高雄醫學大學 103 學年度學士後醫學系招生考試試題

科目：英文　　考試時間：80 分鐘

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

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

三、試題、答案卡及答案卷必須繳回，不得攜出試場。

I. Vocabulary. 20 points

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

A. Please choose the <u>best</u> answer to match with each underlined word.

1. His way of life may seem a bit **<u>ostentatious</u>**, but his energy and enthusiasm is infectious, and there is nothing snobbish or contemptible about him.
(A) flamboyant (B) insufficient (C) indigent (D) understandable (E) conservative

2. The pyramids illustrate the **<u>ingenuity</u>** of the ancient Egyptians.
(A) cleverness (B) violence (C) tranquility (D) peace (E) offense

3. I am not vain enough to **<u>delude</u>** myself that I can in the few remaining years make an important discovery useful for everyone or can lead a social movement.
(A) confront (B) obscure (C) enclose (D) beguile (E) compete

4. We act **<u>callously</u>** when we disregard or even turn our backs on the needs of the distressed and disadvantaged in our community.
(A) forcefully (B) understandably (C) unfeelingly (D) affectionately (E) impartially

5. While the **<u>dazzle</u>** of the moment is fresh and indeed surreal, Dion’s commitment to her work as an actress is grounded in impressive self-knowledge.
(A) cleanness (B) terror (C) splendor (D) duo (E) command

B. Please choose the <u>best</u> answer to complete each sentence.

6. While stopped at the traffic light, the _____ socialite in her brand new luxury car glanced disdainfully to her left at the beat-up old sedan and at the car’s driver.
(A) supercilious (B) primitive (C) addictive (D) languid (E) gallant

7. The patient _____ with the doctor's orders, doing what the doctor told him to do.
(A) complied (B) defied (C) repudiated (D) broke (E) refilled

8. To keep the discussion focused on realistic possibilities, it is _____ that active researchers in the area participate.
(A) imperative (B) genetic (C) faculty (D) desperate (E) mortal

9. The _____ women travelers described in this book may not have breached the gap between colonizers and the colonized, but through their efforts both were changed in the process of their encounters.
(A) cautious (B) irresolute (C) flitching (D) intrepid (E) imprudent

10. Trying to get around almost any Latin American capital has become more time-consuming in the past decade. There are millions more cars, but investing in roads and public transport has _____ behind.
(A) lagged (B) legged (C) leagued (D) liquored (E) lingered

11. A _____ person is overtly modest in speaking of his or her own qualities and accomplishment.
(A) self-effacing (B) self-efficient (C) self-seeking (D) self-enclosed (E) self-employed

12. In MRI, the patient is placed in the magnetic field, and a pulse of radio waves is generated by antennas _____ around the patient.
(A) recorded (B) positioned (C) pressured (D) replicated (E) cozened

13. My friend Jason complains about his bad temper and serious condition of insomnia, I think that Jason should consult a _____ about his feelings of sadness and anxiety.
(A) philanthropist (B) physicist (C) physiologist (D) psychologist (E) philosopher

14. A study claims that the smell of fear is real, transmissible by direct or indirect contact, and therefore it is _____.
(A) exclusive (B) contagious (C) demanding (D) translucent (E) magnificent

15. The main _____ to development is the country's gigantic foreign debt.
(A) production (B) innovation (C) network (D) federation (E) impediment

16. The silver drinking cups seen in the work are exact _____ of ancient goblets discovered in an archaeological dig, while the discovery of what some believe to be King Philip's grave in 1977 gave the makeup department specific cues.
(A) replicas (B) benches (C) personas (D) authenticities (E) commodities

17. The actor had Lincoln so _____ in his psyche, in his soul, in his mind, that the director would come to work in the morning and Lincoln would sit behind his desk and they would begin the movie.
(A) restrained (B) restated (C) shunned (D) cracked (E) embedded

18. The place, well equipped, comfortable, with first floor balcony and large deck, provides a pleasant _____ for watching the wildlife.
(A) vantage (B) daredevil (C) mount (D) recruitment (E) constraint

19. Like all parents of modest personality, they stopped _____ their desire to shop for themselves when they began to have children and needed to save more money.
(A) intriguing (B) monitoring (C) indulging (D) designating (E) moralizing

20. Such diagnostic failures are treated as anomalous events because they do not conform to _____ patterns, because they divert from standard models.
(A) amused (B) injected (C) amplified (D) projected (E) ejected

II. Grammar and Structure. 20 points

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A. Please choose the <u>best</u> answer to complete each sentence.

21. _____ the philosophy that medicine is a human experience, Dr. Mars placed the course "Medicine in Society" in the core curriculum of the medical school.
(A) Holding (B) Held (C) Having hold (D) To have held (E) To be held

22. K. Danner Clouser warns that medical students _____ by those who live in the medical world are easily trapped in conceptual ghettos, a world segregated from the common world of the patients.
(A) who trained (B) trained (C) have trained (D) have been trained (E) are being trained

23. _____ the opponents of Julius Caesar were steadfast in their struggle against him, the tale of Julius Caesar is filled with ambition, glory, and ultimately, tragedy.
(A) Now that (B) However (C) In terms of (D) In spite of (E) Because of

24. *Catching the Big Fish* comes as a revelation to the legion of fans _____ personal vision, and it is equally compelling to those who wonder how they can nurture their own creativity.
(A) who have longed to better understand the author's
(B) have longed to better understand the author's
(C) with a longing to better understand the author
(D) whose longing to better understand the author
(E) that have better understood the author

25. Human ingenuity and the laws of physics are a dynamic combination which seems to have no limits. The question of whether life and intelligence exist elsewhere in the universe _____ planetary systems are common or a unique aberration of our own star.
(A) results in how (B) builds on where (C) dominated by that (D) hinges on if (E) interacts with that

26. Once you stray outside the mosque, there is nothing more indicative of Arabia than the customs and tradition _____ by Dubai.
(A) wrap up in the life style representing
(B) wrapped up in the life style represented
(C) wrapping up in the life style represent
(D) wrap up in the life style representation
(E) wrapped up in the life style represent

27. _____ calculators makes it harder to succeed in business.
(A) Not know how to use
(B) Not knowing what to use
(C) Not knowing which to use
(D) Not known to use
(E) Not knowing how to use

28. _____, you can succeed at a job interview and get the job you want.
(A) As you following three simple steps
(B) By following three simple steps
(C) By follow three simple steps
(D) By followed three simple steps
(E) By three simple steps follow

29. _____ most climate experts, forest preservation must be part of the world's response to global warming as well.
(A) Above all (B) Despite (C) Other (D) Until (E) According to

30. _____ the field of reputation management is relatively new, it has changed significantly because Yelp, Yahoo and other review sites are making it harder to counter a bad review by posting a positive one.
(A) With (B) While (C) To (D) In (E) At

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

31. In New York City, there lives a man who claims to be (A) a certified leech therapist, and he believes these terrify (B) water-dwelling (C) creatures can help his clients get rid of (D) allergies, fix infertility, and cure other ailments (E).

32. The Bureau of Labor Statistics has drawn (A) up a list (B) of the top ten most dangerous (C) jobs, based on (D) the number of persons killed in various type (E) of work.

33. After years of blogging and tweeting (A) about the hardships of daily life in Cuba to a rapidly expanding (B) international audience, writer Yoani Sanchez launch (C) a digital newspaper (D) on Wednesday, testing (E) the limits of freedom of speech on the Communist-run island.

34. This book is intends (A) to help you select compatible native plants (B) appropriate for (C) your Arizona low desert garden (D) and arrange them in appealing (E) combinations.

35. In their simplest form (A), auctions are events who (B) customers bid on (C) items, and whoever (D) is willing to (E) pay the most gets to take them home.

36. Poverty devastates (A) families, communities (B) and nations; it causes instable (C) and political unrest (D) and fuels (E) conflict.

37. The newspaper is an important means (A) for people to obtain information (B), and its versatile (C) and availability make it (D) the most popular mass medium (E) at all levels of a community.

38. Speech arises not just from the expressive values (A) of the words when join with (B) due respect for logic and syntax (C) but also from my experience of the world (D), other persons and the language I inhabit (E).

39. The majority of (A) Irish immigrants to the United States during the decades (B) immediately before and after (C) the American Revolution of 1776 to 1783 were Protestants from (D) Ulster, Ireland's north provinces (E).

40. If you looked (A) in the articles of the rights of men (B), you would have found your efforts superseded (C), because without equality (D), liberty cannot exist (E).

III. Reading Comprehension. 30 points

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

To some there is nothing so urgent that it cannot be postponed in favour of a cup of tea. Such procrastination is a mystery to psychologists, who wonder why people would sabotage themselves in this way. A team of researchers led by Sean McCrea of the University of Konstanz, in Germany, reckon they have found a piece of the puzzle. People act in a timely way when given concrete tasks but dawdle when they view them in abstract terms.

As the team report in Psychological Science, those who were presented with concrete tasks and information responded more promptly than those who were asked to think in an abstract way. Moreover, almost all the students who had been prompted to think in concrete terms completed their tasks by the deadline while up to 56% of students asked to think in abstract terms failed to respond at all.

Theories abound for why people procrastinate. Some psychologists think that those who delay completing tasks do so because they have low confidence that they will succeed in that task. Perhaps procrastinators are perfectionists or they may just be depressed. Others believe they are impulsive and lack self-control. Earlier research has shown that people defer tasks that are unappealing, difficult or expensive, which is no great surprise.

41. In the first paragraph, the word **"procrastination"** means _____.
(A) discrepancy (B) affiliation (C) carelessness (D) dilatoriness (E) paralysis

42. According to the passage, there are many explanations provided by psychologists on why people procrastinate. Which of the followings is not one of them?
(A) lack of confidence (B) depression (C) diligence (D) lack of self-control (E) low spirit

43. According to the passage, we find _____.
(A) people cannot deal with abstract task
(B) people are more likely to finish their task when they are well-paid
(C) it is nature to malinger
(D) people are more likely to finish concrete task than abstract one
(E) difficulties often prompt people to take the challenge

Some call it hubris; others call it cool reason. But the idea that we might combat global warming by deliberately engineering a cooler climate – for instance, by constructing some kind of planetary sunshade – has lately migrated from the fringe to the scientific mainstream. We are already modifying climate by accident, say proponents of geoengineering; why not do something intentional and intelligent to stop it? Hold on, say critics. Global warming shows we understand the Earth too little to engineer it without intended and possibly disastrous consequences. Both sides worry that facts on the ground – rising seas, melting ice, failing crops – may cut short the geoengineering debate.

44. What is the main idea of this passage?
(A) Geoengineers are taking the step to build a large sun-shade.
(B) We do not have much time for geoengineering debate.
(C) The debate over whether humans can possibly take control over climate change.
(D) Global warming can be monitored.
(E) Planetary sunshade construction is a cutting-edge technology.

45. The tone of the narrator could be described as _____.
(A) energetic (B) incredible (C) pessimistic (D) ironic (E) concerned

Until World War II, a serious spinal cord injury (SCI) usually meant certain death. Anyone who survived such injury relied on a wheelchair for mobility in a world with few accommodations and faced an ongoing struggle to survive secondary complications such as breathing problems, blood clots, kidney failure, and pressure sores. By the middle of the twentieth century, new antibiotics and novel approaches to preventing and treating bed sores and urinary tract infections revolutionized care after spinal cord injury. This greatly expanded life expectancy and required new strategies to maintain the health of people living with chronic paralysis. New standards of care for treating spinal cord injuries were established: reposition the spine, fix the bones in place to prevent further damage, and rehabilitate disabilities with exercise.

The largest proportion of spinal cord injuries (36.5 percent) occurs during car accidents; more than a quarter is the result of falls; and the rest are due to acts of violence (primarily gunshot wounds), sporting accidents, and other less common causes. According to reports, the cost of managing the care of spinal cord injury patients is $3 billion each year, but the average age at injury is 42.6 years, and eighty percent are male.

