

高雄醫學大學九十七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，切勿使用修正液(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、非選擇題限黑色或藍色墨水之鋼筆、原子筆或中性筆，在「答案卷」上作答。

三、試題、答案卡及答案卷必須繳回，不得攜出試場。

I. Grammar and Structure: Choose the best answer to complete each sentence. 5 points.

【單選題】每題 1 分，共 5 題，答錯一題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

- No sooner had the supervisor left the warehouse _____.
(A) than the workers began to fight (B) than the works had begun to fight
(C) the workers then have begun to fight (D) as beginning the workers to fight
(E) later began the fight among workers
- That the legal drinking age _____ lowered is a hot topic for debate in many states of the US.
(A) should have (B) should (C) should be (D) which should (E) which should have
- Because it is the last class for Miss Davidson, the sub teacher well-loved by all of the boys, _____.
(A) neither Ian nor his cousins are willing to quit the room
(B) both Ian and his cousins are not willing to leave the room
(C) not only Ian but also his cousins doesn't want to quit the room
(D) neither Ian nor his cousins wants to leave the room
(E) Ian and his cousins all don't want to leave the room
- At the department store's promotion sale last week, _____.
(A) Meg almost got 3000 dollars off all her purchases
(B) Meg nearly saved 3000 dollars for her purchases
(C) approximately 3000 dollars cheaper for Meg's purchases
(D) about 3000 dollars being cut from Meg's purchases
(E) Meg saved almost 3000 dollars for all purchases
- It is not uncommon for outlaws to dye their hair _____.
(A) in case of the police should recognize them (B) so as the police wouldn't recognize them
(C) to avoid being recognizing the police (D) to prevent being recognized by the police
(E) lest the police recognizes them

II. Definition and Synonym: Choose the word or expression that is closest in meaning to the underlined word or expression in each sentence. 15 points.

【單選題】每題 1 分，共 15 題，答錯一題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

- All organisms, regardless of their unique identity, have certain physical characteristics in common.
(A) as a result of (B) considering (C) avoiding (D) whatever (E) in recognition of
- Great vigilance is required from all of us as this is an emergent situation.
(A) courage (B) watchfulness (C) intelligence (D) energy (E) excitement
- At the back of each eye, nerve fibers bundle together to form optic nerves, which join and then split into two optic tracts.
(A) group (B) grow (C) fit (D) branch (E) settle
- I don't have a long walk between classes because the engineering building is adjacent to the chemistry labs.
(A) lies above (B) lies beneath (C) lies next to (D) lies away from (E) lies between
- In order to meet the challenges of the new e-commerce era, this trading company launched a new website last year.
(A) put off (B) triggered off (C) sent off (D) went off (E) got off
- The torrential rains that accompany most hurricanes represent a third significant threat – flooding.
(A) pouring (B) storming (C) drizzling (D) unexpected (E) unforeseen

12. This rise of female subjectivity and autonomy is the inevitable corollary of the feminist movement that started in the previous century.
 (A) consequence (B) impact (C) collaboration (D) development (E) circumstance
13. Robert Butler, the American pioneer gerontologist, underlines the value of life review for the elderly, who sometimes relive and reassess their life through reminiscence of past experiences.
 (A) renewal (B) contemplation (C) recollection (D) repression (E) repetition
14. Regarding the coincidence, the judge expects an unequivocal explanation, without which you'll never be able to clear yourself.
 (A) reasonable (B) unpardonable (C) understandable (D) unintelligible (E) unambiguous
15. Investigating closely into a number of contemporary literary theories reveals that some of them are simply a(n) amalgam of earlier premises.
 (A) culmination (B) rejoinder (C) mixture (D) reiteration (E) resurgence
16. Computer games act as narcotics on children—mesmerizing them, stunting their ability to think, and displacing such wholesome activities as book reading and family discussion.
 (A) prohibiting (B) impeding (C) expediting (D) compelling (E) blurring
17. In the science class today, the visiting professor introduced to us an assortment of insects which have a natural camouflage to hide themselves from the attack of their enemies.
 (A) disguise (B) masquerade (C) shell (D) dwelling (E) semblance
18. Over the years, Mrs. McNaron has gradually developed a passion for gardening chiefly as a temporary respite from the headaches of routine housework.
 (A) diversion (B) escape (C) change (D) remedy (E) relief
19. I just don't see how it possible for the kids to keep in good shape, for sugar is ubiquitous in their diet.
 (A) inevitable (B) common (C) everywhere (D) popular (E) high
20. The great migration of European intellectuals to the United States in the second quarter of the twentieth century prompted a transmutation in the character of Western social thought.
 (A) metamorphosis (B) transgression (C) mobility (D) interference (E) dynamics

III. Vocabulary and Usage: Choosing the best answer to complete each sentence. 30 points.

【單選題】每題 1.5 分，共 20 題，答錯一題倒扣 0.375 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

21. Dengue is ___ to humans by the *Aedes aegypti* (rarely *Aedes albopictus*) mosquito, which feeds during the day.
 (A) transported (B) transmitted (C) transplanted (D) transmuted (E) transformed
22. A ___ pipe or faucet can waste as much as sixteen hundred liters of water each month.
 (A) stuck (B) working (C) leaky (D) slippery (E) stopped
23. ___ language ability, researchers have discovered evidence that apes also possess self-awareness, a feature which has long been considered an exclusive trait of the human race.
 (A) Beside (B) In addition (C) Except (D) Apart from (E) Despite
24. As the policy stands now, lesbians and gays will be barred from US military service if they are open about their sexual ____.
 (A) distillation (B) orientation (C) implication (D) origination (E) disinclination
25. To keep citizens _____ in areas beyond the loudspeakers, quake-prone prefectures are provided with special home radios that pick up emergency broadcasts.
 (A) informed (B) introduced (C) intimidated (D) introspected (E) intuited
26. Calamity Jane spent most of her life in Deadwood, South Dakota, a town ___ for its collection of criminals, alcoholics, gamblers and prostitutes.
 (A) infamous (B) noticeable (C) eminent (D) celebrated (E) widespread
27. The word 'idiot,' referring to someone of remarkable low intelligence, is ___ the Greek word 'idiots,' which simply meant 'private person.'
 (A) resulting from (B) derived from (C) rooted in (D) evolved from (E) established upon
28. A _____ shopping mall is being put up nearby our town. It will be as large as five baseball fields.
 (A) cyclopaedic (B) gigantic (C) extortionary (D) generous (E) impenetrable
29. After a series of experiments and tests, the prize-winning chemist eventually ___ an important discovery in the use of plastics.
 (A) did (B) found (C) made (D) reached (E) had

30. ____, often inherent in creative minds, is very highly esteemed in the field of marketing.
 (A) Incongruity (B) Ingenuity (C) Intuition (D) Integration (E) Integrity
31. A buzzard flying hundreds of feet in the air can see a beetle on the ground, and an owl can hear and home in on the slight rustle of a mouse, a sound ____ to the human ear.
 (A) indistinguishable (B) inaudible (C) unimaginable (D) unintelligible (E) unpredictable
32. Looking for the missing check was like trying to find a _____ in a haystack.
 (A) horse (B) needle (C) straw (D) hair (E) rake
33. Boris wishes to join the international team of ____ in Egypt to study the remains of ruined buildings, ancient tombs and tools.
 (A) archivists (B) architects (C) archaeologists (D) archdeacons (E) anthropologists
34. The tour guide assures the group, saying that most visitors to the Wild Animal Park will have a great time if they follow the signs and do not ____ the marked path.
 (A) stay behind (B) wander away (C) stray off (D) trip over (E) step on
35. The idea that television displaces reading as a form of entertainment—a common ____ about television—is now challenged by a recent study which claims that the amount of time spent watching television is not related to reading ability.
 (A) contention (B) convention (C) phenomenon (D) stereotype (E) practice
36. A renowned professor, best-selling author and popular politician, Richard McDonald led a(n) ____ of lives when he was alive.
 (A) abundance (B) mystery (C) blending (D) myriad (E) microcosm
37. With her very positive comments on my daughter's performance, we ____ a long and friendly conversation about theatrical arts.
 (A) picked up (B) launched into (C) probed into (D) dwelled on (E) started with
38. The American stock market crisis in 1929 led to a _____ and sustaining memory in the history of economics.
 (A) unfledged (B) unforgivable (C) unforgettable (D) unfinished (E) unforeseen
39. To _____ for a free voucher and to enter the prize draw, please make sure that your completed form reaches our agency by July the 31st.
 (A) certify (B) nullify (C) rectify (D) pacify (E) qualify
40. Even though his proposals had been turned down again and again, William told the girl that he would win her love ____.
 (A) by no means (B) by all means (C) by any means (D) in the meantime (E) beyond his means

IV. Reading Comprehension: Choose the best answer. 30 points.

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"Plutoid" is the new classification that has been sanctioned for the object that was formerly known as the "ninth planet." It is nearly two years since the International Astronomical Union (IAU) stripped Pluto of its former status as a "proper" planet. Now an IAU committee, meeting in Oslo, has suggested that small, nearly spherical objects orbiting beyond Neptune should carry the "plutoid" tag.

As astronomy's official nomenclature organization, the IAU must approve all new names and classifications. Its decision at the 2006 General Assembly to demote Pluto from "planet" to "dwarf planet" caused an international furor. Pluto's relegation was felt necessary because new telescope technologies had begun to reveal far-off objects that rivaled the world in size. Without a new classification, these discoveries raised the prospect that textbooks could soon be talking about 50 or more "planets" in the Solar System. That prospect proved too much for IAU members who took the historic decision to redefine the Solar System. They relegated Pluto to a grouping that includes Ceres (the largest asteroid), and Eris, an object slightly larger than Pluto that orbits even further out from the Sun in an icy region known as the Kuiper Belt.

Recently the IAU further explained the plutoid definition as celestial bodies that "have sufficient mass for their self-gravity to overcome rigid body forces so that they assume a hydrostatic equilibrium (near-spherical) shape, and that have not cleared their orbits of debris. The two known and named plutoids are Pluto and Eris. It is expected that more plutoids will be named as science progresses and new discoveries are made." The plutoids will also need to have a minimum brightness. Ceres will not be considered a plutoid because of its position in the asteroid belt between Mars and Jupiter.

