (A) excited, increases (B) depolarized, increases (C) depolarized, decreases
 (D) hyperpolarized, increases (E) hyperpolarized, decreases
19. "Accommodation" is the process in the eye of _____.
- (A) regulation of vitreous humor volume
 (B) bending light rays to varying degrees by the lens
 (C) converting light energy into electrical signals by the retina
 (D) adjustment to varying light levels by altering the sensitivity of the eye
 (E) adjustment of the amount of light admitted to the eye by adjusting pupil diameter
20. Biofuels are mainly produced by _____.
- (A) plants that convert hemicellulose into gasoline
 (B) plants that are easy to grow in arid environments
 (C) transgenic crops that have cell walls containing ethylene
 (D) the genetic engineering of ethanol-generating genes into plants
 (E) the breakdown of cell wall biopolymers into sugars that can be fermented
21. Liver cells, mammary cells, and skin cells all contain the same genome; however, their respective proteomes vary drastically. This observation is best explained by what phenomenon?
- (A) cell growth (B) cell division (C) crossing over (D) cell differentiation (E) evolution
22. The first heart sound is produced at _____.
- (A) closing the semilunar valve (B) the beginning of systole (C) the end of systole
 (D) the beginning of diastole (E) the end of diastole

23. Which of the following statements about fluid mosaic model is **FALSE**?
- (A) Lipid-anchored proteins are a part of the original fluid mosaic.
 - (B) The fluid part of the model is the phospholipid bilayer.
 - (C) The mosaic part of the model is the protein.
 - (D) The model was proposed by S. Jonathan Singer and Garth Nicolson.
 - (E) This model can provide explanations for most of the criticisms of the “lipid bilayer plus protein sheets” model.
24. Which of the following statements about the cell cycle is **FALSE**?
- (A) Maturation-promoting factor (MPF) stimulates nuclear envelope breakdown by phosphorylating the lamin proteins of nuclear lamina.
 - (B) Active MPF phosphorylates microfilament-associated proteins to facilitate formation of the mitotic spindle.
 - (C) Active MPF phosphorylates histones to allow chromosome condensation.
 - (D) Epidermal growth factor can induce cells to pass through the G1 checkpoint and into S phase through the Ras pathway.
 - (E) The p21 protein functions to suppress the activity of Cdk-cyclin complex to block passage through the G1 checkpoint.
25. Which of the following statements about the extracellular matrix (ECM) is **FALSE**?
- (A) Collagens are the major structure fiber of ECM in animal cells.
 - (B) Mucoproteins are the components of hydrated matrix of ECM in animal cells.
 - (C) Cellulose are adhesive molecules of ECM in plant cells.
 - (D) Fibronectins and laminins are adhesive molecules of ECM in animal cells.
 - (E) Hemicellulose and extensins are the components of hydrated matrix of ECM in plant cells.
26. Which of these statements about viruses is true?
- I. H5N1 virus is an RNA virus.
 - II. SARS virus is a single positive-stranded RNA virus.
 - III. Dengue fever virus is a mosquito-borne single negative-stranded RNA virus.
 - IV. Zika virus is a single negative-stranded RNA virus.
- (A) I and II (B) I and III (C) I and IV (D) I, II, and III (E) I, II, III, and IV
27. Which of these statements best describes fruits?
- I. A pea pod is formed from an ovary.
 - II. When you consume tomato, you are eating fruits that are derived from ripen ovary.
 - III. A peach and a nut are a simple fruit that is derived from a flower.
 - IV. A strawberry is a fruit that is derived from a single flower.
 - V. A pineapple is a simple fruit.
- (A) I and II (B) II and III (C) III and IV (D) I, II, III, and IV (E) I, II, III, IV, and V
28. _____ triggers the ripening and aging of the banana, while _____ inhibits growth and seed germination during periods of drought.
- (A) Auxin; abscisic acid (B) Abscisic acid; ethylene (C) Ethylene; cytokinin
(D) Ethylene; abscisic acid (E) Auxin; gibberellin
29. A Taiwan ecologist monitoring the number of Formosan macaque in a wildlife refuge over a 10-year period is studying ecology at which level?
- (A) population (B) ecosystem (C) organism (D) community (E) biosphere
30. Which of the following characteristics best describes specialized cell junction?
- (A) Adherens junctions but not desmosomes are the main types of anchoring junctions.
 - (B) Gap junctions prevent the movement of molecules across cell layers.
 - (C) Tight junctions allow direct electrical and chemical communication between cells.
 - (D) Plasmodesmata permit direct cell-cell communication between plant cells.
 - (E) Tight junctions are the main types of communicating junctions between cardiac muscle cells.
31. Which of the following sources of reducing equivalents is most important for steroid hormone synthesis?
- (A) glycolysis (B) tricarboxylic acid (TCA) cycle (C) malate shuttle
(D) fatty acid oxidation (E) pentose phosphate pathway
32. Which of the following statements about gout is true?
- (A) It results from the overproduction of orotic acid.
 - (B) It can result from a deficiency in phosphoribosylpyrophosphate (PRPP) synthetase.
 - (C) It can be treated with inhibitors of xanthine oxidase.
 - (D) It occurs more frequently in women than men.
 - (E) The symptoms appear in early adolescence.