Today, improved emergency care for people with spinal cord injuries, antibiotics to treat infections, and aggressive rehabilitation can minimize damage to the nervous system and restore function to varying degrees. Advances in research are

giving doctors and people living with SCI hope that spinal cord injuries will eventually be repairable. With new surgical techniques and developments in spinal nerve regeneration, cell replacement, neuroprotection, and neurorehabilitation, the future for spinal cord injury survivors looks brighter than ever.

46. Which is the best title for the essay above?
(A) Spinal Cord Injury: New Drug
(B) Spinal Cord Injury: Hope Through Research
(C) New Medical Resources
(D) How are Spinal Cord Injuries Classified
(E) What Happens When the Spinal Cord Is Injured

47. According to the essay above, which answer is correct?
(A) Scientists expect further development of spinal nerve regeneration in the future.
(B) Most spinal injured survivors are female.
(C) Doctors and scientists have found a solution for serious spinal cord injury.
(D) Women would get injured easily.
(E) Repositioning the spine remains the most difficult problem.

48. Several new surgical techniques will contribute to spinal cord injury survivors, but which technology is NOT discussed in the essay?
(A) spinal nerve regeneration
(B) neuroprotection
(C) neurorehabilitation
(D) cell replacement
(E) heart bracket valve and implanting device

49. Which statement is correct?
(A)Doctors use antibiotics to treat infection problems for spinal cord injury survivors.
(B)Most cases of spinal cord injuries result from violence.
(C)Before World War II, scientist found special cure for spinal cord injury.
(D)A lot of survivors of spinal cord injury do not need to use wheelchair after one year’s treatment.
(E)Treating spinal cord injuries, most doctors do not suggest antibiotics to avoid drug resistance.

50. What does it mean by chronic paralysis?
(A) Loss or impairment of motor function of body for a long time.
(B) Loss of feeling of sympathy in a long term.
(C) Tentative loss of muscle function.
(D) Loss of auditory function.
(E) Loss of life.

Steven Spielberg's career as a director has been one of almost profligate variety: from mechanical sharks to the Normandy invasion, from Indiana Jones to the Warsaw ghetto, not to mention the slave ships, the angry dinosaurs and the second worst Pearl Harbor movie ever made. But every so often he comes back to the figure of a lonely boy facing the incomprehension and cruelty of the adult world.

In the sentimental film *Artificial Intelligence: AI* (2001) based on a futuristic tale, the central character is an 11 year-old highly advanced robotic boy named David. Monica is the woman who adopted him as a substitute for her real son, who remains in cryo-stasis, stricken by an incurable disease. David is living happily with Monica and her husband, but when their real son returns home after a cure is discovered, his life changes dramatically, but David still holds his never-ending love for his "mother." Two thousand years later, David requests to recreate Monica out of her DNA, although she could live for one day only.

The central plot of this story is the experience of David who is to be abandoned and betrayed by his parents who adopted him. Spielberg asks us to identify with a young boy, who exiled from the only home he knows and forced to find his way in a strange and unsympathetic world. Spielberg’s fantasy about human replica probes into the inconsistent nature of human beings. This movie tells you how to feel, especially when we see David, who has a similar yearning like Pinocchio’s, set out to find the blue fairy who will transform him into a real boy.

Movies are not real, but few moviemakers have been as adept at finding original ways to counterfeit human emotion as Spielberg. But here Spielberg confronts a crucial and difficult question: Do the virtual selves we project into the world, on screen and elsewhere, bring us closer to knowing who we are, or do they distract us from our search for that knowledge, what we are and what we will become?

51. The film, *Artificial Intelligence*, directed by Spielberg falls into the genre of _____.
(A) a detective story (B) a ghost story (C) science fiction (D) animated story (E) war history

52. Spielberg wants to probe into several themes and motifs, including _____ .

(A) the nature of human beings
(B) how scientists should work on experiments
(C) why robots can be adopted by humans
(D) how people can find blue fairies
(E) how to cure cryo-stasis

53. According to the description above, which one is correct?
(A) Monica is revived and lived happily with David thereafter.
(B) Monica represents the human beings who do not like robots.
(C) David is a robot boy yearning for friendship.
(D) David is a robot boy thrust into an unsympathetic human world.
(E) David makes a decision by living with the blue fairy.

54. Please describe the film reviewer's commentary toward the film *Artificial Intelligence*?
(A) The film is very realistic.
(B) The film is sentimental.
(C) The film is too blood-thirsty.
(D) The film is illogical.
(E) The film is not comprehensible.

55. What question is to be solved by Spielberg?
(A) Why the Robot Boy needs a Mom?
(B) Why the Robot Boy needs to be reprogrammed?
(C) How does the Robot Boy imitate human Life?
(D) What is the fate of Artificial Intelligence?
(E) Has Spielberg's film let human beings better understand themselves?

IV. Essay Writing. 20 points

Please write a well-organized essay in at least 200 words to express your view on the increase of police force.

In response to recent incidents that haunt the society, from an increasing number of rallies to enhanced security after the Taipei MRT stabbing incident, the government resolves to boost police numbers. This sets off concerns and worries over tolerance of police force turning into abuse of power. During the Sunflower protest in March, for example, the picture of a police officer clubbing unarmed students in protest has set off an alarm of the Ma Administration's turning this country into a police state in which the government exercises rigid and repressive controls over the social, economic, and political life of the population.

Do you agree or disagree with the idea that the boost of police force is the solution to social disturbance? Give specific reasons or examples to support your ideas.

高雄醫學大學 103 學年度學士後醫學系招生考試試題

科目：普通生物學　　考試時間：80 分鐘

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

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

1. An unicellular eukaryote with a siliceous shell and heterotrophic nutrition should belong to _____.
(A) dinoflagellate (B) brown algae (C) amoeba
(D) foraminiferan (E) radiolarian

2. The first stable intermediate produced in the Krebs cycle is _____.
(A) pyruvate (B) FAD (C) acetyl CoA
(D) citrate (E) oxaloacetate

3. The tissue makes up most of the wood of a tree is _____.
(A) primary xylem (B) secondary xylem (C) primary phloem
(D) secondary phloem (E) cork

4. A plant produces a guard cell hormone under water-deficit conditions. Most likely the hormone is _____.
(A) 2, 4-D (B) gibberellin (C) IAA
(D) abscisic acid (E) ethylene

5. Which of the following levels of organization is arranged in the correct sequence from most to least inclusive?
(A) community, ecosystem, individual, population.
(B) ecosystem, community, population, individual.
(C) population, ecosystem, individual, community.
(D) individual, population, community, ecosystem.
(E) community, individual, population, ecosystem.

6. Which of these is NOT considered an amniote?
(A) amphibians (B) reptiles (C) avians
(D) mammals (E) all of the above

7. The number of legs an insect has, and the number of vertebrae in a vertebral column are all strongly influenced by _____ genes.
(A) haploid (B) introns within (C) heterotic
(D) Hox (E) SRY

8. Lichens are symbiotic associations of fungi and _____.
(A) mosses (B) cyanobacteria+ mosses (C) green algae+ mosses
(D) cyanobacteria+ green algae (E) all of the above

9. What are the sporangia of bread molds?
(A) asexual structures that produce haploid spores
(B) asexual structures that produce diploid spores
(C) sexual structures that produce haploid spores
(D) sexual structures that produce diploid spores
(E) asexual structures that produce sporophytes

10. A valid clade must be _____.
(A) monophyletic (B) convergent (C) paraphyletic
(D) polyphyletic (E) divergent

11. An African butterfly species exists in two strikingly different color patterns. This is an example of _____.
(A) directional selection (B) stabilizing selection (C) disruptive selection
(D) sexual selection (E) linkage disequilibrium

12. Gene flow is a concept best used to describe an exchange between _____.
(A) species (B) males and females (C) populations
(D) individuals (E) habitats

13. Optimal foraging as a form of efficient behavior would be favored by _____.
(A) mutualism (B) transduction (C) energy expended
(D) natural selection (E) none of these choices are correct

14. Why might unrelated individuals engage in altruistic acts?
(A) They are trying to mate with each other.
(B) It is possible they may mate with each other.
(C) The altruism is likely to be reciprocated.
(D) Individuals are part of the same large flock.
(E) None of these choices are correct.

15. The idea that humans have a love of life or living systems, coined by E.O. Wilson, is known as _____.
(A) biodiversity (B) the call of the wild (C) the last of the wild
(D) biophilia (E) biotheology

16. Which of the followings is a characteristic of species which occur in the early stages of succession?
(A) Poor seed dispersal
(B) High photosynthetic efficiency in low light
(C) Low resource acquisition
(D) K-selected
(E) Long seed longevity

17. In island biogeography compared to smaller islands, larger islands support _____ species.
(A) more (B) fewer (C) bigger-size
(D) the same (E) smaller

18. How are species-area relationships traditionally plotted?
(A) On a bar graph (B) On a log-log plot (C) On a semi-log plot
(D) As a regular graph (E) As a pie chart

19. Which of the following properties of a river is the closest to the headwaters?
(A) Channel depth (B) Mean flow velocity (C) Bed material grain size
(D) Stream discharge volume (E) Volume of stored alluvium

20. If primary production increases in an ecosystem, it would be reasonable to expect that _____.
(A) nutrients are a limiting factor
(B) gross production would not increase
(C) cellular respiration would decrease
(D) the food web has become more complex
(E) the biomass of herbivores would increase

21. If a forested area surrounding a stream is cleared of trees, what might happen?
(A) Increased import of nutrients to the soil
(B) Decreased rates of soil and rock weathering
(C) Increased run-off of water
(D) Decreased rates of chemical leaching
(E) Increased denitrification

22. Darwin's main conclusions about the origin of species were _____.
(A) all organisms are descended with modification from common ancestors
(B) the mechanism for evolution was natural selection
(C) inheritance is generally particulate
(D) A and B
(E) B and C

23. The Hardy-Weinberg equation states that $p^2 + 2pq + q^2 = 1$; the genotype frequency of heterozygotes is represented by _____.
(A) p^2 (B) 2pq (C) q^2
(D) $p^2 + q^2$ (E) $p^2 + 2pq$

24. Populations are best defined as _____.
(A) all members of a species
(B) all organisms found in an environment
(C) families
(D) metacommunities
(E) groups of interbreeding individuals

25. Which is **NOT** a feature of habitat destruction?
(A) swamp drainage (B) deforestation (C) strip mining
(D) overharvesting (E) river channelization

26. Hamilton's Rule is a calculation of the strength in a population of _____.
(A) sexual selection (B) group selection (C) natural selection
(D) genetic relatedness (E) kin selection

27. What is a major consequence for plants and animals if current predictions of global warming are accurate?
(A) Rates of natural selection will increase at the same pace.
(B) New continental land masses will appear.
(C) Water will be more widely available for plants and animals.
(D) Anticipated changes in climate will occur faster than many organisms can move or adapt.
(E) Many plants and animals will become smaller.

28. Which type of plants keeps their stomata open at night, but closed in the day?
(A) C_3 (B) C_4 (C) CAM
(D) C_3 and C_4 (E) C_4 and CAM

29. If x is the extinction rate of populations in patches per unit time and m is the rate of movement between patches, then, according to Richard Leurs, the proportion of occupied patches in a metapopulation will stabilize over time to _____.
(A) x/m (B) 1 + (x/m) (C) 1 – (x/m)
(D) 1/(x/m) (E) (1+x)/m

30. Allelopathy is _____.
(A) interference competition
(B) the secretion of toxins into the environment by plant roots
(C) intraspecific competition
(D) the transmission of viruses from deer to rabbits
(E) the death of one species from diseases transferred from a second species

31. What is NOT a hypothesis to explain why seed dispersal is so advantageous to plants?
(A) Competition avoidance (B) Predator escape (C) Colonization
(D) Indirect dispersal (E) Directed dispersal

32. If fertilization occurs, the hormone____, which mimics the hormone _____, is produced by the_____.
(A) prolactin, estradiol, anterior pituitary
(B) oxytocin, estradiol, anterior pituitary
(C) inhibin, progesterone, uterus
(D) hCG, FSH, uterus
(E) hCG, LH, placenta

33. Which of the following statements concerning excretory system is **FALSE**?
(A) Urea can be processed by filtration, reabsorption, and secretion during the process of urine formation.
(B) Kidney contributes pH balance in body fluid.
(C) Ascend limb of the loop of Henle is the site for reabsorption of water.
(D) Proximal tubule is the major site for reabsorption of nutrients.
(E) The final concentration of the urine is determined in the collecting duct.