The classification will not placate those incensed by Pluto's demotion. Alan Stern, a former NASA space sciences chief and principal investigator on a mission to Pluto, was scathing in his condemnation of the IAU. "It's just some people in a smoke-filled room who dreamed it up," he told the Associated Press. "Plutoids or haemorrhoids, whatever they call it. This is irrelevant."

41. What will be the most appropriate title for the article?
 (A) A Star Is Born (B) From Pluto with Love
 (C) Non-planet Gets New Class (D) The Promotion of Pluto
 (E) NASA versus IAU
42. How many planets are there in the Solar System now?
 (A) 6 (B) 7 (C) 8 (D) 9 (E) 50
43. According to the article, why did IAU deprive Pluto of the status as a planet?
 (A) IAU thought that Pluto is too big in size to be classified as a planet.
 (B) IAU was afraid that there would be too many planets in the Solar System.
 (C) New telescope technologies showed that Pluto was not part of the Solar System.
 (D) IAU thought that Pluto was not bright enough to be a planet.
 (E) IAU thought that Pluto should belong to the Kuiper Belt.
44. According to the article, in addition to Pluto the other known plutoid is _____.
 (A) Uranus (B) Mars (C) Ceres (D) Eris (E) Venus
45. According to the article, what is NOT one of the definitions of plutoids?
 (A) The plutoids must be close to Pluto.
 (B) The plutoids should be big enough to overcome body forces.
 (C) The plutoids need to have certain brightness.
 (D) The plutoids should be of near-spherical shape.
 (E) The plutoids must be part of the Kuiper Belt.

Signitheia Fordham's 1986 ethnographic study of a mostly black high school in Washington, D.C., *Black Students' School Success*, concluded that many behaviors associated with high achievement—speaking standard English, studying long hours, striving to get good grades—were regarded as “acting white.” Fordham further concluded that “many black students limit their academic success so their peers won't think they are ‘acting white’.”

[...]. It seemed to me that certain things I valued—hard work, initiative, articulateness, education—were not solely white people's prerogative.

Trouble begins, however, when students lower their standards in response to peer pressure. Such a retreat from achievement has potentially horrendous effects on the black community.

Even more disturbing is the rationale behind the “acting white” accusation. It seems that, on a subconscious level, some black students wonder whether success—in particular, academic success—is a purely white domain.

In his essay “On being Black and Middle Class,” in *The Content of Our Character* (1990), Shelby Steele, a black scholar at San Jose State University, argues that certain “middle-class” values—the work ethic, education, initiative—by encouraging “individualism,” encourage identification with American society, rather than with race. The ultimate result is integration.

But, Steele argues, the racial identification that emerged during the 1960s, and that still persists, urges middle-class blacks to view themselves as an embattled minority; to take an adversarial stance toward the mainstream. It emphasizes ethnic consciousness over individualism.

Steele says that this form of black identification emerged in the civil-rights effort to obtain full racial equality, an effort that demanded that blacks present themselves (by and large) as a racial monolith: a single mass with the common experience of oppression. So blackness became virtually synonymous with victimization and the characteristics associated with it: lack of education and poverty.

I agree with Steele that a monolithic form of racial identification persists. The ideas of the black as a victim and the black as inferior have been too much entrenched in cultural imagery and too much enforced by custom and law not to have damaged the collective black psyche.

This damage is so severe that some black adolescents still believe that success is a white prerogative—the white “turf.” These young people view the turf as inaccessible, both because (among other reasons) they doubt their own abilities and because they generally envision whites as, if not outspoken racists, people who are mildly interested in “keeping blacks down.”

The result of identifying oneself as a victim can be, “Why even try? It's a white man's world.”

46. In the passage above, one sentence is missing between the first two paragraphs. Which of the following is it?
 (A) Frankly, I never took the “acting white” accusation seriously.
 (B) Honestly, I didn't share Fordham's view that school success meant “acting white.”
 (C) Precisely, I observed that many black students limited their potentials to avoid “acting white.”
 (D) Indeed, I used to believe that school success accounted for the “acting white” accusation.
 (E) Unfortunately, school success was characteristic of Caucasian Americans.
47. Like Fordham's research, in general, an ethnographic study may explore the following topics *except* ____?
 (A) Australian folk medicine (B) Traditional music in Tibet
 (C) higher education in Germany (D) American slave narratives
 (E) Acadian and Creole folklore and mythology
48. Which of the following statements can be validated by the passage above?
 (A) Blackness is synonymous with victimization. (B) Academic achievement is a white prerogative.
 (C) Ethnic consciousness outweighs individualism. (D) Middle-class values encourage segregation.
 (E) Retreat from achievement hampers black community.

49. What can be safely concluded about Shelby Steele?
- (A) He views racial identification as a predictable source of social problem.
 (B) He traces racial identification among blacks back to the civil-rights movement.
 (C) He believes that a monolithic form of racial identification is recommendable.
 (D) He confirms that blacks are largely disadvantaged in mainstream society.
 (E) He feels strongly hostile to white Americans, who are, mostly, racists.
50. What does the author conclude about some black adolescents?
- (A) They are persistent in their racial identity.
 (B) They take an adversative stance towards the mainstream.
 (C) They are mostly low-achievers in academic performance.
 (D) They view themselves as embattled minority.
 (E) They believe that success is unattainable.
51. What would be the best title for this essay?
- (A) The Color of Success
 (B) The White Man's Burden
 (C) Keeping Blacks Down
 (D) Black is beautiful
 (E) Against Acting White

As the belief that God directly controlled and influenced human behavior weakened during the nineteenth century, philosophers tried to construct a science of society, or social science. Social scientists rejected the idea that human activities occur at random, and affirmed instead that all human activities reveal observed regularities or patterns. Gradually, social scientists refined such concepts as social class and kinship to explain these patterns.

By the end of the nineteenth century, the quest for a unified social science was giving way to the rise of the social sciences. As knowledge became more technical and specialized, economists, political scientists, sociologists, anthropologists, and psychologists each pursued different avenues of inquiry into social experience. Although social scientists in one field borrowed ideas from other fields, each field tended to develop its own specialized language, or jargon, and distinctive concepts. What began as an all-encompassing effort to identify a single science of society became an enterprise marked by diversity, specialization, and often fragmentation. Today, the usual list of social sciences includes economics, political science, anthropology, psychology, and sociology. In addition, some view history as a social science.

52. Which of the following words best describes the nature of social sciences nowadays?
- (A) diversified (B) generalized (C) panoramic (D) unified (E) chaotic
53. Which of the following will *not* be included in the curriculum of social sciences?
- (A) political campaign in Europe (B) organizational psychology
 (C) theory of macroeconomics (D) computation and corpus linguistics
 (E) cultures of Latin America
54. Which statement below is incorrect about today's social scientists?
- (A) They refute the idea that events occurring in human society are largely accidental.
 (B) They assert that there are regular patterns in most human activities.
 (C) They employ the ideas of class and kinship to describe human activities.
 (D) They usually stay within the scope of their own ideas in their research.
 (E) They have distinctive concepts and terminologies for their own disciplines.
55. What can we infer from the passage?
- (A) People in the past tended to be faltering in their religious faith.
 (B) There used to be an attempt to search for a single unified social science.
 (C) Social science has branched out widely since it first started in the nineteenth century.
 (D) Human societies were dominated by a supreme being in ancient times.
 (E) People no longer believe in God as knowledge became more specialized.

Given the spate of Jane Austen adaptations, one could be forgiven for anticipating diminishing returns from *Mansfield Park*, a novel that is widely viewed as the author's least satisfying and most intractably moralistic work.

But that would be to reckon without the contribution of Canadian director Patricia Rozema who, disdaining a purist approach, offers some smart and suggestive variations on the usual Regency rituals. Rozema's previous features have all dealt with meek, repressed female protagonists who are initiated into new social and cultural worlds, before attaining self-sufficiency. In this respect, Austen's Fanny, who arrives at Mansfield Park a timid and socially unsure young woman only to become an indispensable member of the household, would seem to be another variant on Rozema's heroines.

Yet the Fanny of Rozema's film is resolutely all the things the Fanny of the novel is not: vivacious, artistic, even sexy—a self-confessed "wild beast." This Fanny is, in fact, something of a hybrid of Austen's heroine and the novelist herself. In Fanny, Rozema creates a screen heroine we can root for, and a film that stands alongside the rest of her oeuvre as a paean to female artistic and romantic independence. Austen's Fanny, as the unimpeachable repository of older, High Tory values, must strike modern sensibilities as something of a prig. Rozema's heroine, on the other hand, is a modern woman oppressed by an antiquated patriarchal society.

To throw this theme into sharper relief, Rozema has chosen to make the slavery issue explicit. Rozema's point is that Mansfield Park, and the amorous escapades of its wealthy inhabitants, are founded on and sustained by this debased form of exploitation. This is certainly an intriguing opening-out of the novel, but in doing so the film appropriates the moral high ground in a way that further distances it from the delicacy and ambiguity of Austen's insights.

56. What is the major point of this article?
- (A) Austen's novels have often been adapted into films.
 - (B) Austen's protagonist in *Mansfield Park* is a carrier of traditional patriarchal values.
 - (C) Rozema's film is completely different from Austen's original novel.
 - (D) Rozema's Fanny is vivacious.
 - (E) Rozema has brought up the issue of slavery in her film.
57. The author claims that "Rozema creates a screen heroine we can root for." Here "root for" is closest in meaning to _____.
(A) apply force to (B) antipathetic to (C) rein in (D) take sides with (E) get to the root
58. This article would be most likely to be read in which of the following courses?
(A) history (B) sociology (C) psychology (D) literature (E) astrology
59. It can be inferred from the first paragraph of the article that _____.
(A) we don't need any more of the film adaptations of Austen's novels
(B) the author did not expect that there could be a good adaptation of *Mansfield Park*
(C) it is not easy to produce a film version of *Mansfield Park*
(D) the author is extremely interested in *Mansfield Park*
(E) the author agrees on the moral position of *Mansfield Park*
60. The article claims that Rozema has chosen to make the issue of slavery explicit because _____.
(A) she really cares about the history of slavery
(B) she thinks that Austen's Fanny is a prig
(C) she thinks that the issue of slavery is antiquated
(D) she wants to highlight how Fanny suffers from patriarchal oppression
(E) she believes that the issue of slavery provides a sharp contrast to Fanny's life in Mansfield Park

V. Writing: Write an essay in which you argue for or against the following statement (in 200 words). 20 points.

As a general rule, professors who have better achievements in research in their academic field usually teach better as well.