33. Which of the following characteristics best describes the urea cycle?
 (A) All of the enzymes are localized in the cytosol of hepatocytes.
 (B) The enzymes are present in high concentration in the perivenous hepatocytes.
 (C) Arginine is the end product of the urea cycle.
 (D) The cleavage of argininosuccinate releases fumarate.
 (E) Asparagine is a substrate in the urea cycle.
34. Which of the following vitamins involves primarily in transamination reactions of amino acid metabolism?
 (A) Vitamin C (B) Vitamin E (C) Vitamin B6 (D) Vitamin B12 (E) Vitamin A
35. Martin and Mary have free earlobes, but their son Mark does not. If Martin and Mary have two more children, what is the probability that both will have attached earlobes?
 (A) 1/4 (B) 3/4 (C) 1/16 (D) 9/16 (E) 3/16
36. Which of these statements best describes stem cells?
 (A) Adult stem cells but not embryonic stem cells are immortal in lab culture.
 (B) Only embryonic stem cells are found in every tissue of the adult body.
 (C) Embryonic stem cells and induced pluripotent stem cells give rise to all the different types of cells in the organism.
 (D) Stem cells can be isolated from the inner cell mass of blastocytes, bone marrow, and amniotic fluid, but not from adipose tissues.
 (E) Cancer stem cells possess characteristics associated with normal stem cells.
37. Which order is correct according to the number of genes from big to small in the following organisms?
 1. *E. coli*
 2. Rice
 3. Human sperm
 4. *D. melanogaster* (Fruit fly)
 5. *Saccharomyces cerevisiae* (yeast)
 (A) 23451 (B) 24351 (C) 34251 (D) 32415 (E) 34521
38. Phenylketonuria (PKU) is due to a recessive allele. Given 1 PKU occurrence per 25 births, what is the frequency of individuals with the heterozygous phenotype if the population is in Hardy-Weinberg equilibrium?
 (A) 0.2 (B) 0.32 (C) 0.64 (D) 0.8 (E) 0.96
39. Which of these statements best describes speciation?
 (A) Populations separated by a geographic barrier are known as sympatric populations.
 (B) Geographic isolation necessarily leads to new species.
 (C) For allopatric speciation to occur, changes in the gene pool must produce reproductive isolation.
 (D) In allopatric speciation, reproductive isolation develops and new species arises without geographic separation.
 (E) A small population is less likely to have its gene pool changed by genetic drift and natural selection.
40. _____ clinical trial tests on the target human population, and _____ clinical trial maximize the number of test subjects and include human subjects of both sexes, different ethnic groups, and those who have health problems besides the one that the drug is intended to benefit.
 (A) Phase I; phase II (B) Phase I; phase III (C) Phase II; phase III
 (D) Phase II; phase IV (E) Phase III; phase IV
41. Which of the following normal ranges for measurements of some fasting blood values is **FALSE**?
 (A) Glucose: 75-110 mg/dL (B) Arterial blood pH: 7.00-7.45 (C) Protein: 6.5-8 g/dL
 (D) Cholesterol: less than 200 mg/dL (E) Sodium: 135-145 mM
42. Which of these statements about a secondary immune response is **FALSE**?
 (A) Antibodies of the IgE class are produced.
 (B) Antibodies are made quickly and in great amounts.
 (C) Antibody production lasts longer than in a primary response.
 (D) Lymphocyte clones are believed to develop.
 (E) It provides active immunity against the specific pathogens.
43. Which of these statements about muscle contraction is **FALSE**?
 (A) Ca^{2+} is required for all muscle contraction.
 (B) Troponin is present in skeletal muscles and smooth muscles.
 (C) When a skeletal muscle shortens during contraction, the H band and sarcomere shorten.
 (D) Skeletal muscles but not cardiac muscles require neural stimulation to contract.
 (E) The sarcoplasmic reticulum and transverse tubules are well-developed in skeletal muscles and poorly developed in smooth muscles.