34. The plant hormone that inhibits growth and promotes leaf senescence is _____.
(A) abscisic acid (B) auxin (C) cytokinin
(D) gibberellin (E) strigolactone

35. Which of the following elements is **NOT** macronutrients for plants?
(A) potassium (B) phosphorus (C) calcium
(D) manganese (E) sulfur

36. Pores on the leaf surface that function in gas exchange are called _____.
(A) xylem cells (B) stomata (C) phloem cells
(D) cuticle (E) upper epidermis

37. The cells which allow us to distinguish different colors are _____.
(A) cones (B) rods (C) both cones and rods
(D) only certain rods (E) none of the above

38. Which function is **NOT** controlled by parasympathetic nervous system?
(A) stimulates salivary gland secretion
(B) stimulates activity of pancreas
(C) stimulates gallbladder
(D) stimulates adrenal medulla
(E) stimulate activity of intestine

39. The particular sequence in the template strand of DNA is 5' AGTAAT 3'. The corresponding sequence for the mRNA transcribed is _____.
(A) 3’ AUUACU 5’ (B) 3’ UGAUUA 5’ (C) 3’ AGUAAU 5’
(D) 3’ UAAUGA 5’ (E) 3’ UCAUUA 5’

40. At which phase is centrioles beginning to duplicate in animal cells?
(A) interphase (B) prophase (C) metaphase
(D) anaphase (E) telophase

41. During strenuous exercise, lactic acid is produced by human muscles because of an insufficiency of _____.
(A) NADH (B) NAD (C) ADP
(D) oxygen (E) glucose

42. In _____, a cell engulfs a particle by wrapping pseudopodia.
(A) receptor-mediated endocytosis (B) phagocytosis (C) pinocytosis
(D) exocytosis (E) osmosis

43. If one parent has the blood genotype A i and the other parent has the blood genotype B i, what (is, are) all the possible blood type(s) of their children?
(A) A, O (B) B, O (C) A, B
(D) A, B, O (E) A, B, AB, O

44. The emigration or immigration of fertile individuals from or to a small population may alter the gene pool of the population. This example of a change in allele frequency is best characterized as _____.
(A) natural selection (B) population bottleneck (C) founder effect
(D) gene flow (E) convergent evolution

45. Which of the following structures does **NOT** develop from ectoderm of vertebrates?
(A) epidermis of skin (B) nervous system (C) adrenal cortex
(D) teeth (E) germ cells

46. A given bird has 24 chromosomes in its body cells. How many chromatids will be present in each prospective gamete cell during metaphase II of meiosis?
(A) 6 (B) 12 (C) 24
(D) 48 (E) 96

47. Which of the followings is **NOT** a neurotransmitter?
(A) nitric oxide (B) substance P (C) cAMP
(D) serotonin (E) carbon monoxide

48. Renin is a(n) _____. Its secretion is stimulated by _____.
(A) hormone, high osmolality
(B) hormone, low blood pressure
(C) hormone, low pH
(D) enzyme, high osmolality
(E) enzyme, low blood pressure

49. Carbon dioxide is transported in the blood _____.
(A) dissolved in the plasma (B) attachment to hemoglobin (C) as bicarbonate ion
(D) both A and C (E) all of A, B, and C

50. During photosynthesis, carbon dioxide is incorporated into glucose in _____; water is broken down and oxygen gas produced in _____.
(A) photosystem I; photosystem II (B) Calvin cycle; photosystem II (C) photosystem II; Calvin cycle
(D) Calvin cycle; photosystem I (E) photosystem I; Calvin cycle

51. A nitrogen-containing carbohydrate is _____.
(A) chitin (B) glucose (C) starch
(D) cellulose (E) glycogen

52. Which method **CANNOT** detect the gene expression levels?
(A) Northern blotting (B) RT-PCR (C) DNA microarray assay
(D) *in situ* hybridization (E) SNP

53. In eukaryotic cell, a mature mRNA does **NOT** contain _____.
(A) promoter (B) 5’ CAP (C) 5’ UTR
(D) 3’ UTR (E) poly-A tail

54. Which of the following statements about human immunodeficiency virus (HIV) is **FALSE**?
(A) HIV is double –stranded RNA virus.
(B) HIV is equipped with reverse transcriptase.
(C) It can infect T lymphocytes and cause AIDS.
(D) Its genome serves as template for DNA synthesis and the newly made viral DNA can integrate into the host's chromosome as provirus.
(E) The host's RNA polymerase transcribes the provial DNA into mRNAs and viral genomes.

55. Which of the following statements concerning "genomic imprinting" is **FALSE**?
(A) It is an exception to standard Medelian inheritance.
(B) In many cases, methylation of cytosine involves in genomic imprint during embryo formation.
(C) A given allele will have different effect that depends on father or mother passed along the allele.
(D) Most of the known imprinted genes are critical for embryonic development in mammal.
(E) In heterozygous of normal and recessive mutant *Igf2* gene, the dwarf phenotype can be seen.

56. Which statement about DNA replication is true?
(A) Helicase breaks, swivels, and rejoins the parental DNA.
(B) Topoisomerase unwinds and separates the parental DNA strands.
(C) Primase synthesizes DNA primers, using the parental DNA as a template.
(D) In *E. coli*, DNA polymerase I and II are the main enzymes in synthesis of new DNA.
(E) Okazaki fragments are found both in *E. coli* and eukaryotes.

57. Which of the followings is an extending Mendelian genetics for two or more genes?
(A) pleiotropy (B) epistasis (C) multiple alleles
(D) incomplete dominance (E) codominance

58. If there are 24 chromatids in a mammalian skin cell, how many kinetochores are there?
(A) 6 (B) 12 (C) 24
(D) 36 (E) 48

59. Which of the following statements concerning mitochondria are correct, **EXCEPT _____**.
(A) mitochondrion is a double membrane organelle
(B) both pyruvate oxidation and Krebs cycle are carried out in mitochondria matrix
(C) chemiosmosis can promote ATP hydrolysis
(D) most mitochondria genes are maternal inheritance in human
(E) leber's hereditary optic neuropathy is a mitochondria disorder

60. The bundle branches and Purkinje fibers conduct impulses from the_____.
(A) AV node to the ventricles (B) AV node to the SA node (C) SA node to the atria
(D) SA node to the AV node (E) atria to the SA node

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

61. Which of the following statements is **FALSE**?
(A) The presence of scaffolding proteins can increase the efficiency of signal transduction.
(B) Enzyme cascades amplify the cell's response to a signal.
(C) Inositol triphosphate and diacylglycerol are produced by phospholipase A cleavage of certain kind of phospholipid.
(D) Phosphodiesterase converting cAMP to AMP is one of the ways to terminate the signal.
(E) The activation of cell surface receptors of growth factors may regulate the activity of a specific gene.

62. Regarding photosynthesis, which statement is **INCORRECT**?
(A) Light-harvesting complex may consist of chlorophyll *a*, chlorophyll *b* and carotinoids.
(B) RuBp carboxylase-oxygenase is thought to be the most abundant protein on Earth.
(C) In C_4 pathway, PEP carboxylase promotes CO_2 to be added to malate.
(D) Sugarcane is a kind of C_4 plant.
(E) C_4 plants contain C_4 and C_3 pathways.

63. In a dark environment, plants will grow toward light in a response called phototropism. Which of the followings is an **INCORRECT** statement regarding phototropism?
(A) Phototropism is caused by a chemical signal.
(B) One chemical involved is auxin.
(C) Auxin causes an increase in growth on one side of the stem.
(D) Auxin causes a decrease in growth on the side of the stem exposed to light.
(E) Removing the apical meristem prevents phototropism.

64. The result of double fertilization in angiosperms leads to _____.
(A) formation of both a diploid embryo and triploid endosperm
(B) the endosperm developing into a diploid nutrient tissue
(C) formation of a triploid zygote
(D) two embryos in every seed
(E) the fertilized antipodal cells developing into the seed coat

65. Which type of biome would most likely occur in a climate with mild, rainy winters and hot, dry summers?
(A) desert (B) taiga (C) temperate grassland
(D) temperate broadleaf forest (E) chaparral

66. Which statement is **FALSE**?
(A) Succession is predictable.
(B) Pioneer species have wide ranges of tolerances.
(C) Pioneer plant species are usually small annuals with an abundance of easily dispersed seeds.
(D) The succession that occurs in an abandoned field is primary succession.
(E) Climax species are those that are best adapted to the specific climate where the succession occurs.

67. Which of the followings is a trend in the evolution of land plants?
(A) Decrease in the size of the leaf
(B) Reduction of the gametophyte phase of the life cycle
(C) Elimination of sperm cells or sperm nuclei
(D) Increasing reliance on water to bring sperm and egg together
(E) Increasing spore size

68. Prokaryotic organisms have recently been divided into two domains, Bacteria and Archaea. This division is based on characteristics such as _____.
(A) circular genome
(B) no nucleus or membrane-bound organelles
(C) presence or absence of histones
(D) no introns
(E) all of the above

69. Assuming complete dominance, crosses between two dihybrid F1 plants, which are offspring from a cross AABB x aabb, result in F2 phenotype ratios of _____.
(A) 1:2:1 (B) 3:1 (C) 1:1:1:1
(D) 9:3:3:1 (E) 9:1

70. Inbreeding and small population size of a threatened species can combine to form a downward spiral for the species known as a(n) _____.
(A) extinction vortex
(B) random change of allele frequencies attributable to chance
(C) random mutation
(D) accelerated evolution of new traits
(E) none of the possibilities are correct

71. Which is **NOT** a recognized hypothesis to account for the strong competitive ability of invasives?
(A) Enemy release
(B) Superior competition
(C) Lack of environmental constraints
(D) Propagule pressure
(E) Climate pre-adaptation

72. If a community exhibits lognormal rank abundance, we may conclude there are _____.
(A) a large number of rare species, a large number of common species, and a few species of intermediate rank
(B) a few rare species, a few common species, and a large number of species of intermediate rank
(C) a few rare species and a large number of very common species
(D) a few common species and a large number of rare species
(E) rare species are very common

73. A new menstrual cycle begins with the production of _____, following the removal of inhibition by combination of _____.
(A) GnRH, FSH and LH
(B) GnRH, estradiol and progesterone
(C) LH, estradiol and progesterone
(D) estradiol, FSH and LH
(E) estradiol, GnRH and LH

74. Which of the followings is **NOT** true of G protein-coupled receptors (GPCRs)?
(A) GPCRs are cell-surface transmembrane receptors that work with the help of monomer G proteins.
(B) GPCRs have similar structure in which a single polypeptide has seven transmembrane helices.
(C) Epinephrine can target the same type of GPCR in liver cell and skeletal muscle blood vessel.
(D) G protein systems are involved in cholera and pertussis diseases.
(E) G protein functions as a molecular switch that is either on or off depending on GTP or GDP is attached.

75. Which of the following statements about genome is **FALSE**?
(A) Usually, the gene density of archaea genome is higher than eukaryotes.
(B) Usually, the number of genes of archaea genome is more than eukaryotes genome.
(C) The genome size of archaea is less than eukaryotes.
(D) The number of genes of fruit fly genome is less than *Arabidopsis thaliana* genome.
(E) The number of genes of fruit fly genome is less than *C. elegans* genome.

76. Which of the following statements concerning human embryonic development is correct?
(A) Inner cell mass is a group of cells that cluster at one end of the gastrula.
(B) The trophoblast, the outer epithelium of the gastrula, supports embryo growth.
(C) The trophoblast continues to expand into the endometrium, and four new extraembryonic membranes appear.
(D) By the end of blastocyst, three embryonic germ layers have formed.
(E) By the end of gastrulation, the extraembryonic ectoderm and extraembryonic membranes surround the embryo.