You should use your own ideas, knowledge, reasoning, and experience and support your arguments with examples.

高雄醫學大學九十七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，切勿使用修正液(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】1-50 題，每題 1 分，共計 50 分。答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答時，不給分亦不扣分。

1. What type of process can produce coloration differences between a rooster and hens within one species?
(A) balancing selection. (B) directional selection. (C) disruptive selection.
(D) sexual selection. (E) stabilizing selection.
2. The primary cause for the decline in number of sharks and whales:
(A) pollution. (B) habitat loss. (C) habitat fragmentation.
(D) introduced species. (E) over harvesting.
3. Physiological ecologists study
(A) nutrient cycling and energy flow through ecosystems.
(B) exchanges of materials, energy, and organisms between communities.
(C) physiological and anatomical mechanisms by which organisms deal with variation in their physical and chemical environment.
(D) physiological and anatomical mechanisms by which organisms deal with variation in their social environment.
(E) None of the choices are correct.
4. In many species, the females can reproduce by the process of parthenogenesis. Then why do males persist in those species?
(A) defense. (B) to increase the number of offspring produced.
(C) to assist in rearing of the offspring. (D) to decrease the chance of infertility.
(E) to ensure genetic diversity.
5. A group of subpopulations living in spatially isolated patches connected by exchange of individuals among patches is called a
(A) micropopulation. (B) megapopulation. (C) isopopulation. (D) allopopulation. (E) metapopulation.
6. The acidity of the stomach contents triggers the small intestine to secrete a hormone known as
(A) histones. (B) secretin. (C) TSH.
(D) pepsin. (E) cholecystokinin, or CCK.
7. In which blood vessel is glucose concentration likely to vary the most?
(A) coronary arteries. (B) abdominal artery.
(C) hepatic vein, which drains the liver. (D) hepatic portal vessel.
(E) pulmonary veins.
8. Which of the following is an example of countercurrent exchange?
(A) The flow of water across the gills of a fish and that of blood within those gills.
(B) The flow of air within the primary bronchi of a human and that of blood within the pulmonary veins.
(C) The flow of blood in the dorsal vessel of an insect and that of air within its tracheae.
(D) The flow of fluid out of the arterial end of a capillary and that of fluid back into the venous end of the same capillary.
(E) The flow of water across the skin of a frog and that of blood within the ventricle of its heart.
9. What advantage does internal fertilization have compared with external fertilization?
(A) Usually a smaller number of genes are present, which promotes genetic stability.
(B) Usually many offspring are produced, ensuring survival of the species.
(C) The time and energy devoted to reproduction is decreased.
(D) The increased survival rate results in rapid population increases.
(E) The smaller number of offspring often receive a greater amount of parental protection.
10. Which function associated with muscle would be most directly affected by low levels of calcium?
(A) The muscle fiber resting membrane potential. (B) Muscle contraction.
(C) The initiation of an action potential. (D) ATP hydrolysis.
(E) Muscle fatigue.

11. Phylogenetic trees are best described as
 (A) true and inerrant statements about evolutionary relationships.
 (B) the most accurate representations possible of genetic relationships among taxa.
 (C) theories of evolution.
 (D) hypothetical portrayals of evolutionary relationships.
 (E) the closest things to absolute certainty that modern systematics can produce.
12. Estimates of the number of species present in a community
 (A) are not affected by the sampling effort devoted to estimation.
 (B) usually require only limited effort by ecologists.
 (C) can usually be made more easily by sampling only a single indicator taxon.
 (D) are all that is necessary to calculate species diversity.
 (E) must, to be useful, be based on standardized sampling techniques.
13. A major perturbation of the carbon cycle by human activity is associated with
 (A) release of carbon from carbonate rocks.
 (B) release of carbon from fossil fuel deposits.
 (C) removal of carbon from the atmosphere in the industrial production of fertilizers.
 (D) accelerated removal of carbon from the atmosphere by forests.
 (E) respiratory production of CO₂ by the large human population.
14. Which statement about changing ecosystem properties during succession is **FALSE**?
 (A) Biomass increases.
 (B) Soil depths decrease.
 (C) Primary production increases.
 (D) Community respiration increases.
 (E) Stream spiraling lengths decrease.
15. The nuclear genomes of eukaryotes are composed of different categories of sequences. Repetitive sequences are one type of the categories. Which of the following is an example of highly repetitive sequences?
 (A) Histone gene cluster . (B) Ribosomal RNA genes. (C) Homologous genes.
 (D) Alu elements. (E) Multigene families.
16. If the genes of a cell's spliceosomes were mutated so the spliceosomes no longer action normally. Which of the following would occur?
 (A) A functional protein would be produced. (B) Transcription would stop.
 (C) A primary transcript would not be produced. (D) Translation would stop.
 (E) Intron(s) would stay in the mature mRNA.
17. If the homeotic genes are mutated and cannot be expressed in an orchid during flower development. What would be the consequence?
 (A) The orchid will not develop cotyledons.
 (B) The orchid will die.
 (C) The orchid will become dwarf.
 (D) The orchid will develop flowers instead of leaves.
 (E) The orchid will develop leaves instead of flowers.
18. Adenylyl cyclase is to cAMP as _____ is to AMP.
 (A) protein kinase C (B) phospholipase C (C) phosphodiesterase (D) phosphatase (E) Ras
19. For cloning of genomic DNA sequences, yeast artificial chromosome (YAC) and bacterial artificial chromosome (BAC) are two popular cloning vector systems. Which of the following is **NOT** correct?
 (A) A BAC would be circular and a YAC would be linear.
 (B) A YAC would have telomeres and a BAC would not.
 (C) A YAC would have a centromere and a BAC would not.
 (D) A YAC would be bound to histones in the cell and a BAC would not.
 (E) A BAC would contain a much larger DNA insert than a YAC.
20. Which of the following processes does **NOT** occur in the eukaryotic nucleus?
 (A) RNA splicing. (B) RNA polyadenylation. (C) DNA synthesis.
 (D) RNA capping. (E) Production of charged tRNAs.
21. Which of the following is true of chromatin?
 (A) Heterochromatin has more acetyl groups on the histones.
 (B) Heterochromatin has fewer methyl groups on the DNA.
 (C) Active genes are not bound by nucleosomes.
 (D) Sequence-specific DNA binding proteins can only activate transcription.
 (E) The chromatin structure on a particular gene may be different in different cells.

22. In *E. coli*, biosynthesis of tryptophan can be repressed. The repressor protein of the *trp* operon
 (A) is activated by the binding of tryptophan.
 (B) is inactivated by the binding of tryptophan.
 (C) is not affected by tryptophan.
 (D) is activated by the binding of free tRNA.
 (E) is only synthesized in the presence of tryptophan.
23. The major lipids found in membranes are
 (A) triacylglycerols and cholesterol.
 (B) cholesterol and sphingomyelin.
 (C) phospholipids, glycolipids, and cholesterol.
 (D) phospholipids and free fatty acids.
 (E) cholesterol, inositol, and glycolipids.
24. During glycolysis NADH is produced in the cytosol. Under aerobic conditions, what is the primary fate of this NADH?
 (A) It accumulates in the cytosol.
 (B) It diffuses into the mitochondria.
 (C) It transfers its reducing equivalents directly to NADP⁺.
 (D) The reducing equivalents are transferred by a shuttle system to the mitochondrial electron transport system.
 (E) It is used to reduce glucose to sorbitol.
25. Which of the following is **NOT** a post-translational modification?
 (A) Phosphorylation. (B) Glycosylation. (C) Acetylation. (D) Methylation. (E) Ubiquitination.
26. Which one of the following components is **NOT** necessary in an expression plasmid to be useful in the construction of recombinant DNA?
 (A) A multiple cloning site. (B) A tag coding sequence.
 (C) A promoter and a terminator. (D) Multiple cloning sites.
 (E) A coding sequence that is for antibiotic resistance.
27. Inheritance of phenotype sometimes does not directly involving the nucleotide is termed epigenetic inheritance. The epigenetic inheritance
 (A) only refers to genomic imprinting. (B) only effects female offspring.
 (C) only effects male offspring. (D) only refers to X inactivation.
 (E) can result in the expression of different alleles in different generations.
28. Which of the following is a possible application of tandem mass spectrometry?
 (A) Cell-specific gene expression. (B) Gene regulation.
 (C) Elucidation of metabolic pathways. (D) Tumor profiling.
 (E) Determination of the amino acid sequence of a peptide.
29. Which of the following is **NOT** correct regarding homeotic genes?
 (A) Homeotic genes encode transcription factors.
 (B) Homeotic genes are the only genes that contain the homeobox.
 (C) Homeotic genes are found in clusters called complexes.
 (D) The proteins encoded by homeotic genes contain DNA-binding domain.
 (E) Homeotic genes activate other developmental genes.
30. Ribosomes attached to rough ER are the site for synthesis of many types of secretory proteins. Which of the following mechanism is typically used for nascent protein insertion into the mammalian ER membrane?
 (A) Pretranslational. (B) Cotranslational. (C) Post-translational. (D) Cotranscriptional. (E) All of the above.
31. MPF is a cyclin-Cdk complex that was discovered first in *Xenopus* egg. Its activity fluctuates during cell cycle. Which of the following is **NOT** its characteristic?
 (A) Fluctuation of the cyclin concentration is the same as MPF activity.
 (B) The peak of the MPF activity is G₂ phase.
 (C) The peak of the MPF activity is M phase.
 (D) The breakdown of the MPF occurs abruptly during M phase.
 (E) The activity of the MPF promotes mitosis by phosphorylating various proteins.
32. Which of the following human DNA polymerases is responsible for replicating the mitochondrial DNA?
 (A) Alpha. (B) Beta. (C) Gamma. (D) Delta. (E) Theta.