44. What is the correct sequence of events involving cyclic AMP as a second messenger of glucagon hormone?
1. The stimulation of the activity of adenylate cyclase.
 2. The activation of G-proteins.
 3. The conversion of ATP to cyclic AMP.
 4. The activation of protein kinase A.
 5. The stimulation of lipid mobilization.
 6. An increase in the activity of hormone-sensitive lipase.
- (A) 213645 (B) 213456 (C) 214356 (D) 213465 (E) 214365
45. Which of the following sequence of the steps is regular for Western Blotting Assay that is widely used for detection of the specific protein in a tissue?
1. Tissues are broken down using a homogenizer or by sonication.
 2. The protein is probed with an addition of the primary antibody.
 3. The protein is transferred to a PVDF membrane.
 4. Add secondary antibody conjugated with peroxidase.
 5. The proteins of the tissues are separated using gel electrophoresis.
 6. The protein is detected with an addition of a peroxidase substrate.
- (A) 123456 (B) 153246 (C) 152346 (D) 154623 (E) 124653
46. All are stages in gene transcription **EXCEPT**:
- (A) binding of RNA polymerase holoenzyme at the promoter sites.
 - (B) DNase I activity on RNA polymerase/DNA complex.
 - (C) chain elongation.
 - (D) initiation of polymerization.
 - (E) chain termination.
47. The driving force that pushes the root tip through the soil is primarily _____.
- (A) the elongation of root hairs
 - (B) continuous cell division of root cap cells
 - (C) elongation of cells behind the root apical meristem
 - (D) continuous cell division in the root cap at the tip of the root
 - (E) continuous cell division just behind the root cap in the center of the apical meristem
48. Iron deficiency is often indicated by yellowing in newly formed leaves. This suggests that iron _____.
- (A) is a relatively immobile nutrient in plants
 - (B) is concentrated in the xylem of older leaves
 - (C) is tied up in formed chlorophyll molecules
 - (D) is concentrated in the phloem of older leaves
 - (E) is found in leghemoglobin and reduces the amount available to new plant parts
49. You find a new species of mouse that, compared to the house mouse you are familiar with, sprints extraordinarily rapidly but also fatigues quickly. Which type of muscle fiber (compared to an ordinary house mouse) would you expect to see an increase in _____?
- (A) slow glycolytic fibers (B) slow oxidative fibers (C) fast glycolytic fibers
 - (D) fast oxidative fibers (E) fast and slow oxidative fibers
50. Which of the following is true about short-term and long-term memory processes?
- (A) Both short-term and long-term memory processes require protein synthesis.
 - (B) Neither short-term nor long-term memory processes require protein synthesis.
 - (C) Invertebrate animals like Aplysia and Drosophila do not show long-term memory processes.
 - (D) Short-term memory processes act through second messenger systems while long-term memory processes require protein synthesis.
 - (E) Long-term memory processes act through second messenger systems while short-term memory processes require protein synthesis.
51. An open circulatory system differs from a closed one in that:
- (A) The open circulatory system has a combination of blood vessels and large thin-walled sinuses whereas a closed circulatory system has only vessels.
 - (B) An open circulatory system opens into the heart whereas the closed circulatory system does not.
 - (C) An open circulatory system opens into arteries and is drained by veins whereas in a closed one it is just the reverse.
 - (D) An open circulatory system drains into the mantle cavity whereas a closed circulatory system drains into the hemolymph.
 - (E) A closed circulatory system is completely encased in the body cavity whereas the open one is not.