77. Which of the following descriptions about muscle and skeletal system is **NOT** true?
(A) The strength of a muscular contraction is determined by the number of neurons delivering action potentials.
(B) Skeletal, cardiac, and smooth muscle all have transverse tubules.
(C) A hydrostatic skeleton consists of fluid held under pressure in a closed body compartment.
(D) Gap junctions provide direct electrical coupling between the cardiac muscle cells.
(E) Calcium ions cause smooth muscle contraction by binding to calmodulin.

78. The correct sequence of the cardiac cycle in a healthy adult human is _____.
(1. atrial systole and ventricular diastole 2. ventricular systole and atrial diastole 3. atrial and ventricular systole 4.atrial and ventricular diastole)
(A) 1 → 3 → 2 (B) 4 → 1 → 2 (C) 4 → 2 → 1
(D) 2 → 4 → 3 (E) 1 → 4 → 3

79. Which of the following statements concerning hormonal control of digestion is **FALSE**?
(A) Secretin stimulates the pancreas to release bicarbonate.
(B) Cholecystokinin (CCK) stimulates the release of digestive enzymes form the pancreas and of bile from the gallbladder.
(C) Both secretin and CCK act on the stomach to promote secretion of gastric juices.
(D) Secretin and CCK are released from duodenum.
(E) Gastrin is released from stomach and regulates production of gastric juices.

80. Which of the following statements concerning regulation of eukaryotic gene expression is **FALSE**?
(A) DNA methylation can activate or inactivate gene expression.
(B) Acetylation of histone tails promotes condensation of the chromatin.
(C) Enhancers are segments of DNA that may be within an intron.
(D) Unlike operons in *E. coli*, dispersed genes can be coordinately controlled by transcription activators or repressors in eukaryotes.
(E) Alternative RNA splicing can produce different mRNA molecules from the same primary transcript.

高雄醫學大學 103 學年度學士後醫學系招生考試試題

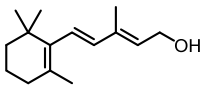
科目:有機化學　　考試時間: 80 分鐘

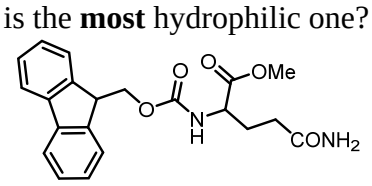
說明:一、選擇題用 2B 鉛筆在「答案卡」上作答，修正時應以橡皮擦擦拭，不得使用修正液(帶)，未遵照正確作答方法而致電腦無法判讀者，考生自行負責。
二、試題及答案卡必須繳回，不得攜出試場。

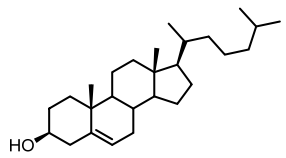
Choose one best answer for the following questions

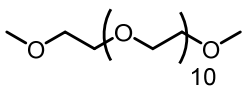
【單選題】每題 1 分，共計 60 分，答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

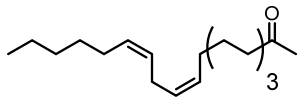
1. Which of the following compounds is the **most** hydrophilic one?

(A) 

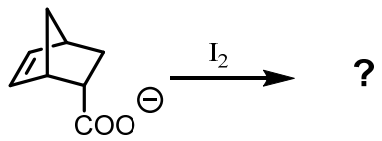
(B) 

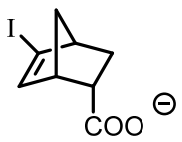
(C) 

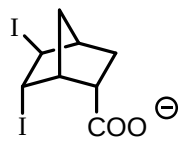
(D) 

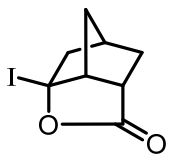
(E) 

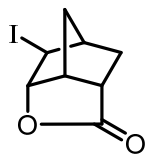
2. Which is the **major** product of the following reaction?

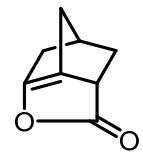


(A) 

(B) 

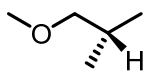
(C) 

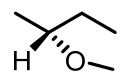
(D) 

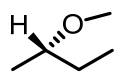
(E) 

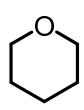
3. What is the **major** product in the following reaction sequence?

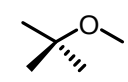
(R) 2-Butanol $\xrightarrow{NaH}$ $\xrightarrow{CH_3I}$?

(A) 

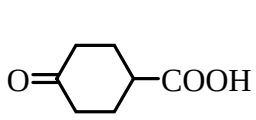
(B) 

(C) 

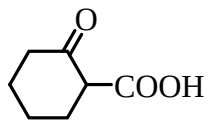
(D) 

(E) 

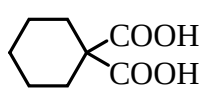
4. Which of the following carboxylic acids would undergo decarboxylation readily when heated?



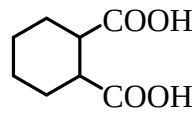
I



II



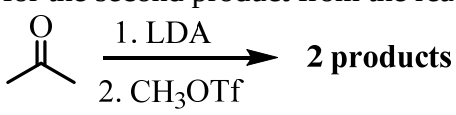
III

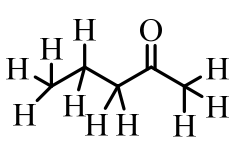


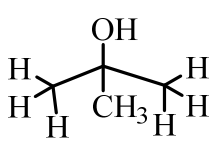
IV

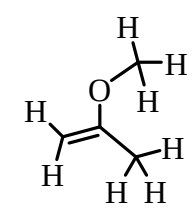
(A) I　(B) II　(C) III　(D) IV　(E) II and III

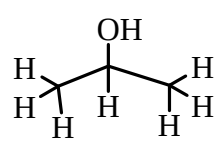
5. Two products can be obtained from the reaction below. One of the product is 2-Butanone. What is the **most** likely structure for the second product from the reaction?

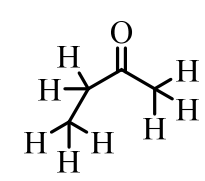


(A) 

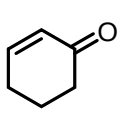
(B) 

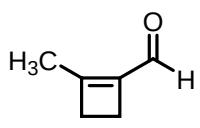
(C) 

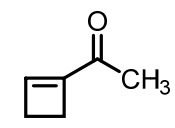
(D) 

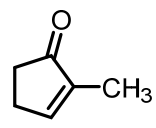
(E) 

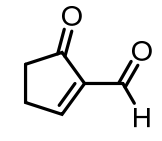
6. The aldol cyclization, followed by dehydration of 5-oxo-hexanal will give which product below.

(A) 

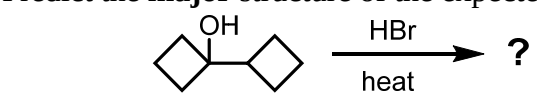
(B) 

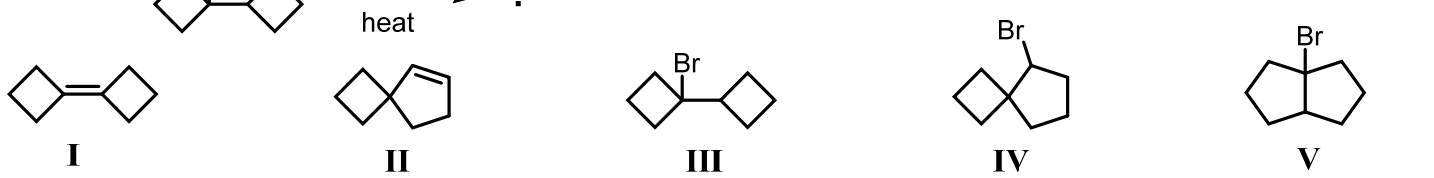
(C) 

(D) 

(E) 

7. Predict the **major** structure of the expected product for the following reaction.

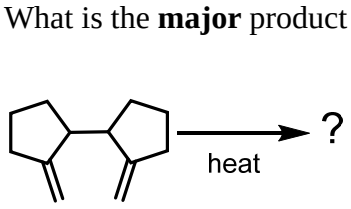


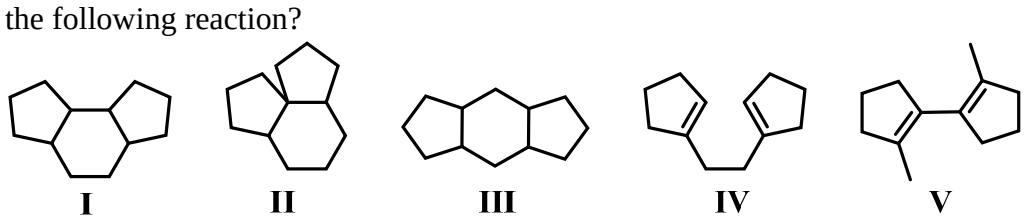


I **II** **III** **IV** **V**

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

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





I **II** **III** **IV** **V**

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

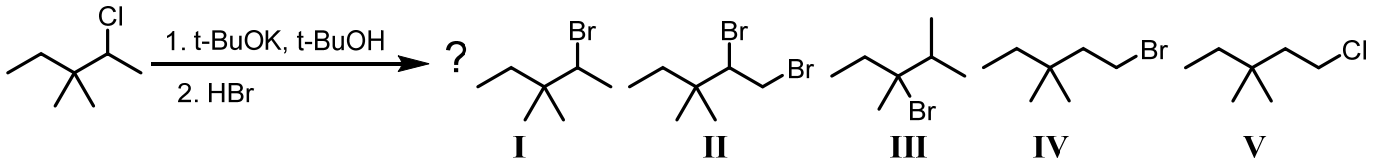
9. Which of the following reaction sequences would convert 2-butanol into 2-deuterobutane?

(A) 1. H_2SO_4, heat 2. BD_3 in THF, then H_2O_2, NaOH
(B) 1. H_2SO_4, heat 2. D_2, Pd/C
(C) 1. PBr_3 2. Mg/ether, then D_2O
(D) 1. PBr_3 2. NaOD, then D_2O
(E) 1. PBr_3 2. NaD in hexane

10. Which of the following factors has **NO** effect on the rate of S_{N1} reactions?

(A) the nature of the alkyl halide
(B) the nature of the leaving group
(C) the concentration of the alkyl halide
(D) the concentration of the nucleophile
(E) the value of the rate constant

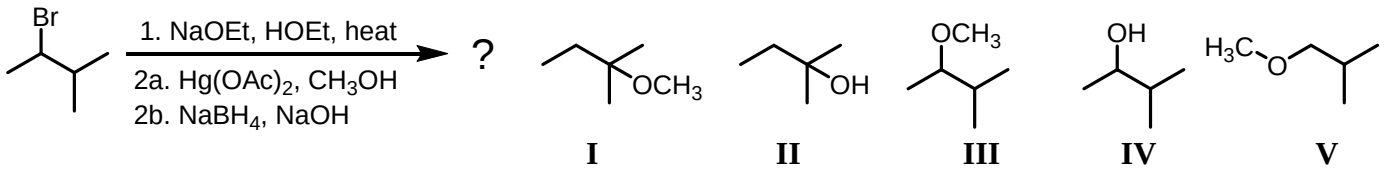
11. What is the expected **major** product of the following reaction sequence?