33. Which one is the correct sequence of protein synthesis?
 1. An aminoacyl-tRNA binds to the A site
 2. A peptide bond forms between the new amino acid and a polypeptide chain
 3. tRNA leaves the P site, and the P site remains vacant
 4. A small ribosomal subunit binds with mRNA
 5. tRNA translocates to the P site
 (A) 5,4,3,2,1 (B) 2,4,5,1,3 (C) 4,1,2,5,3 (D) 4,1,3,2,5 (E) 1,3,2,4,5
34. Which one is correct for the description of transposons?
 (A) It occurs only in bacteria.
 (B) Some transposons do jump from one genome location to another, in what is called replicative transposition.
 (C) It plays little or no role in evolution.
 (D) Few can move to many alternative locations in the DNA.
 (E) None of the above.
35. Proto-oncogenes can change into oncogenes that cause cancer, which one can best explain the characteristic of proto-oncogenes?
 (A) *p53* gene and *ras* gene belong to one of proto-oncogenes. (B) Proto-oncogenes are the normal cellular genes.
 (C) Cells produce proto-oncogenes as they age. (D) All of the above.
 (E) None of the above.
36. Which one of modifications is likely to alter the rate at which a DNA fragment moves through a gel during electrophoresis?
 (A) Altering the charges of the DNA fragment.
 (B) Increasing or decreasing the length of the DNA fragment.
 (C) Increasing the concentration of a gel.
 (D) Methylating the cytosine base within the DNA fragment.
 (E) All of the above.
37. Proteomics is a new kind of challenge because
 (A) the number of proteins in humans probably far exceeds the number of genes.
 (B) a cell's proteins differ with cell type.
 (C) proteins are extremely varied in structure and chemical properties.
 (D) some proteins can not be easily analyzed due to their amounts or solubility.
 (E) All of the above.
38. Which of the following is considered an intrinsic isolating mechanism?
 (A) Gametic incompatibility. (B) Sterile offspring. (C) Ecological isolation.
 (D) Timing of courtship display. (E) All of the above.
39. If organisms A, B, C belong to the same phylum, but to different classes and if organism D, E, and F belong to the same class but to different orders, which one of pairs of organisms would be expected to show **the least** degree of structural homology?
 (A) A and B (B) C and F (C) A and F (D) B and D (E) D and F
40. Which one of the statements in the fact that some fungi are **NOT** beneficial to agriculture?
 (A) They recycle nutrients that are linked to dead organic matter.
 (B) They form mycoses on plants.
 (C) They contribute to the initial stages of soil formation from rock.
 (D) They may harbor photosynthetic partners that add nitrogenous compounds to the soils.
 (E) None of the above.
41. Which one of pairs is matched correctly for the germ layers from which animals evolve?
 (A) Ectoderm-muscle. (B) Mesoderm-outer covering.
 (C) Endoderm-internal linings of digestive tract. (D) Mesoderm-nervous system.
 (E) Ectoderm-internal linings of liver and lungs.
42. A plant with high levels of tolerance to heavy metals was applied for mining minerals in potential profitable areas. Such an application of this plant is an example of
 (A) bioremediation. (B) nitrogen fixation.
 (C) helping locate suitable sites for toxic waste storage. (D) minimizing the erosion of soil in arid lands.
 (E) None of the above.
43. Why is nitrogen fixation needed for the growth of some plants?
 (A) Nitrogen fixers are sometimes symbiotic with legumes.
 (B) Nitrogen fixation can only be done by certain prokaryotes.
 (C) Nitrogen fixation can produce metabolic energy for plants' growth.
 (D) Fixed nitrogen is a limiting factor for plant growth.
 (E) Nitrogen-fixing capacity is varied in many different plants.

44. Which one is true of micronutrients in plants?
 (A) Overdoses of them can not be toxic.
 (B) They generally help in catalytic functions in the plants.
 (C) They are not required for a plant to grow from seed.
 (D) They are essential elements of small size and molecular weight.
 (E) They are the elements required in relatively big amounts.
45. How might a plant respond to cold stress **EXCEPT**
 (A) an alteration of membrane lipids.
 (B) the production of a specific solute “plant antifreeze” that reduces water loss.
 (C) excluding ice crystals from the interior walls.
 (D) converting of the fluid mosaic cell membrane to a solid mosaic one.
 (E) increasing the proportion of unsaturated fatty acid in the membranes.
46. Which one of the statements is **FALSE** for digestion and absorption of fat?
 (A) The requirement of emulsification.
 (B) The absorption of fat in the stomach.
 (C) The entrance of lymphatic system of the absorbed fat.
 (D) The hydrolysis of fat by lipase.
 (E) None of the above.
47. The function of plasma proteins is **NOT** related to which one of the following?
 (A) Oxygen transport. (B) Immune responses.
 (C) Transport of water-insoluble lipids. (D) Maintenance of blood osmotic pressure.
 (E) Blood clotting.
48. Which statement about the complement is true?
 (A) These proteins are involved in innate immunity only.
 (B) These proteins can be induced after the invasion of pathogens into the humans.
 (C) These proteins can only defense against the bacteria’s infection.
 (D) These proteins are selectively antimicrobial proteins.
 (E) None of the above.
49. Melatonin can participate in which one of the following items?
 (A) Skin pigmentation. (B) Monitoring day length. (C) Biological rhythms.
 (D) Reproduction. (E) All of the above.
50. Based on the gene and protein sequences that follow, what type of mutation-polypeptide effect has occurred?
 Normal gene: ATGGCCGGCCCGAAAGAGACC
 Mutated gene: ATGGCCGGCACCGAAAGAGACC
 Normal protein: Met-Ala-Gly-Pro-Lys-Glu-Thr
 Mutated protein: Met-Ala-Gly-Thr-Glu-Arg-Asp
 (A) Base addition-silent. (B) Base addition-none. (C) Base addition-missense.
 (D) Base addition-nonsense. (E) Base addition-synonymous.

II. 【單選題】 51-75 題，每題 2 分，共計 50 分。答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答時，不給分亦不扣分。

51. What distinguishes a coelomate animal from a pseudocoelomate animal is that coelomates?
 (A) have a body cavity completely lined by mesodermal tissue, whereas pseudocoelomates do not.
 (B) have a complete digestive system with mouth and anus, whereas pseudocoelomates have a digestive tract with only one opening.
 (C) have a gut that lacks suspension within the body cavity, whereas pseudocoelomates have mesenteries that hold the digestive system in place.
 (D) contain tissues derived from mesoderm, whereas pseudocoelomates have no such tissue.
 (E) have a body cavity, whereas pseudocoelomates have a solid body.
52. The pathway leading to the perception of sound begins with the hair cells of the organ of Corti,
 (A) which rests on the tympanic membrane, coming in contact with the tectorial membrane.
 (B) which rests on the tectorial membrane, coming in contact with the basilar membrane.
 (C) which rests on the basilar membrane, coming in contact with the tectorial membrane.
 (D) which comes in contact with the tectorial membrane as a result of fluid waves in the cochlea causing vibrations in the round window.
 (E) which stimulates the tectorial membrane neurons leading to the auditory section of the brain.

53. A drug might act as a stimulant of the somatic nervous system if it
 (A) increases the sensitivity of the postsynaptic membrane to acetylcholine.
 (B) increases the release of substances that cause the hyperpolarization of the neurons.
 (C) stimulates the activity of acetylcholinesterase in the synaptic cleft.
 (D) makes the membrane permanently impermeable to sodium.
 (E) increases the sensitivity of the presynaptic membrane to acetylcholine.
54. Which of the following word pairs are **MISMATCHED**?
 (A) Random distribution: aggressive interaction.
 (B) Clumped distribution: attraction to a common source.
 (C) Regular distribution: antagonistic behaviors.
 (D) Large scale distribution: substantial environmental changes.
 (E) Small scale distribution: insignificant environmental changes.
55. Why would a scientist choose to use DNA analysis rather than isozyme analysis when investigating genetic variations?
 (A) Smaller sample size can be used for DNA analysis.
 (B) Repeat sampling over a period of time is possible.
 (C) Non-injurious to the organism.
 (D) Non-lethal.
 (E) All of the choices are correct.
56. Which of the following ecosystems has the highest net primary production ($\text{g/m}^2/\text{yr}$):
 (A) Estuary. (B) Swamp and marsh. (C) Algal beds and reefs.
 (D) Tropical rain forest. (E) Temperate deciduous forest.
57. The frequency of antibiotic resistance increases in human populations which is the result of:
 (A) balancing selection. (B) disruptive selection. (C) directional selection.
 (D) sexual selection. (E) stabilizing selection.
58. Bioinformatics is the application of computational methods to the storage and analysis of enormous volumes of biological data. What is the BLAST program in NCBI which has been described by many biologists as the single most important tool in bioinformatics?
 (A) It is the tool to find out ESTs (expressed sequence tags).
 (B) It is the tool to figure out the protein-protein interaction.
 (C) It is the tool to translate the coding sequence.
 (D) It is the tool to align the sequences.
 (E) It is the tool to look the protein 3D structure.
59. Which of the following enzyme(s) is/are involved in the human nucleotide excision repair of UV-induced pyrimidine dimers?
 1. endonucleases 2. DNA ligase 3. DNA polymerase 4. photoreactivating enzyme (DNA photolyase)
 (A) 1. (B) 1 and 3. (C) 2 and 4. (D) 1, 2 and 3. (E) All of them.
60. Which of the following statement regarding the transcription initiation and RNA Pol I is **NOT** true?
 (A) The regulatory sequences include a core element and an upstream element.
 (B) RNA Pol I is responsible for synthesizing tRNAs and 5S-rRNA.
 (C) An active Pol I initiation complex contains multi-protein complexes assembled in order.
 (D) RNA Pol I is responsible for synthesizing rRNA.
 (E) RNA Pol I itself is a multi-subunit complex.
61. Which of the following is **NOT** a characteristic of microRNAs?
 (A) MicroRNAs are found in eukaryotes including animals and plants.
 (B) MicroRNAs regulate gene expression by degradation of specific mRNAs.
 (C) MicroRNAs regulate gene expression by translational inhibition of specific mRNAs.
 (D) MicroRNAs usually act as negative regulator of gene expression.
 (E) MicroRNAs can function when they are short double-stranded RNA.
62. Stigmasterol, ergosterol, bile acids, vitamin D, cholesterol and share all the following common features **EXCEPT**
 (A) four-ring structure.
 (B) a carboxylic acid group.
 (C) contain asymmetric structure.
 (D) an extending carbon chain derived from the ring structure.
 (E) a hydroxyl group on first ring.
63. Meiosis is a special type of cell division. Which of the following mechanism(s) occur during meiosis guarantees that each haploid germ cell will have a unique combination of gene alleles that is distinct from each parent as well as every other haploid germ cell generated?
 (A) Recombination. (B) Reassortment. (C) Duplication. (D) A and B. (E) A, B and C.