52.



In the above graph, curve _____ is most likely the oxygen-binding curve for normal adult human hemoglobin. Curve _____ is most likely that of llama hemoglobin (from a llama population that has lived in the mountains of Peru for thousands of years). Curve _____ is most likely that of myoglobin.

- (A) A, B, C (B) A, C, B (C) B, C, A (D) B, A, C (E) C, B, A

53. A small island has stable populations of plants and animals, including one species of hawk as the only predator. A ship docks at the island, and the ship's cat has recently had a litter of kittens. One of the young cats accidentally goes ashore in a small boat, jumps to land and runs into the brush. No one notices, and they leave the cat on the island. What do you think is a likely consequence of the cat's presence on the island?

- (A) The insect populations will decline.
 (B) The fish in the lagoon will decrease due to predation.
 (C) It's only one cat and will make no difference to the island.
 (D) Some species of ground-nesting birds may go extinct within a few years.
 (E) The increase in nitrogenous waste from the cat will increase the size of many plants.

54. Which is **NOT CORRECT**?

- (A) Introduced species are sometimes a problem because they usually are better competitors.
 (B) For carbon cycle, the CO_2 would be returned to the atmosphere when the trees died and decayed.
 (C) Global warming is caused by increased CO_2 and CH_4 levels.
 (D) UV-B radiation is increasing due to increased CH_4 concentration in the polar region.
 (E) CO_2 level increased due to enhanced human activities.

55. Which statement about hyperpolarization of a neuron is true? When hyperpolarization occurs,

- (A) membrane potential is more negative than during resting potential.
 (B) membrane potential is closer to Na^+ equilibrium potential (E_{Na}) than it is to E_{K} .
 (C) Na^+ and/or Cl^- channels are open.
 (D) if it occurs in a downstream neuron, exciting postsynaptic potentials (EPSPs) are more likely to be generated than are inhibitory PSPs (IPSPs).
 (E) generation of action potentials is likely to occur.

56. Which of the statement about digestion system in animals is correct?

- (A) Stomach acid activates pepsinogen into pepsin.
 (B) Secretin modulates digestion by triggering acid release in the stomach.
 (C) The bile salts function in fat digestion by dispersing big droplets of fats to small droplets.
 (D) A fatty acid absorbed into an intestinal cell becomes part of a chylomicron.
 (E) Glucagon, the pancreatic hormone, functions to stimulate the liver to release glucose.

57. For the reproduction of flowering plants, double fertilization:

- (A) is characteristic of all plants.
 (B) produces a triploid sporophyte and a diploid endosperm.
 (C) results in the fertilization of egg by sperm and polar nuclei by pollen tube nucleus.
 (D) results from the fusion of the male and female sporophytes of angiosperms.
 (E) prevents the production of fertile pollen grains.

58. A difference between a stem and a root in secondary growth is that the root often lacks _____.

- (A) xylem (B) vascular cambium (C) pith (D) parenchyma rays (E) cork

59. For invertebrates, which statement is **NOT CORRECT**?

- (A) Molluscs are the most diverse phylum.
 (B) Trematodes have very sophisticated defenses against immune system attack.
 (C) Tapeworms lack a mouth and a gut.
 (D) Echinoderms and vertebrates are more closely related than arthropods.
 (E) Barnacles are classified as mollusks because of their trochophore larvae.

60. Which statement is true for seed plants?
- (A) In angiosperm life cycles, the female gametophyte is the ovule.
 - (B) A spore grows into a seed.
 - (C) A pollen grain contains a male gametophyte.
 - (D) Double fertilization results in the production of a diploid zygote and a triploid endosperm nucleus.
 - (E) The life cycle of seed plants does not include a gametophyte generation.