I **II** **III** **IV** **V**

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

12. What is the expected **major** product of the following reaction sequence?



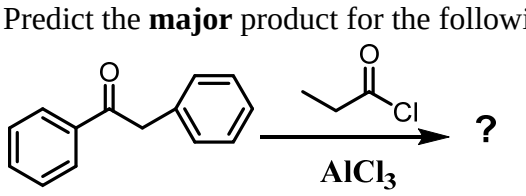
I **II** **III** **IV** **V**

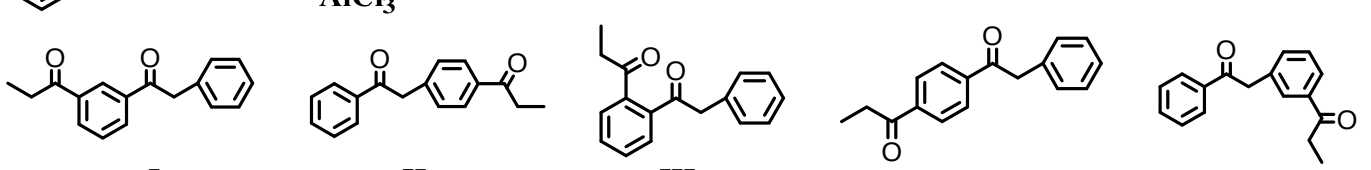
(A) I (B) II (C) III (D) IV (E) V

13. Which one of the following compounds is **NOT** a product of reaction between 1,3-butadiene and HBr?

(A) (S)-3-bromo-1-butene (B) (R)-3-bromo-1-butene (C) (E)-1-bromo-2-butene
(D) (Z)-1-bromo-2-butene (E) (Z)-2-bromo-2-butene

14. Predict the **major** product for the following reaction.

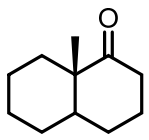




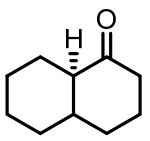
I **II** **III** **IV** **V**

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

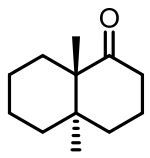
15. Which one of the following compounds would undergo racemization at the α-stereocenter in presence of a base?



I



II



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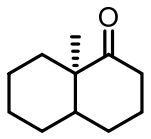
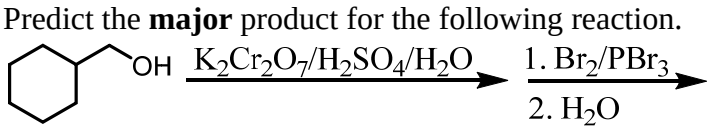
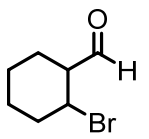


IV

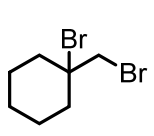
(A) I (B) II (C) III (D) IV (E) None of the above

16. Predict the **major** product for the following reaction.





I



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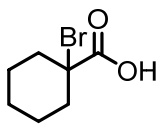

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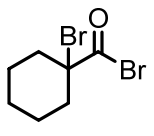

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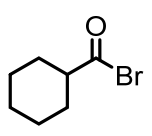
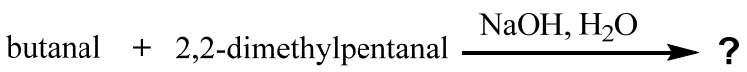
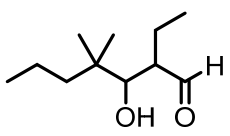


V

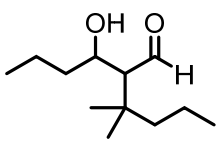
(A) I (B) II (C) III (D) IV (E) V

17. Predict the **major** product for the following reaction.





I



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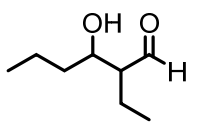

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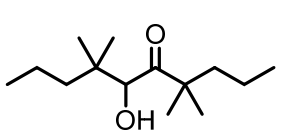

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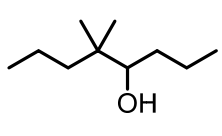
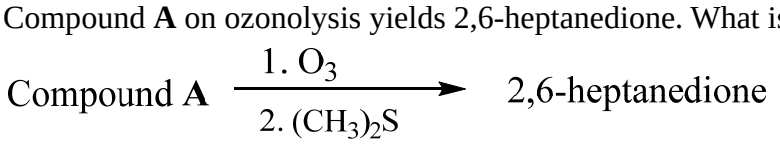


V

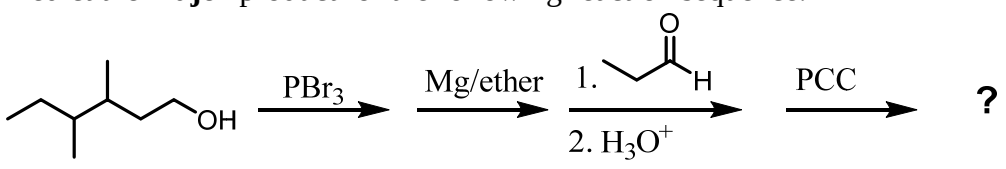
(A) I (B) II (C) III (D) IV (E) V

18. Compound **A** on ozonolysis yields 2,6-heptanedione. What is the structure of compound **A**?



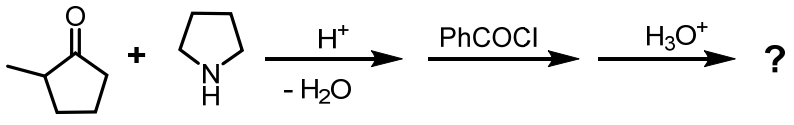
(A) 1,2-dimethylcyclohexene (B) 2,6-dimethylcyclohexene (C) 1,5-dimethylcyclopentene
(D) 1,2-dimethylcyclopentene (E) 2-methyl-1-cyclopentene

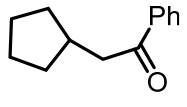
19. Predict the **major** product for the following reaction sequence.

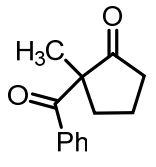


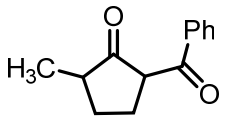
(A) 6,7-dimethyl-3-nonanol (B) 6,7-dimethyl-3-nonanone (C) 6,7-dimethyl-3-nonanal
(D) 3,4-dimethyl-7-nonanol (E) 3,4-dimethyl-7-nonanone

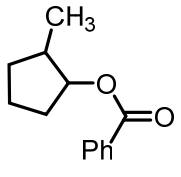
20. What is the **major** product for the reaction sequence below.

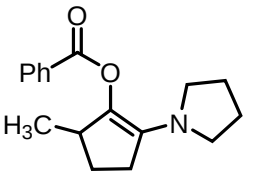


(A) 

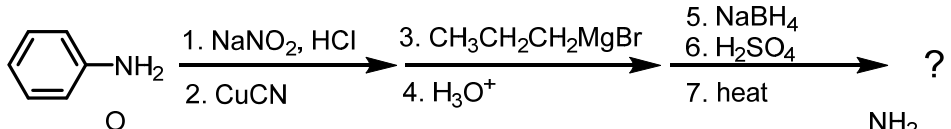
(B) 

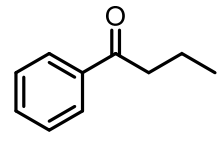
(C) 

(D) 

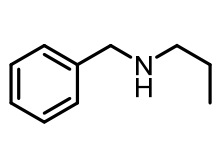
(E) 

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

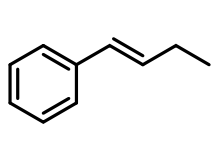




I



II



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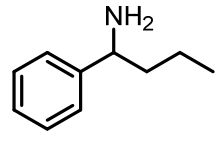

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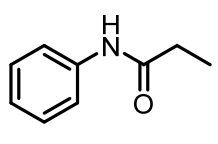
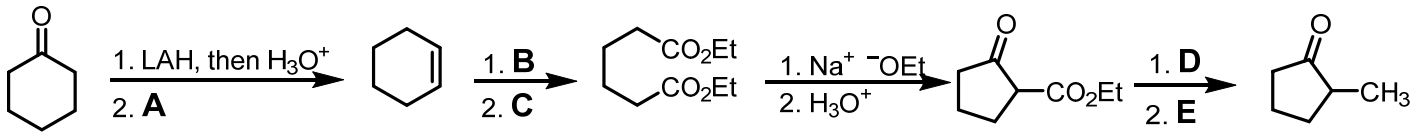


V

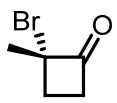
(A) I (B) II (C) III (D) IV (E) V

22. Which reaction condition could **NOT** give the indicated product in the following scheme?



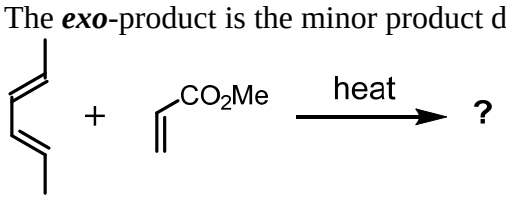
(A) $POCl_3$, pyridine (B) $KMnO_4$, H_3O^+ (C) CH_3CH_2OH, H^+ (D) Na^+ ^-OEt, then CH_3MgBr (E) H_3O^+, heat

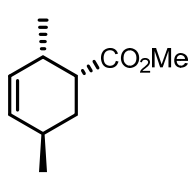
23. What is the **IUPAC** name for the following compound?

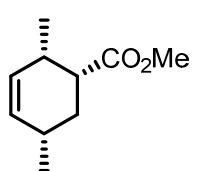


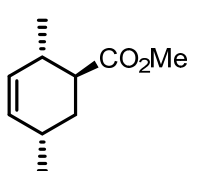
(A) (R)-2-bromo-2-methylcyclobutanone
(B) (S)-2-bromo-2-methylcyclobutanone
(C) (R)-2-methyl-2-bromocyclobutanone
(D) (S)-1-bromo-1-methyl-2-cyclobutanone
(E) (R)-1-bromo-1-methyl-2-cyclobutanone

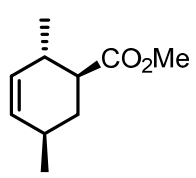
24. The ***exo***-product is the minor product during the 4+2 reaction. Which is the ***exo***-product?

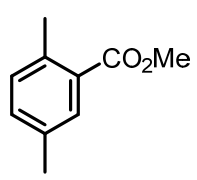


(A) 

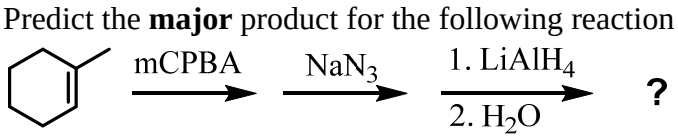
(B) 

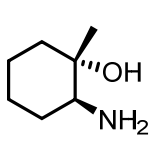
(C) 

(D) 

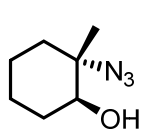
(E) 

25. Predict the **major** product for the following reaction sequence.

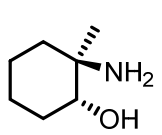




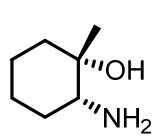
I



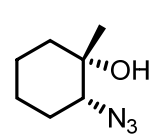
II



III



IV

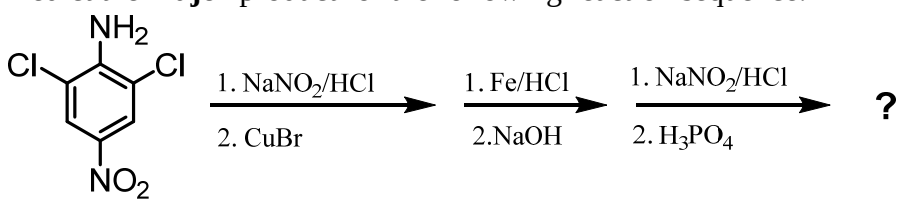


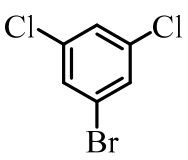
V

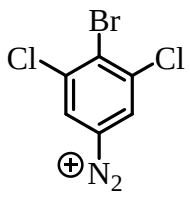
(A) I (B) II (C) III (D) IV (E) V

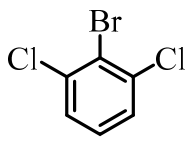
26. Which of these alkyl halides **cannot** be used to prepare amines using Gabriel synthesis?
(A) 1-bromopentane
(B) 1-bromo-3-methylbutane
(C) 2-bromo-3-methylpentane
(D) 1-bromo-2,3-dimethylbutane
(E) 2-bromo-2,3-dimethylbutane

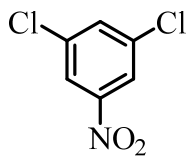
27. Predict the **major** product for the following reaction sequence.