64. Which of the following statements is true of *Trichomonas vaginalis*?
 (A) It is a prokaryote. (B) It lacks true mitochondria. (C) It has mitochondria.
 (D) It infects the human gastrointestinal tract. (E) It has cilia.
65. The rate of an enzyme catalyzed reaction:
 1. can be determined by measuring the increase in product concentration with respect to time.
 2. is usually dependent on temperature and pH.
 3. at saturating substrate concentrations, becomes zero-order with respect to substrate.
 4. is independent of the enzyme concentration.
 (A) 1. (B) 1 and 3. (C) 2 and 4. (D) 1, 2 and 3. (E) All of them.
66. Which one **FALSELY** describes a genomic library?
 (A) A genomic library must be performed with a restriction enzyme, a DNA ligase, and a reverse transcriptase.
 (B) A genomic library contains only coding sequences.
 (C) Plasmids can be used the cloning vector for making genomic libraries.
 (D) A genomic library is a “shotgun” approach-no single gene is targeted for cloning.
 (E) None of the above.
67. The ostrich and the emu look very similar and live in similar habitat. However, they are not very closely related. This is an example of
 (A) sympatric speciation. (B) divergent evolution. (C) exaptation.
 (D) adaptive evolution. (E) None of the above.
68. Which one of the statements about the domain of Archaea is correct?
 (A) They must inhabit solution are nearly 30 % salt.
 (B) They must not adapt to waters with temperatures above the boiling point.
 (C) Based on DNA analysis, they are probably more closely related to bacteria than to eukaryotes.
 (D) Archaeal cell walls are composed of peptidoglycan.
 (E) None of the above.
69. Which of the following groups is matched with its members?
 (A) Proteobacteria-diverse gram-positive bacteria.
 (B) Chlamydias-extracellular parasites.
 (C) Spirochetes-helical heterotrophs.
 (D) Gram-positive bacteria-diverse pathogens whose endotoxins are components of their membrane.
 (E) Cyanobacteria-solitary and no photosynthesis.
70. Lichens sometimes reproduce asexually using
 (A) soredia. (B) ascocarps. (C) basidiocarps.
 (D) conidophores. (E) aseptate fugal hyphae.
71. Which one of the statements is **INCORRECT** for the major difference between ectomycorrhizae and endomycorrhizae?
 (A) Endomycorrhizae but not ectomycorrhizae form a dense sheath over the surface of the root.
 (B) Ectomycorrhizae are found in about 90% of plant families.
 (C) Ectomycorrhizae do not penetrate root cells, whereas endomycorrhiza grow into the invaginations of the root cell membranes.
 (D) A and B only.
 (E) A, B and C.
72. Auxin can be functioned as **EXCEPT**
 (A) herbicides. (B) the detection of photoperiod.
 (C) formation of adventitious roots. (D) phototropism.
 (E) cell elongation.
73. What does the infected plant produce in response to the attacking of a pathogenic fungus?
 (A) Phytoalexins. (B) Phytochrome. (C) Statoliths. (D) Antisense RNA. (E) None of the above.
74. It is estimated that humans can produce over 1.5 million different types of antibodies. Which of the following statements regarding this extraordinary variation is correct?
 (A) V and J domains of antibody light chains are randomly joined.
 (B) Random segments of DNA can be removed from antibody genes.
 (C) V and J domains of antibody heavy chains are randomly joined.
 (D) Cytosines in the variable regions of antibody genes can be converted to uracils via hypermutation.
 (E) All of the above.
75. Blue flower color (B allele) is dominant to white (b allele). In a population plants with white flowers (bb) are at a frequency of 0.04. What frequency of the alleles are for white flower color (b)?
 (A) 0.04 or 4%. (B) 0.16 or 16%. (C) 0.2 or 20%. (D) 0.8 or 80%. (E) 0.96 or 96%.

高雄醫學大學九十七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,切勿使用修正液(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. Choose one correct answer for the following questions

【單選題】每題 1 分,共計 60 分,答錯一題倒扣 0.25 分,倒扣至本大題零分為止,未作答,不給分亦不扣分。

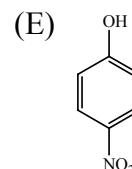
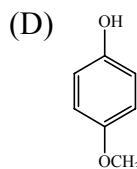
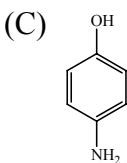
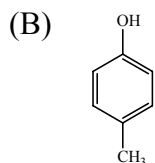
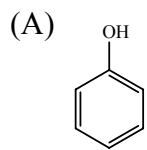
1. Which family of compounds has the lowest pKa value

- (A) alkane (B) alkene (C) alkyne (D) amine (E) alcohol

2. Claisen rearrangement of allyl phenyl ether to o-allylphenol is a sigmatropic rearrangement. This rearrangement is a [x, y] shift and proceeds under what condition.

- (A) [1, 3]; thermal (B) [1,3]; hv (C) [1,7]; hv (D) [3,3]; thermal (E) [3, 5]; hv

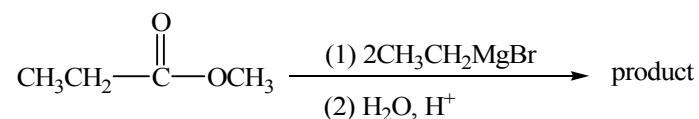
3. Which of the following phenols is the most acidic?



4. Which compound is a free-radical initiator?

- (A) ethyl benzoate (B) isopropyl benzoate
(C) n-propyl benzoate (D) methyl benzoate
(E) azobisisobutyronitrile (AIBN)

5. What product will the following reaction give?



- (A) 3-methyl-3-pentanol (B) 3-ethyl-3-pentanol (C) 3-pentanone (D) ethyl propanoate (E) propanoic acid

6. Which one of the following compounds is a fatty acid?

- (A) $\text{CH}_3(\text{CH}_2)_9\text{COOH}$ (B) $\text{CH}_3(\text{CH}_2)_{11}\text{COOH}$ (C) $\text{CH}_3(\text{CH}_2)_{13}\text{COOH}$ (D) $\text{CH}_3(\text{CH}_2)_{15}\text{COOH}$ (E) $\text{CH}_3(\text{CH}_2)_{16}\text{COOH}$

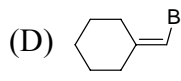
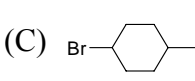
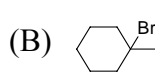
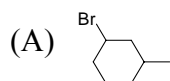
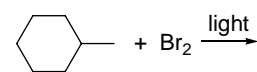
7. Which of the molecules below can hydrogen bond to another of the same compound?

- (A) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ (B) $\text{CH}_3\text{CH}_2\text{COOCH}_3$ (C) $(\text{CH}_3\text{CH}_2)_2\text{CHOH}$ (D) $(\text{CH}_3\text{CH}_2)_3\text{N}$ (E) all of the above

8. Which of the following compounds has the **highest** heat of combustion **per CH₂ group**?

- (A) cyclopropane (B) cyclobutane
(C) cyclopentane (D) cyclohexane
(E) all have equal $\Delta H_{\text{combustion}}$

9. What is the major product of the following reaction?

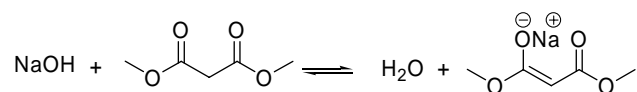


(E) no reaction occurs

10. Which of the following solvents could be described as polar and protic?

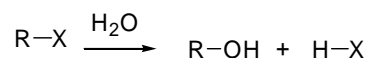
- (A) ethanol (B) acetonitrile (C) dimethylformamide (D) tetrahydrofuran (E) diethyl ether

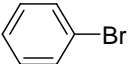
11. To which side (if any) would the following equilibrium lie?



- (A) to the left (B) to the right
 (C) equally to the right and left (D) there is no way to tell
 (E) only $\text{S}_{\text{N}}2$, $\text{S}_{\text{N}}1$ and E2 reactions are possible

12. Which of the haloalkanes below would you expect to most rapidly undergo the reaction shown?



- (A) $\text{CH}_3\text{CH}_2\text{Br}$ (B)  (C) $(\text{CH}_3)_3\text{CBr}$ (D) $(\text{CH}_3)_2\text{CHBr}$ (E) $(\text{CH}_3)_3\text{CCH}_2\text{Br}$

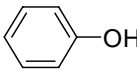

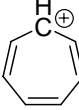

13. A mixture of oct-1-yne, oct-2-yne, and oct-3-yne was hydrogenated in the presence of a platinum catalyst until hydrogen uptake ceased. If one assumes that the hydrogenation went to completion, how many different eight-carbon hydrocarbons were produced?

- (A) 1 (B) 2 (C) 3 (D) 6 (E) 8


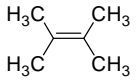
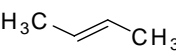
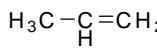
14. Which of the following would you expect to have the **lowest** boiling point?

- (A) $\text{CH}_3\text{CH}_2\text{OH}$ (B) $\text{CH}_3\text{CO}_2\text{H}$ (C) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ (D) $(\text{CH}_3\text{CH}_2)_2\text{NH}$ (E) $(\text{CH}_3\text{CH}_2)_3\text{N}$

15. Which of the following structures, would be classified as anti-aromatic?

- (A)  (B)  (C)  (D)  (E) all of the above





16. Which alkene has the **lowest** heat of hydrogenation $\Delta H^\circ_{\text{hydrog}}$?

- (A)  (B)  (C)  (D)  (E) $\text{H}_2\text{C}=\text{CH}_2$

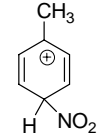
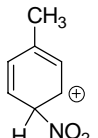
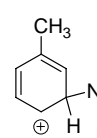
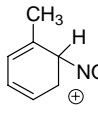
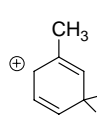
17. Which of the following alkyl halides would be suitable to use when forming a Grignard reagent?