II. 【單選題】 61-80 題，每題 2 分，共計 40 分。答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

61. Which statement is true?
- (A) Plants are defined as multicellular, eukaryotic, photosynthetic autotrophs.
 - (B) Plants are defined by their chloroplasts, which contain chlorophyll *a* and *b*.
 - (C) Plant sporophytes grow from haploid spores.
 - (D) Charophytes and land plants share four derived traits that suggest they share a relatively recent common ancestor.
 - (E) Charophytes are embryophytes.
62. Endosymbiosis is the event occurring in the algal evolution. Which is **NOT CORRECT**?
- (A) Cyanobacterium is included by marine animal cells in the primary endosymbiosis.
 - (B) Genetic exchange between cyanobacterium and animal host.
 - (C) Red algae are the old species derived from primary endosymbiosis.
 - (D) Secondary endosymbiosis is happening again when carbon dioxide concentration is sharply declined.
 - (E) Land plants are appearing after secondary endosymbiosis.
63. Phylogeny is the study of the evolutionary history of related groups of organisms. Organisms are grouped into taxa based on shared characteristics that result from common ancestry. Identify which statement is **FALSE**.
- (A) The term monophyletic refers to a taxon.
 - (B) A taxon includes an ancestral species and all of its descendents.
 - (C) Homologous structures look the same and serve the same function but differ in evolutionary origin and structure.
 - (D) Ancestral traits were present in the shared ancestor of the species within a taxon.
 - (E) Phylogeny is the evolutionary history of a group of organisms.
64. Does the distribution of bases in monkey DNA and human DNA follow Chargaff's rules?
- (A) Yes, it is because the %A + %T is greater than the %G + %C in both species.
 - (B) Yes, it is because %A + %T does not equal %G + %C in both species.
 - (C) Yes, it is because the %A approximately equals the %T and the %G approximately equals the %C in both species.
 - (D) No, it is because %A is higher than %T and %G is higher than %C in both species.
 - (E) Yes, it is because the %A + %T is lower than the %G + %C.
65. A cross between homozygous purple-flowered and homozygous white-flowered pea plants results in offspring with purple flowers. This demonstrates _____.
- (A) a dihybrid cross
 - (B) dominance
 - (C) the blending model of genetics
 - (D) true breeding
 - (E) the mistakes made by Mendel
66. Which is correct for the relationship between photosynthesis and respiration in plants?
- (A) Plants respire only when they don't photosynthesize.
 - (B) Photosynthesis is the plant's form of cellular respiration.
 - (C) Because photosynthesis supplements the plant the energy under light condition, the respiration will reduce when the plant is transferred from dark condition to light condition.
 - (D) Cellular respiration takes place only in plant roots, not throughout the plant.
 - (E) Respiration is not only needed for energy generation in the plants, but also provides compounds for the synthesis of other metabolites that is necessary for the plant life.
67. The role of photosynthetic organisms in an ecosystem is _____.
- (A) reducing light and UV radiation
 - (B) fixing organic compounds for decomposers
 - (C) synthesize organic compounds from inorganic compounds
 - (D) reducing temperature by transpiration
 - (E) keep energy constant in an ecological system
68. Identify which one is **FALSE**.
- (A) Nitrogen-fixing microbes provide energy for carbon fixation.
 - (B) Both eukaryotes and prokaryotes can assimilate nitrogen into organic compounds.
 - (C) Nitrogen may be a limiting plant nutrient, although the atmosphere is 80% nitrogen gas (N₂).
 - (D) Bacteria obtain energy from nitrification.
 - (E) Denitrifying bacteria obtain oxygen gas (O₂) from nitrogenous compounds.