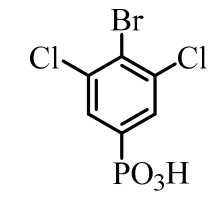


(A) 

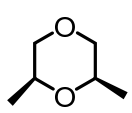
(B) 

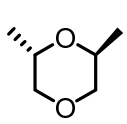
(C) 

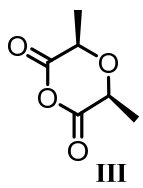
(D) 

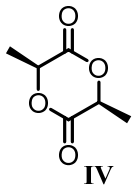
(E) 

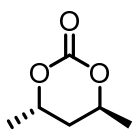
28. Identify which of the structures below are *meso* structures


I


II

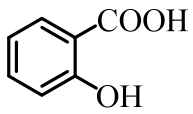

III


IV

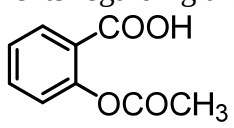

V

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

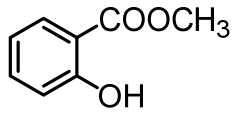
29. Which of the following statements regarding these three compounds is **incorrect**?



I



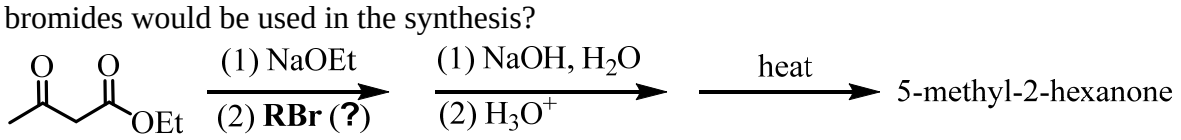
II



III

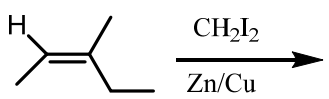
(A) I can be converted to III using methanol and catalytic amounts of H_2SO_4.
(B) I can be converted to II using acetic acid and catalytic amounts of H_2SO_4.
(C) II can be produced from I by reaction with acetic anhydride.
(D) II and I both will react with sodium bicarbonate to evolve carbon dioxide.
(E) II and III are both esters.

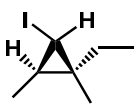
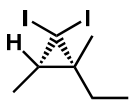
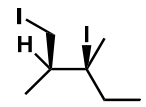
30. The acetoacetic ester synthesis, shown below, can be used to prepare 5-methyl-2-hexanone. Which one of the following alkyl bromides would be used in the synthesis?



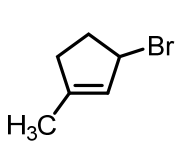
(A) $(CH_3)_2CHBr$ (B) $(CH_3)_2CHCH_2Br$ (C) $(CH_3)_2CHCH_2CH_2Br$
(D) $CH_3CH_2CHBrCH_3$ (E) $(CH_3)_2CBrCH_3$

31. Choose the **major** product of the following reaction.

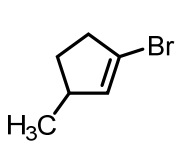


(A) 
(B) 
(C) 
(D) 
(E) 

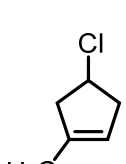
32. Rank the following molecules in order of increasing relative rate of S_N1 solvolysis with methanol and heat (slowest to fastest reacting).



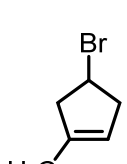
I



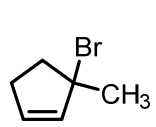
II



III



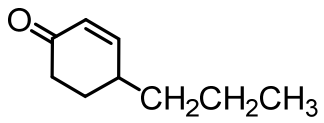
IV



V

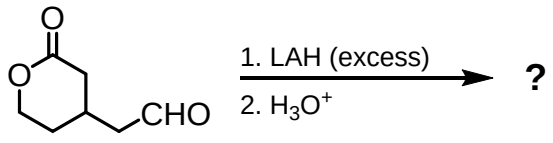
(A) III<II<IV<I<V (B) II<III<IV<I<V (C) I<IV<III<II<V
(D) II<III<IV<V<I (E) I<II<V<IV<III

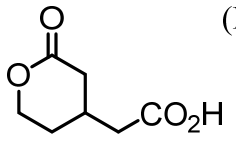
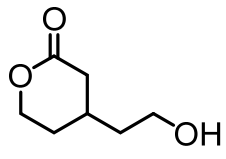
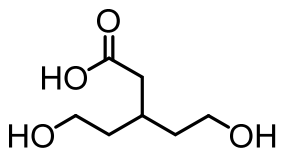
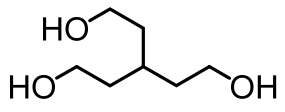
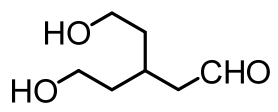
33. Which of the following compounds will react with methyl vinyl ketone in a Robinson annulation to generate the cyclic enone below?



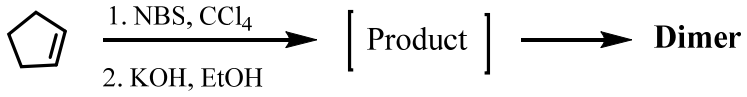
(A) 1-pentene (B) cyclohexanone (C) 2-pentanone
(D) pentanal (E) None of the above

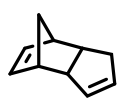
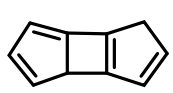
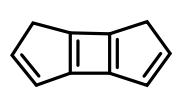
34. Provide the structure of the **major** organic product in the reaction below.



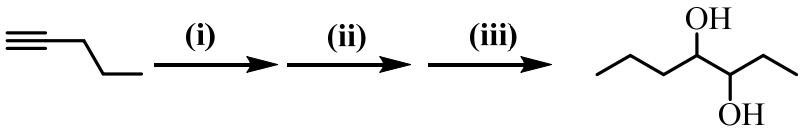
(A) 
(B) 
(C) 
(D) 
(E) 

35. The product of the following reaction immediately undergoes a dimerization at room temperature. What is the structure of the dimer?



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

36. For the following multistep synthesis, choose the **best** reaction conditions to give the desired product?



(A) (i) HBr, (ii) O_3 followed by Zn/H^+, (iii) Li/NH_3
(B) (i) $NaNH_2/NH_3$ followed by CH_3CH_2I, (ii) Lindlar's catalyst/H_2, (iii) OsO_4 followed by $NaHSO_3$
(C) (i) H_2/Pd/C (1 equivalent), (ii) $NaNH_2/NH_3$ followed by CH_3CH_2Br, (iii) $KMnO_4/H_2O$
(D) (i) $HgSO_4/H_2O/H_2SO_4$, (ii) Lindlar's catalyst/H_2, (iii) OsO_4 followed by $NaHSO_3$
(E) (i) Lindlar's catalyst/ H_2, (ii) $NaNH_2/NH_3$ followed by CH_3CH_2Br, (iii) OsO_4 followed by $NaHSO_3$

37. Which sequence of steps below describes the best synthesis of 5-oxohexanoic acid starting with 1-methylcyclopentan-1-ol?

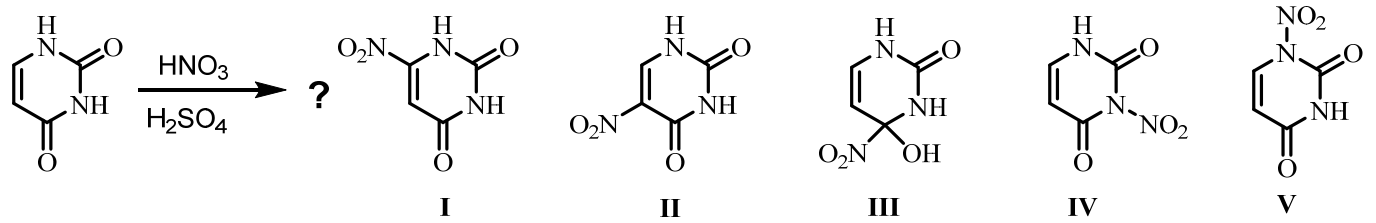
(A) 1. Conc. $KMnO_4$; 2. Dry gaseous HBr; 3. Mg/ether; 4. CO_2
(B) 1. H_2SO_4 and heat; 2. Conc. $KMnO_4$
(C) 1. Conc. $KMnO_4$; 2. CH_3MgBr/ ether; 3. H_3O^+
(D) 1. H_2SO_4 and heat; 2. O_3; 3. $(CH_3)_2S$; 4. PCC
(E) 1. H_2SO_4 and heat; 2. Conc. $KMnO_4$; 3. $LiAlH_4$; 4. H_3O^+

38. Which of the following amines could be formed by reduction of an amide?

(I) benzylamine **(II)** isopropylamine **(III)** aniline **(IV)** triethylamine

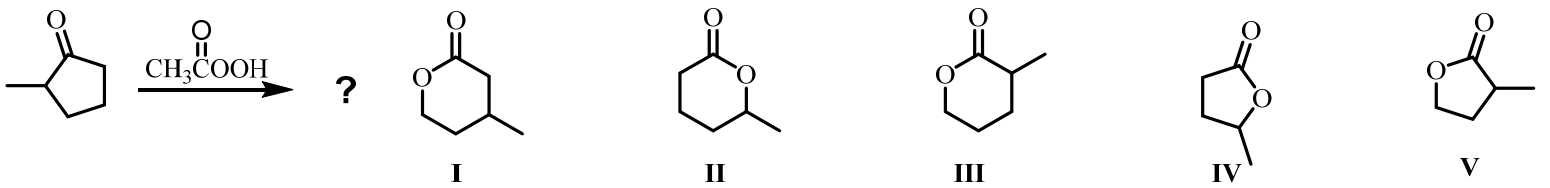
(A) I (B) III & IV (C) I & IV (D) II & III (E) I, III & IV

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



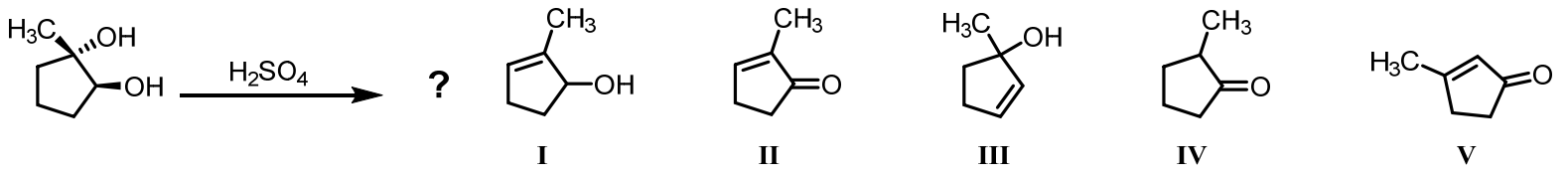
(A) I (B) II (C) III (D) IV (E) V

40. Predict the **major** product of the following reaction sequence.



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

41. Predict the **major** product of the following dehydration reaction.



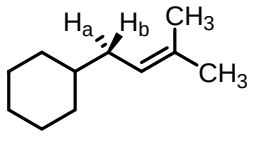
(A) I (B) II (C) III (D) IV (E) V

42. Which of the following oxidants will convert a primary alcohol to an aldehyde?

(**I**) sodium dichromate /sulfuric acid
(**II**) copper oxide
(**III**) pyridinium chlorochromate
(**IV**) dimethylsulfoxide, oxalyl chloride

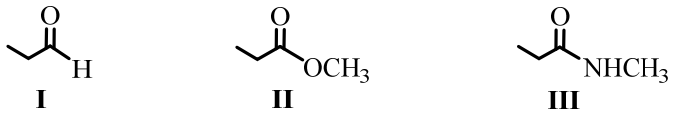
(A) III & IV (B) II, III & IV (C) III (D) I, II, III & IV (E) None of the above

43. Protons H_a and H_b in the following compound are?



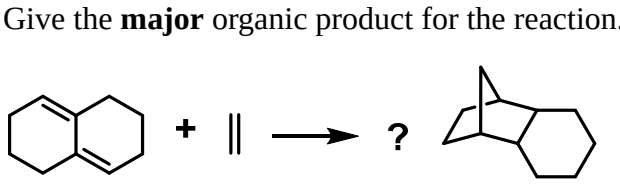
(A) homotopic (B) enantiotopic (C) diastereotopic
(D) mesotopic (E) None of the above

44. Which of the following compounds will **not** display a carbonyl carbon signal in the DEPT-90 and DEPT-135 ^{13}C NMR spectroscopy?