- (A) $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{CN}$ (B) $\text{CH}_3\text{COCH}_2\text{CH}_2\text{Br}$ (C) $(\text{CH}_3)_2\text{NCH}_2\text{CH}_2\text{Br}$ (D) $\text{H}_2\text{NCH}_2\text{CH}_2\text{Br}$ (E) all of the above

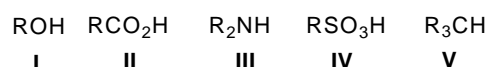
18. Rank the following aromatics in order of decreasing reactivity toward electrophilic aromatic substitution (most reactive > least reactive).

-    
- (A) $\text{A} > \text{C} > \text{D} > \text{B}$ (B) $\text{D} > \text{C} > \text{A} > \text{B}$ (C) $\text{B} > \text{C} > \text{A} > \text{D}$ (D) $\text{D} > \text{A} > \text{C} > \text{B}$ (E) $\text{C} > \text{A} > \text{D} > \text{B}$

19. Which of the following resonance structures is the most stable?

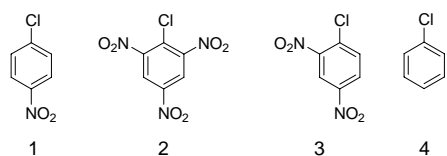
- (A)  (B)  (C)  (D)  (E) 

20. Rank the following in order of decreasing acidity (more acidic > less acidic):



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

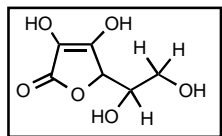
21. How would you rank the following in decreasing order of reactivity toward nucleophilic aromatic substitution? (most reactive on left)



- (A) $4 > 1 > 3 > 2$ (B) $2 > 3 > 1 > 4$ (C) $3 > 2 > 4 > 1$
 (D) $1 > 3 > 2 > 4$ (E) impossible to predict

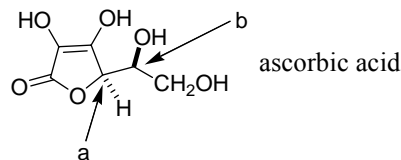
22. When you do an optical-resolution experiment of racemic mandelic acid you have to choose the reagent “_____” theoretically.
- (A) pure achiral alcohol (B) pure racemic alcohol
 (C) pure (*S*)-amine (D) pure racemic amine
 (E) pure achiral amine

23. The following structure is Vitamin C. How many stereoisomers (including optical isomers) of Vitamin C are possible?



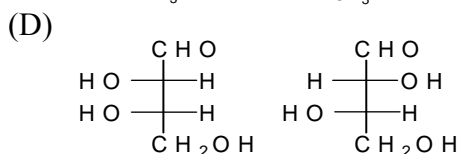
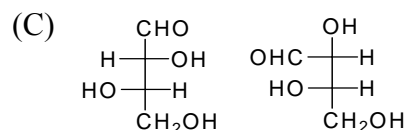
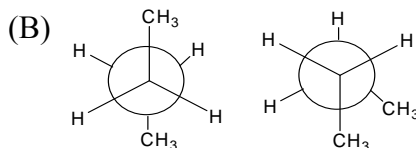
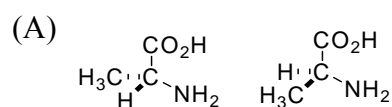
- (A) 2 (B) 3 (C) 4 (D) 6 (E) 8

24. Assign *R* or *S* configurations to the indicated centers in ascorbic acid.



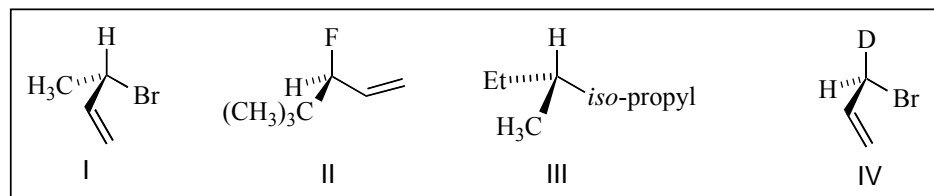
- (A) a = (*R*), b = (*R*) (B) a = (*R*), b = (*S*) (C) a = (*S*), b = (*R*) (D) a = (*S*), b = (*S*) (E) none of them

25. Which of the following pair of compounds theoretically possible to be separated by distillation?



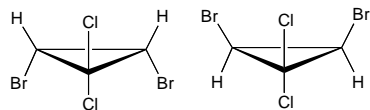
- (E) none of the above

26. Which of the following molecules have the *S* configuration?



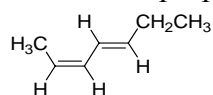
- (A) I, II (B) I, III (C) III, IV (D) I, II, IV (E) all of the above

27. How are the following compounds related?



- (A) diastereomers (B) enantiomers (C) meso compounds (D) optical isomers (E) none of the above

28. What is the proper IUPAC name for the following molecule:

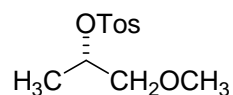


- (A) (*2E,4Z*)-2,4-heptadiene (B) (*2E,3Z*)-2,3-heptadiene
 (C) (*2Z,4E*)-2,4-heptadiene (D) (*2E,4Z*)-2,4-hexadiene
 (E) (*2Z,3E*)-2,3-hexadiene

29. A chiral compound (C_5H_8) upon catalytic hydrogenation yields an achiral compound (C_5H_{10}). What is the best name for the former?

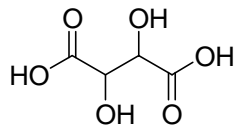
- (A) 1-methylcyclobutene (B) 3-methylcyclobutene
 (C) 1,2-dimethylcyclopropene (D) cyclopentene
 (E) none of them

30. Reaction of the following tosylate in its (S)-form with cyanide ion yields a nitrile product. What is the stereochemistry of the nitrile product?



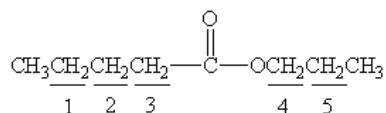
- (A) (S)-form (B) (R)-form (C) racemic form (D) meso form (E) none of them

31. How many total stereoisomer(s) of the following compound is(are) possible?



- (A) 1 (B) 2 (C) 3 (D) 4 (E) 6

32. Which methylene group of the following compound whose chemical shift in NMR spectrum is the largest one, i.e. the most downfield one?

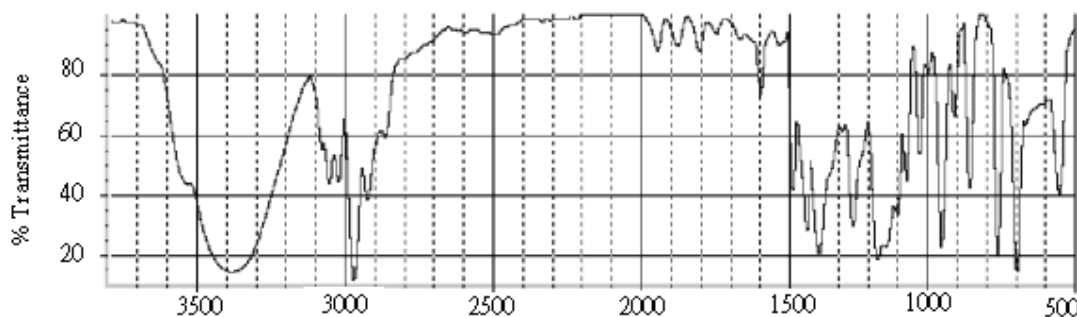


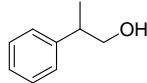
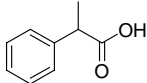
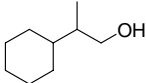
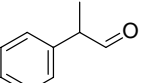
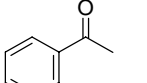
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

33. An NMR spectrometer is 400 MHz for ¹H-NMR spectra. How many MHz is it for ¹³C-NMR spectra?

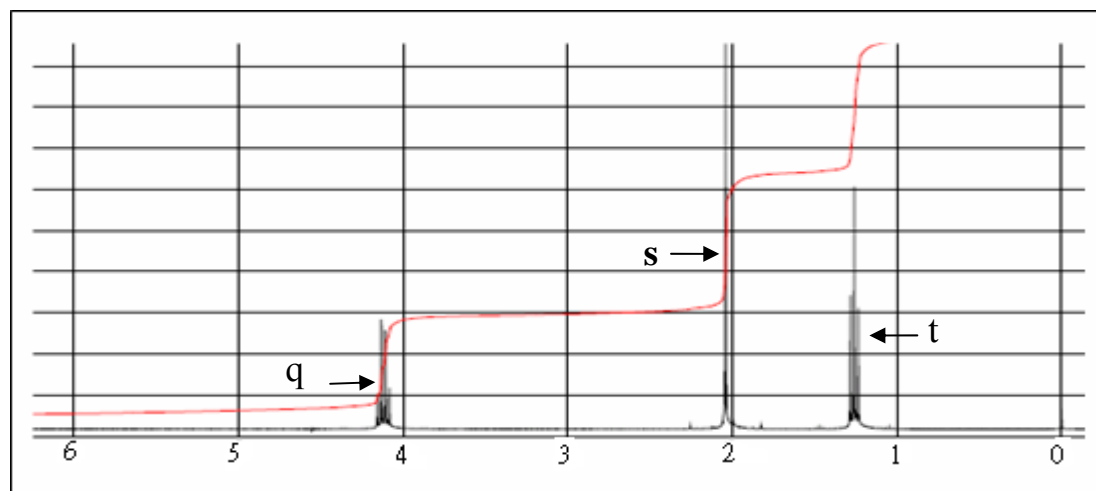
- (A) 400 (B) 300 (C) 200 (D) 100 (E) 50

34. Which of the following structures is consistent with the IR spectra shown below?



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

35. Which of the following structures is consistent with the ¹H NMR spectra shown below?

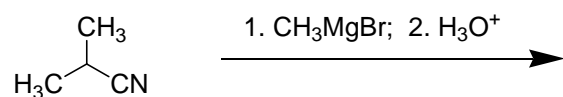


- (A) CH₃CH₂CH₂CH₃ (B) CH₃CH₂OH (C) (CH₃)₂CHOH
(D) CH₃CO₂CH₂CH₃ (E) CH₃CH₂CH₂CO₂H

36. How many signal(s) would be present in the ¹H NMR spectrum of acrylonitrile?

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

37. How many ^1H NMR signal(s) is(are) present for the product of the following reaction?

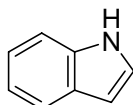


- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

38. Which of the following amino acids does not have an aromatic substructure within its side chain?

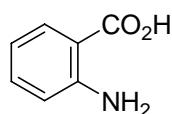
- (A) tryptophan (B) tyrosine (C) phenylalanine (D) histidine (E) leucine

39. The name of the following compound is



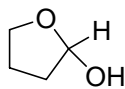
- (A) imidazole (B) pyrrole (C) indole (D) pyrimidine (E) pyridine

40. The name of the following compound is



- (A) anthranilic acid (B) salicylic acid (C) phthalic acid (D) triflic acid (E) adipic acid

41. The best description of the following compound is



- (A) an amide (B) an acetal (C) an ester (D) an ether (E) a hemiacetal

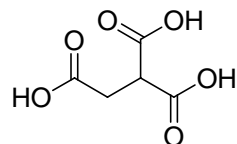
42. What is the correct structure for anisole?