69. What is true?
- (A) Taste buds consist of sensory cells that act as mechanoreceptors.
 - (B) A taste bud consists of at least one sensory receptor cell from each of the major types of taste receptors.
 - (C) The infrared receptors of pit vipers belong to the same general class of sensory receptors as the mechanoreceptors associated with cat whiskers.
 - (D) Tectorial cells are common to the senses of hearing and equilibrium in humans.
 - (E) In vertebrate eyes, the conversion of light energy to chemical energy occurs most directly as the result of changes to cyclic GMP (cGMP).
70. As discussed in the text, the fruit fly *Drosophila melanogaster* has an allele that confers resistance to DDT and similar insecticides. Laboratory strains of *D. melanogaster* have been established from flies collected in the wild in the 1930s (before the widespread use of insecticides) and the 1960s (after 20 years of DDT use). Lab strains established in the 1930s have no alleles for DDT resistance. In lab strains established in the 1960s, the frequency of the DDT-resistance allele is 37%. Which statement below is true?
- (A) Some fruit flies evolved resistance to DDT in order to survive.
 - (B) The heritable trait of DDT resistance cannot change even DDT use became widespread.
 - (C) Fruit flies became more resistant to DDT over time.
 - (D) When DDT was widely used, fruit flies with DDT resistance had greater evolutionary fitness than fruit flies lacking DDT resistance.
 - (E) Alleles for DDT resistance arose by mutation during the period of DDT use because of selection for pesticide resistance.
71. Which statement about evolution is correct?
- (A) On November 24, 1899, Darwin published his hypothesis in *On the Origin of Species by Means of Natural Selection*, ushering in the era of evolutionary biology.
 - (B) Adaptation refers to an individual changing over its lifetime in response to the environment.
 - (C) Two species that are thought to have a recent common ancestor share several homologous structures.
 - (D) Over evolutionary time, the descendants of that ancestor have accumulated diverse modifications, or adaptations, that allow them to survive and reproduce in specific habitats. Many ancestors are co-existing in the world to make biodiversity.
 - (E) Natural selection acts on the variant individuals that make up a community.
72. Mendel took an experimental and quantitative approach. Which of the following statement is **NOT CORRECT**?
- (A) Mendel grew up on a small farm in what is today the Czech Republic, and in 1843, he entered an Augustinian monastery.
 - (B) Mendel studied at the University of Vienna from 1851 to 1853, where he was influenced by a physicist who encouraged experimentation and the application of mathematics to science and by a botanist who stimulated Mendel's interest in the causes of variation in plants.
 - (C) Around 1857, Mendel began breeding garden peas to study inheritance.
 - (D) Pea plants have several advantages for genetic study. Pea plants are available in many varieties that have distinct heritable features, or characters, with different variant traits.
 - (E) Peas have a short plant height, and each mating produces many offspring.
73. Photosynthetic pigments in the thylakoid are light receptors. Which is **NOT CORRECT**?
- (A) Chlorophyll *a*, which participates directly in the light reactions and absorbs best in the red and violet-blue wavelengths and absorbs least in the green, participates directly in the light reactions, but accessory photosynthetic pigments absorb light and transfer energy to chlorophyll *a*.
 - (B) Accessory pigments include chlorophyll *b*, carotenoids, and anthocyanin.
 - (C) An overall action spectrum for photosynthesis profiles the relative effectiveness of different wavelengths of radiation in driving the process. The action spectrum of photosynthesis was first demonstrated in 1883 in a clever experiment performed by Thomas Engelmann.
 - (D) The action spectrum of photosynthesis does not match exactly the absorption spectrum of any one photosynthetic pigment, including chlorophyll *a*.
 - (E) Each light-harvesting complex consists of pigment molecules (which may include chlorophyll *a*, chlorophyll *b*, and carotenoids) bound to proteins, in which the light-harvesting complexes act as an antenna for the reaction-center complex.
74. Which of these statements best describes neurodegenerative diseases?
- (A) In Alzheimer's disease (AD), brain tissues often shrink and have a loss of cholinergic and other neurons in the cerebral cortex but not hippocampus.
 - (B) AD is characterized by memory loss, amyloid beta oligomers, and large amount of dephosphorylated tau protein.
 - (C) Parkinson's disease (PD) results from the death of neurons in the diencephalon.
 - (D) Dopamine can be used as a drug for PD.
 - (E) Acetylcholinesterase inhibitors and NMDA receptor antagonist can be used to treat AD.