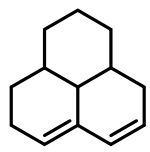


(A) only I (B) only II (C) only III (D) I and II (E) II and III

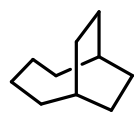
45. Give the **major** organic product for the reaction.



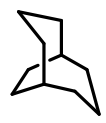
I



II



III



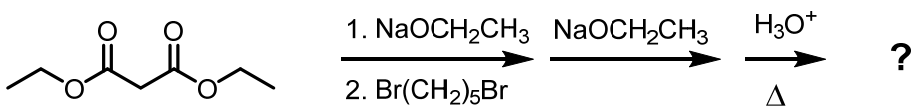
IV

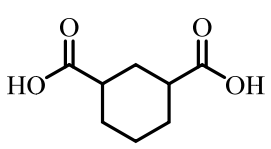
no reaction

V

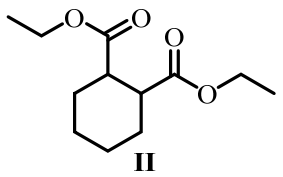
(A) I (B) II (C) III (D) IV (E) V

46. Predict the **major** product for the following reaction sequence.

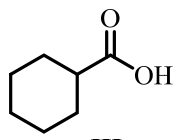




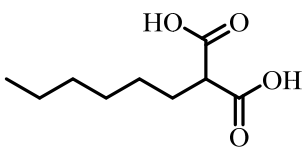
I



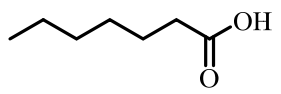
II



III



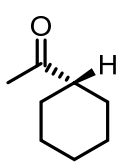
IV



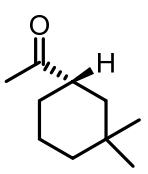
V

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

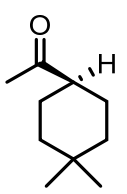
47. Please choose the compound(s) that would undergo racemization in presence of a base?



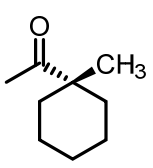
I



II



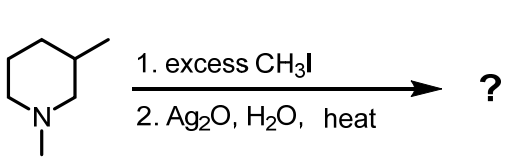
III

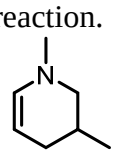


IV

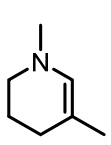
(A) I (B) II (C) III (D) IV (E) II & III

48. Predict the **major** product for the following reaction.

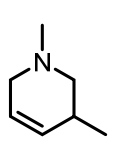




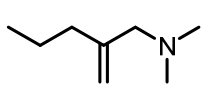
I



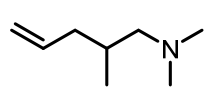
II



III



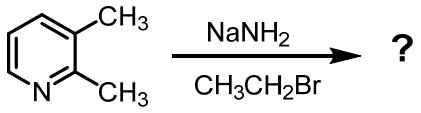
IV



V

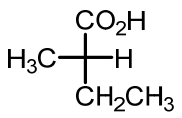
(A) I (B) II (C) III (D) IV (E) V

49. What is the **major** organic product of the following reaction?

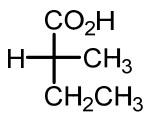


(A) 4-ethyl-2,3-dimethylpyridine (B) 5-ethyl-2,3-dimethylpyridine (C) 6-ethyl-2,3-dimethylpyridine
(D) 2-methyl-3-propylpyridine (E) 3-methyl-2-propylpyridine

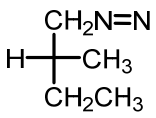
50. Draw a Fischer projection of the product when (*R*)-2-bromobutane is treated with the following sequence of reagents:
1. CN^-, 2. H_3O^+ and 3. CH_2N_2.



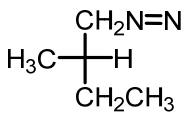
I



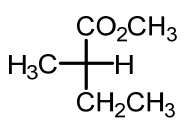
II



III



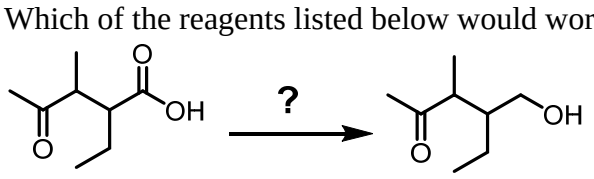
IV



V

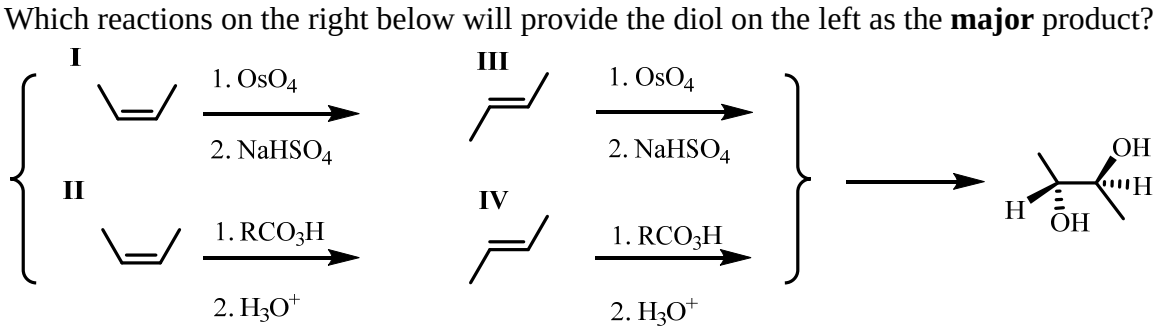
(A) I (B) II (C) III (D) IV (E) V

51. Which of the reagents listed below would work **best** in the following reaction?



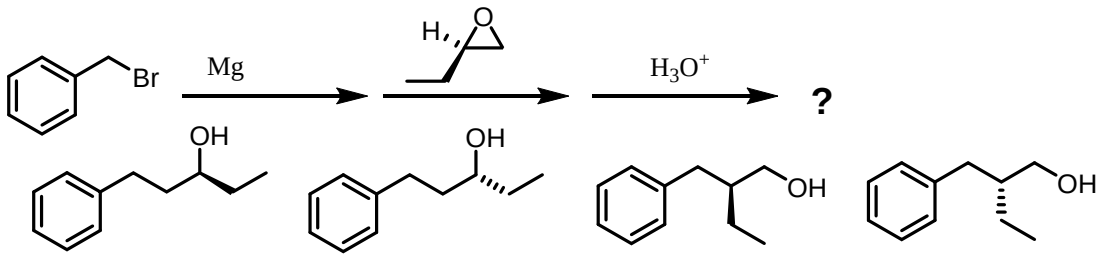
(A) $NaBH_4$ (B) $LiAlH_4$ (C) BH_3 -THF
(D) $LiAl[(OC(CH_3)_3]_3H$ (E) None of the above

52. Which reactions on the right below will provide the diol on the left as the **major** product?



(A) I (B) III (C) IV (D) I and IV (E) II and III

53. Provide a structure for the expected product of the following reaction.



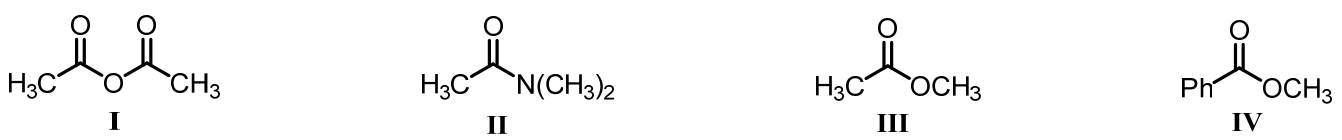
I **II** **III** **IV**

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

54. The ^{1}H NMR spectrum of a compound with formula $C_7H_{14}O$ shows two signals. Which one of the followings is a possible structure for this compound?

(A) 2-heptanone (B) 2-methyl-3-heptanone (C) 3-methyl-2-heptanone
(D) 2,2-dimethyl-3-pentanone (E) 2,4-dimethyl-3-pentanone

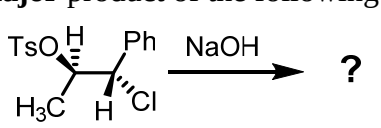
55. What is the order of decreasing reactivity towards nucleophilic acyl substitution for the carboxylic acid derivatives below

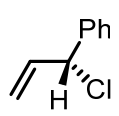


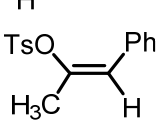
I **II** **III** **IV**

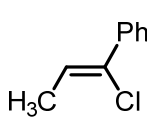
(A) I> II> III> IV (B) I> III> IV> II (C) II> IV> III> I
(D) II> I> III> IV (E) III> IV> I> II

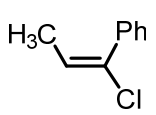
56. Which will be the **major** product of the following E2 reaction?

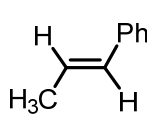


(A) 

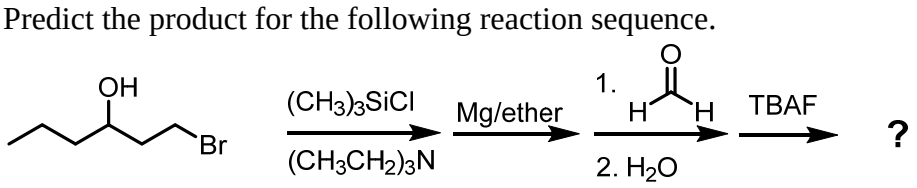
(B) 

(C) 

(D) 

(E) 

57. Predict the product for the following reaction sequence.

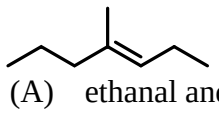


(A) 2,4-heptanediol (B) 1,4-heptanediol (C) 2,5-octanediol
(D) 1,4-octanediol (E) 1,5-octanediol

58. Which of the following compounds will display a singlet, a triplet and a quartet in the ^{1}H NMR spectrum?

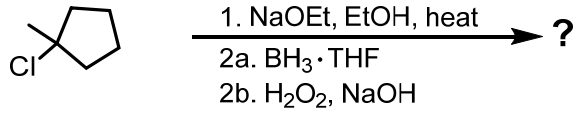
(A) 2-chloro-4-methylpentane (B) 3-chloro-2-methylpentane (C) 3-chloropentane
(D) 1-chloro-2,2-dimethylbutane (E) 3-chloro-3-methylpentane

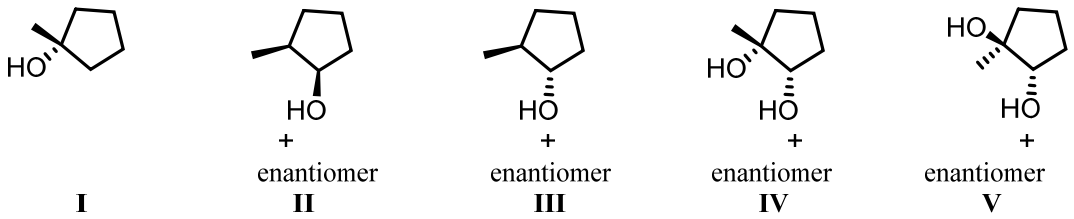
59. Provide the reactants necessary to prepare the following alkene using the Wittig reaction.