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

43. What is the product of cyclohexene reaction with potassium permanganate ($\text{KMnO}_4, \text{H}_3\text{O}^+$)?

- (A) adipic acid (B) glutaric acid (C) hexanoic acid (D) tartaric acid (E) glutamic acid

44. When the following acid is heated to 230°C , carbon dioxide is evolved and a new compound is formed. What is the new compound?



- (A) malonic acid (B) adipic acid (C) succinic acid (D) glutaric acid (E) oxalic acid

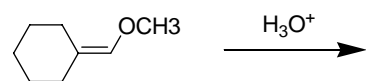
45. One of the following four amines is tertiary. Which one?

- (A) *N*-methylpropanamine (B) propanamine (C) pyrrole
(D) piperidine (E) none of them

46. Cyclopentanone can react with diazomethane to produce

- (A) cyclopentyl amine (B) piperidine (C) cyclohexanone (D) cyclopentanol (E) no reaction

47. What is the product of the following reaction?

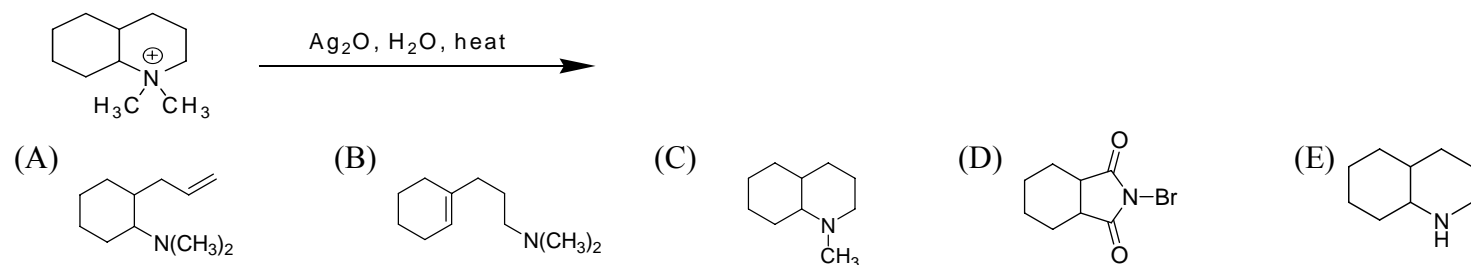


- (A) (B) (C) (D) (E)

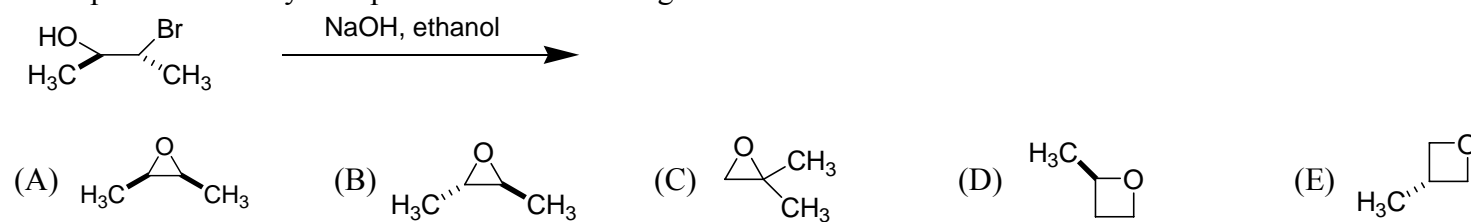
48. Upon heating with aqueous acid, pinacol (2,3-dimethylbutane-2,3-diol) rearranges. What is the product?

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

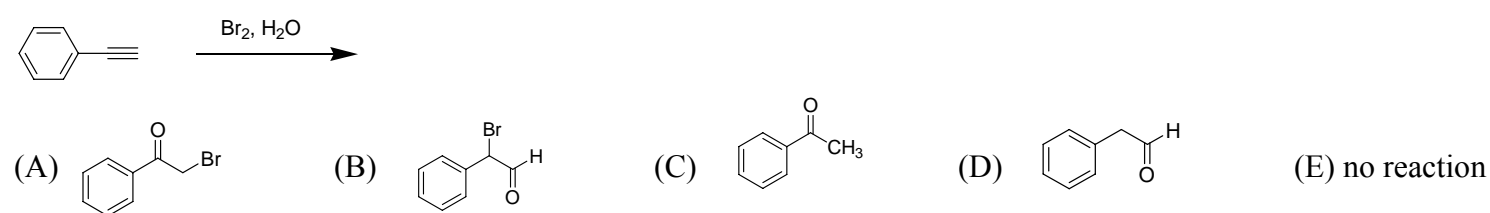
49. Major product of the following reaction is:



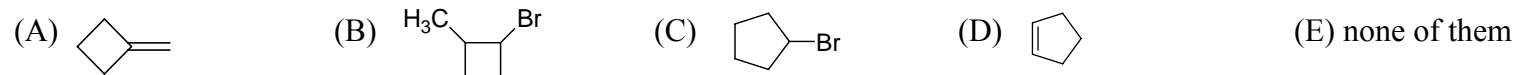
50. What product would you expect from the following reaction?



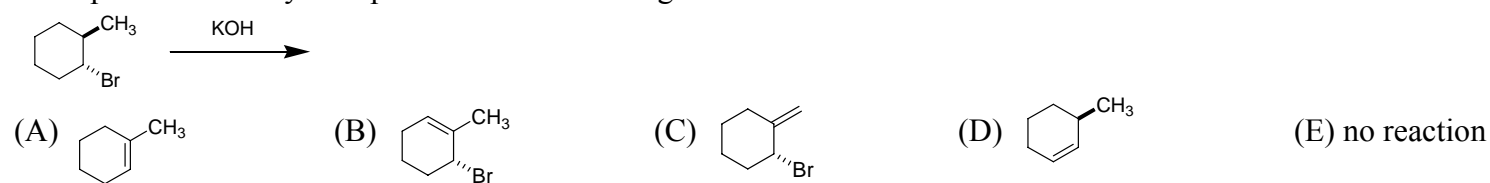
51. What product would you expect from the following reaction:



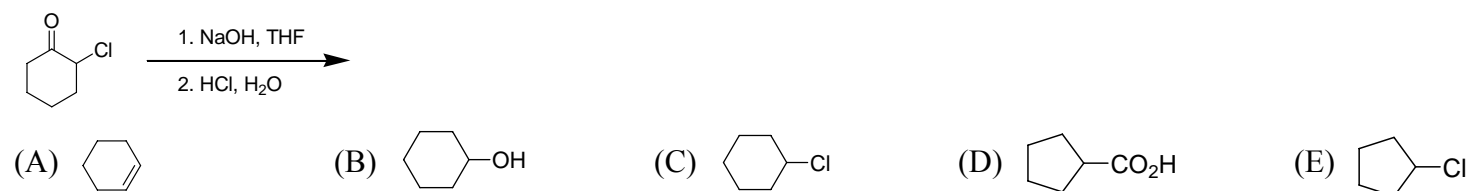
52. Vinylcyclopropane reacts with HBr to yield a rearranged alkyl bromide. What is the structure of the final product?



53. What product would you expect from the following reaction?



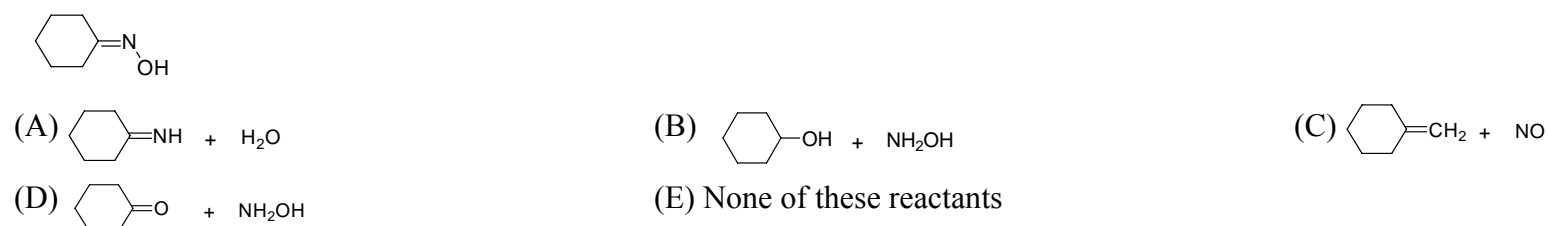
54. What product would you expect from the following reaction?



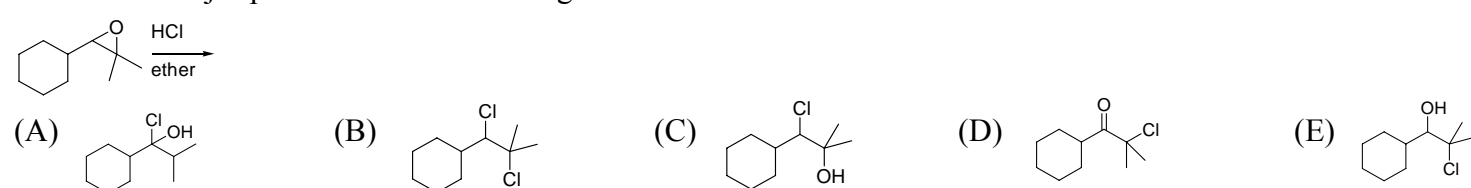
55. Provide the reagents to complete the following transformation.



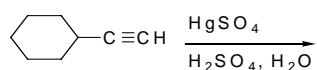
56. What reactants would be required to prepare the oxime shown below?