75. Which of the following animals is classified correctly?
- (A) The Taiwanese frog *Hoplobatrachus rugulosus* and the Taiwanese salamander *Hynobius formosanus* belong to the same order in *Class Amphibia*.
- (B) The formosan sika deer *Cervus nippon taiouanus* and the Taiwanese wild boar *Sus scrofa* belong to the same order in *Class Mammalia*.
- (C) The mosquito *Aedes aegypti* and asian giant hornet belong to the same order in *Class Insecta*.
- (D) The giant panda and Taiwan leopard cat belong to the same family in *Order Carnivora*.
- (E) The formosan landlocked salmon *Oncorhynchus masou formosanus* and rainbow trout belong to the different family in *Order Salmoniformes*.
76. What is the concentration of plasma glucose **at 30 minutes** according the following oral glucose tolerance experiment? (Glucose standard: 100 mg/dL with an absorbance of 0.48 in a 50 μ l volume of cuvette)
- | | | | | | | | |
|-------------------|------|------|------|------|------|------|------|
| Time (min) | 0 | 10 | 20 | 30 | 60 | 90 | 120 |
| Absorbance | 0.48 | 0.49 | 0.58 | 0.36 | 0.58 | 0.55 | 0.49 |
| Plasma (μ l) | 50 | 50 | 50 | 25 | 50 | 50 | 50 |
- (A) 0.75 mg/ml (B) 1 mg/ml (C) 1.2 mg/ml (D) 1.5 mg/ml (E) 1.25 mg/ml
77. Which of the following differences between r-selection and K-selection is true?
- I. The K-selected populations live longer than the r-selected species.
- II. The K-selected species has higher reproduction rate than the r-selected species.
- III. The K-selected species has later reproductive age than the r-selected species.
- IV. In humans, males take a K-selected strategy to produce many sperms.
- V. The K-selected species has a stronger competitive ability than the r-selected species.
- VI. The K-selected species develop more rapidly than the r-selected species.
- (A) I, II, III, IV, and V (B) II and IV (C) III and IV (D) II, IV, VI (E) I, III, V
78. Which of these statements about inhibitors is true?
- (A) DAPI (4',6-diamidino-2-phenylindole) can be used to stain both live and fixed cells for fluorescent microscopy because it binds strongly to A-T rich regions in DNA.
- (B) Actinomycin D is used for the study of protein stability because it inhibits translational elongation.
- (C) Cycloheximide is used for the study of protein stability because it inhibits transcriptional elongation.
- (D) Ethidium bromide is used to see protein gel bands because it is an intercalating agent for protein.
- (E) Colchicine is used to see chromosomes in mitotic prophase because it inhibits microtubule polymerization.
79. Acclimatization to a high altitude involves:
- I. normal arterial P_{O_2}
- II. hyperventilation
- III. decreased affinity of hemoglobin
- IV. increased hemoglobin and red blood cell production
- (A) I, II, III, and IV (B) II, III, and IV (C) II and III (D) II and IV (E) III and IV
80. Which of the following statements about the Calvin cycle is true?
- I. Sugarcane opens stomata on days, while pineapple opens stomata at nights.
- II. On hot and dry days, sugarcane is more efficient to fix CO_2 than rice.
- III. Rubisco is an enzyme involved in the first major step of carbon fixation in rice; its substrate molecules are ribulose-1,5-bisphosphate and CO_2 and its product is a three-carbon compound.
- IV. Sugarcane and pineapple can use phosphoenolpyruvate carboxylase to capture more CO_2 into a four-carbon compound in mesophyll cells.
- (A) I and II (B) II and III (C) III and IV (D) I, II, and III (E) I, II, III, and IV

後醫-英文

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
答案	C	E	A	C	E	A	B	D	E	A	C	B	A	D	B	A	D	A	A	A
題號	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
答案	A	C	C	D	B	A	B	A	E	A	D	A	B	B	E	B	C	A	D	B
題號	41	42	43	44	45	46	47	48	49	50										
答案	B	C	B	D	A	C	B	A	D	C										

後醫-有機化學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
答案	B	B	C	C	A	B	B	B	E	A	B	C	E	E	D	A	E	B	D	C
題號	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
答案	D	A	B	C	D	B	A	C	E	A	C	E	D	D	C	C	A	A	D	E
題號	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
答案	C	B	A	D	C	A	C	C	A	A	C	B	A	C	C	C	B	A	B	A
題號	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
答案	E	A	D	D	B	B	E	E	A	B	B	D	B	D	E	C	D	C	C	A

後醫-普通生物學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
答案	C	D	A	E	A	C	D	E	B	A	B	B	D	A	A	C	E	E	B	E
題號	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
答案	D	B	A	B	C	A	D	D	A	D	E	C	D	C	C	E	A	B	C	C
題號	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
答案	B	A	B	D	B	B	C	A	C	E	A	E	D	D	A	A	B	C	E	D
題號	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
答案	D	E	C	C	B	E	C	A	B	D	B	E	B	E	B	D	E	A	B	E

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