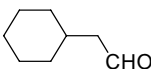
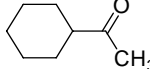
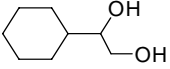
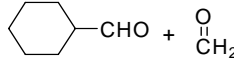
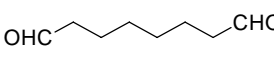


57. What is the major product for the following reaction?

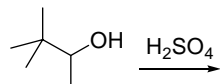


58. What is the major product for the following reaction?



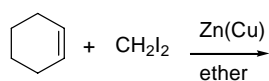
- (A)  (B)  (C)  (D)  (E) 

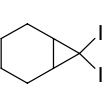
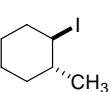



59. What is the major product for the following reaction?



- (A) 2,3-dimethyl-2-butene (B) 2,3-dimethyl-1-butene (C) 3,3-dimethyl-1-butene
(D) 3,3-dimethyl-1-butanol (E) None of the above

60. What is the major product for the following reaction?

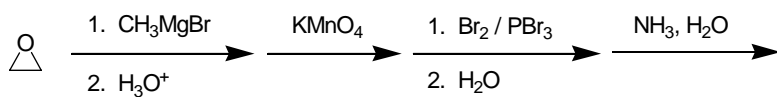


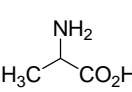
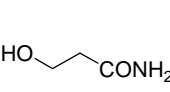
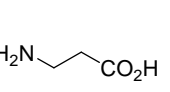
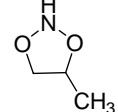
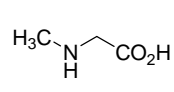
- (A)  (B)  (C)  (D)  (E) 

II. Choose one correct answer for the following questions

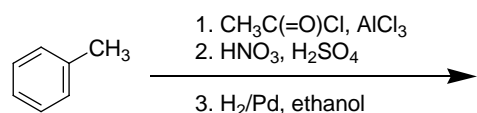
【單選題】每題 2 分，共計 40 分，答錯一題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

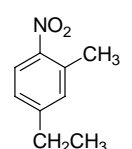
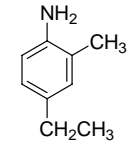
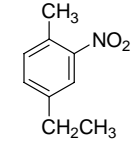
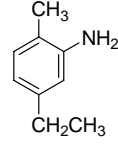
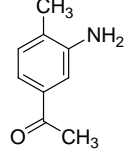
61. What would be the structure of the final product of the following synthesis?



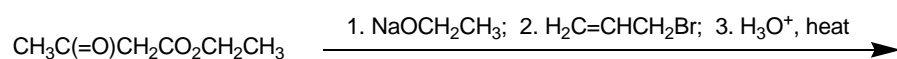
- (A)  (B)  (C)  (D)  (E) 

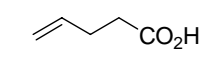
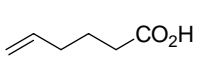
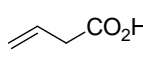
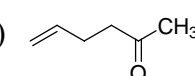
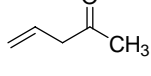
62. The final product of the following synthesis is



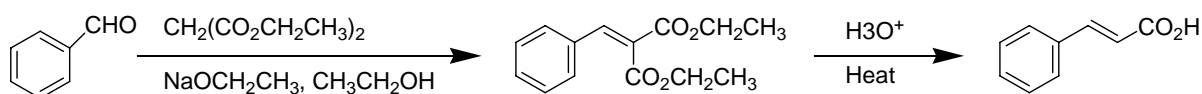
- (A)  (B)  (C)  (D)  (E) 

63. What is the product of the following reaction sequence?



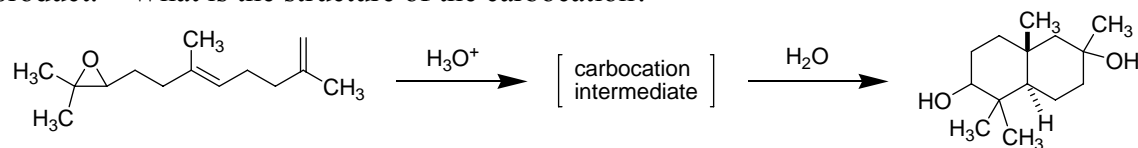
- (A)  (B)  (C)  (D)  (E) 

64. Which of the following statements about the reaction shown below is correct?



- (A) the product name is cinnamic acid
(B) the reaction is called Knoevenagel reaction
(C) one of the starting compound is diethyl malonate
(D) the second step includes an intramolecular decarboxylation
(E) all are correct statements

65. Treatment of the following epoxide with aqueous acid produces a carbocation intermediate that reacts with water to give a diol product. What is the structure of the carbocation?



- (A) (B) (C) (D) (E) none of them

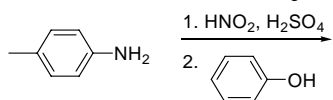
66. Which alcohol has the highest boiling point?

- (A) methanol (B) ethanol (C) n-propanol (D) n-butanol (E) n-pentanol

67. Reduction of 2-butanone with NaBH_4 yields 2-butanol. Which of the following description is **true**?

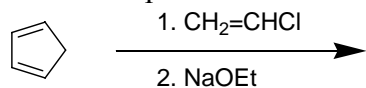
- (A) NaBH_4 is the oxidizing agent.
 (B) 2-butanone ($\text{C}_4\text{H}_8\text{O}$) receives two hydrides from NaBH_4 to form 2-butanol ($\text{C}_4\text{H}_{10}\text{O}$)
 (C) the product contains a chiral center
 (D) the product is optical active
 (E) None of the above

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



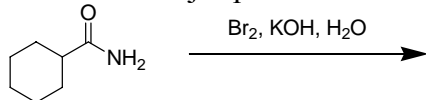
- (A) (B) (C) (D) (E)

69. What is the product structure of the following reaction?



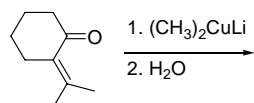
- (A) (B) (C) (D) (E) none of them

70. Predict the major product of the following reaction:



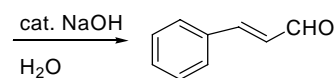
- (A) (B) (C) (D) (E) no reaction

71. What would be the major product from the following reaction?



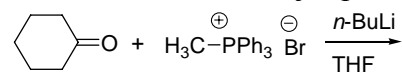
- (A) (B) (C) (D) (E)


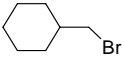
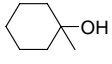
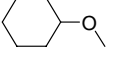
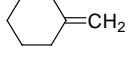
72. What reactants would be used to produce cinnamaldehyde?



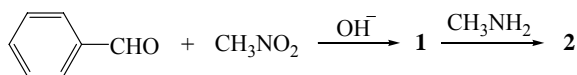
- (A) + H_2CO (B) + CH_3CHO (C) + H_2CO
 (D) + CHO (E) + $\text{CH}_3\text{C(O)CHO}$

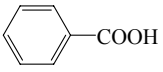
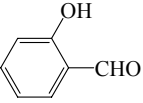
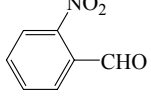
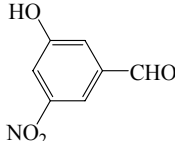
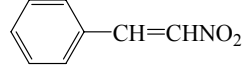
73. What would be the major product from the following reaction?



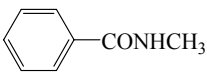
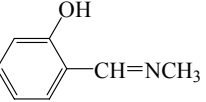
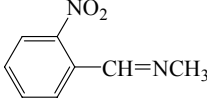
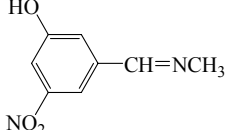
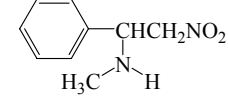
- (A)  (B)  (C)  (D)  (E) 

74. What is the product **1** of the following reactions?

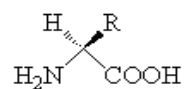



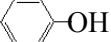
- (A)  (B)  (C)  (D)  (E) 

75. What is the product **2** in the question 74?

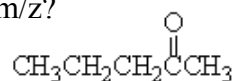
- (A)  (B)  (C)  (D)  (E) 

76. Which α -amino acid is not optical active?



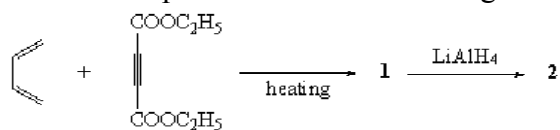
- (A) R=H (B) R=CH₃ (C) R=CH(CH₃)₂
 (D) R=H₂C- (E) R=H₂C-

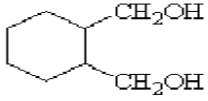
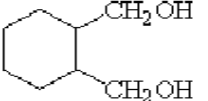
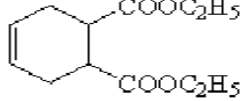
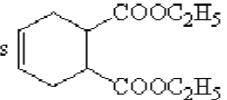
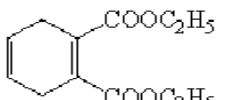
77. A molecular cation is produced by McLafferty rearrangement in the mass spectrum of the following compound. How large is its m/z?



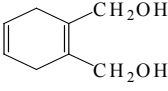
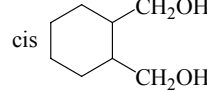
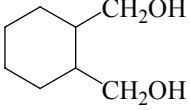
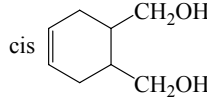
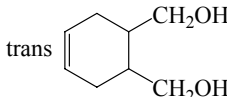
- (A) 44 (B) 56 (C) 57 (D) 58 (E) 60

78. What is the product **1** in the following reactions?



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

79. What is the product **2** in the question 78?

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

80. What is the product of the following reaction?



- (A) $\text{CH}_3\text{C}(=\text{O})\text{CH}_2\text{CH}_2\text{N}(\text{C}_2\text{H}_5)_2$ (B) $\text{CH}_3\text{C}(=\text{O})\text{CH}_2\text{CH}_2\text{OH}$ (C) $\text{CH}_3\text{C}(=\text{O})\text{CH}=\text{CH}_2$
 (D) $\text{CH}_3\text{C}(=\text{O})\text{CH}_2\text{N}(\text{C}_2\text{H}_5)_2$ (E) $\text{CH}_3\text{N}(\text{C}_2\text{H}_5)_2$