(A) ethanal and 2-bromopentane (B) propanal and 2-bromopentane (C) 2-pentanone and 1-bromopropane
(D) 2-pentanone and 2-bromopropane (E) butanal and 2-bromopentane

60. What is the expected **major** product of the following reaction sequence?



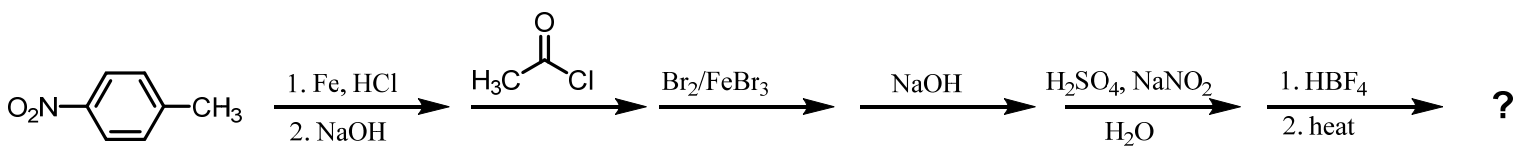


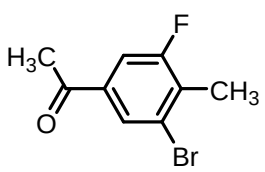
I **II** **III** **IV** **V**

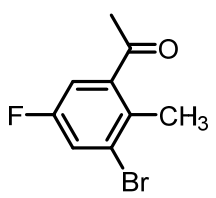
(A) I (B) II (C) III (D) IV (E) V

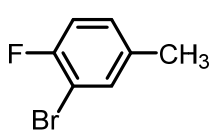
【單選題】每題 2 分，共計 40 分，答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

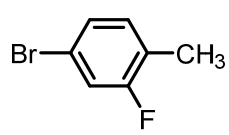
61. Predict the **major** product of the following reaction sequence.

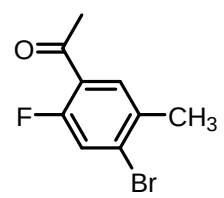


(A) 

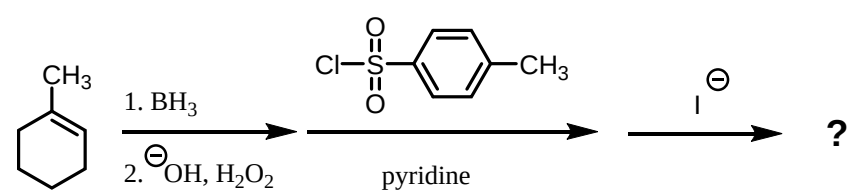
(B) 

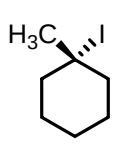
(C) 

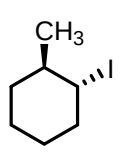
(D) 

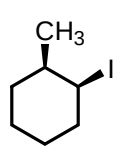
(E) 

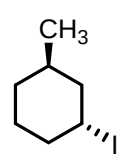
62. Choose the **major** product of the following reaction sequence.

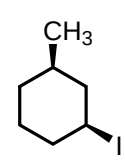


(A) 

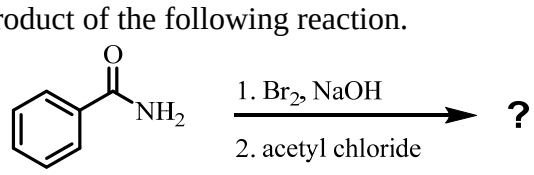
(B) 

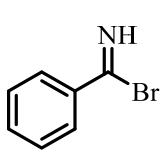
(C) 

(D) 

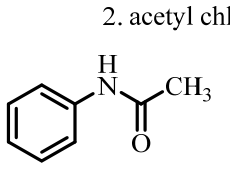
(E) 

63. Predict the product of the following reaction.

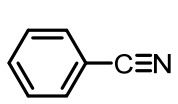




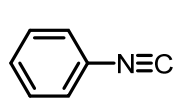
I



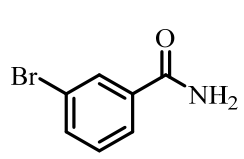
II



III



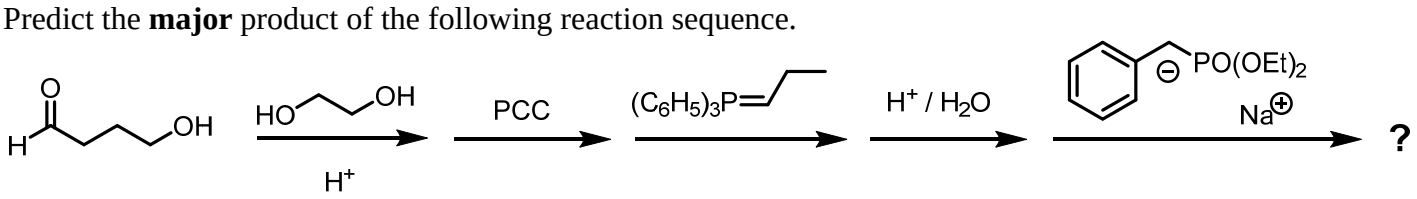
IV

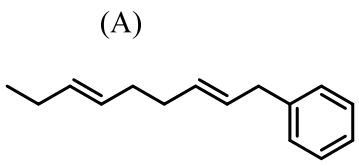
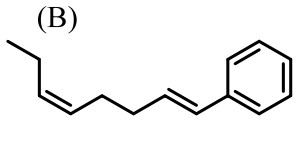
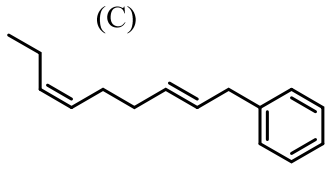
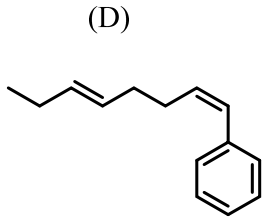
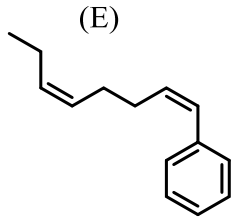


V

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

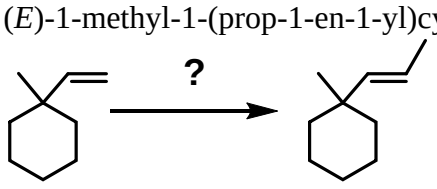
64. Predict the **major** product of the following reaction sequence.



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

65. What is the relative reactivity of 2° vs 1° hydrogens in the free radical bromination of *n*-butane if the ratio of 1-bromobutane to 2-bromobutane formed is 7:93?
(A) The 2° hydrogens are 20 times more reactive than the 1° ones.
(B) The 2° hydrogens are 40 times more reactive than the 1° ones.
(C) The 2° hydrogens are 60 times more reactive than the 1° ones.
(D) The 2° hydrogens are 80 times more reactive than the 1° ones.
(E) The 2° hydrogens are 100 times more reactive than the 1° ones.

66. Which sequence of reagents works **best** to convert 1-methyl-1-vinylcyclohexane to (*E*)-1-methyl-1-(prop-1-en-1-yl)cyclohexane?

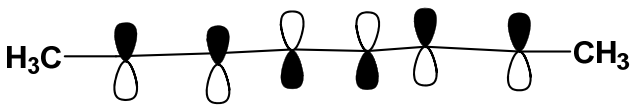


(A) 1. $NaOCH_3$, CH_3OH 2. $NaNH_2$ 3. Br_2 4. H_2 (excess), Pd/C
(B) 1. Br_2 2. $NaNH_2$ 3. $NaNH_2$, then CH_3Br 4. Na, NH_3
(C) 1. BH_3*THF 2. Br_2 3. NaCN 4. Na, NH_3
(D) 1. NaCN 2. HO^-, H_2O_2 3. $NaNH_2$, then CH_3Br 4. Na, NH_3
(E) 1. BH_3*THF 2. Br_2 3. $NaNH_2$, then CH_3Br 4. H_2 (excess), Pd/C

67. How many of these reagents cause **only** *syn* additions to alkenes?
HBr H_2, Pd BH_3 H_2O_2 CH_3CO_3H Br_2 $Hg(OAc)_2$

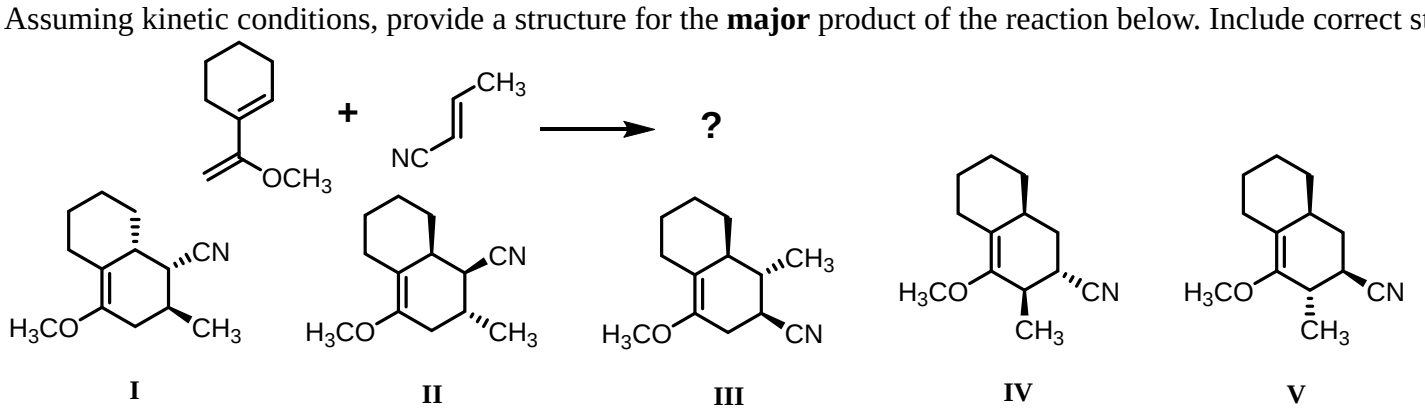
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

68. The HOMO of (2E,4Z,6E)-octatriene undergo thermal cyclization using which process and which product? (HOMO orbital of pi-electrons of octatriene is given below, not showing the stereochemistry)



(A) disrotatory and cis-product
(B) conrotatory and cis-product
(C) disrotatory and trans-product
(D) conrotatory and trans-product
(E) both disrotatory and conrotatory to give trans and cis product respectively

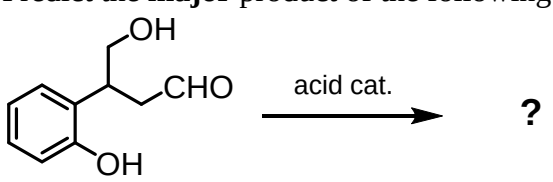
69. Assuming kinetic conditions, provide a structure for the **major** product of the reaction below. Include correct stereochemistry.

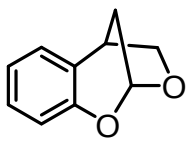


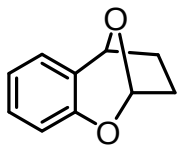
I **II** **III** **IV** **V**

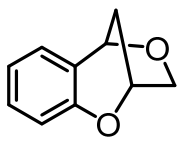
(A) I (B) II (C) III (D) IV (E) V

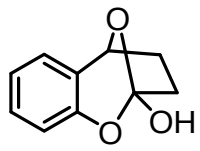
70. Predict the **major** product of the following reaction.

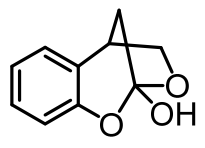


(A) 

(B) 

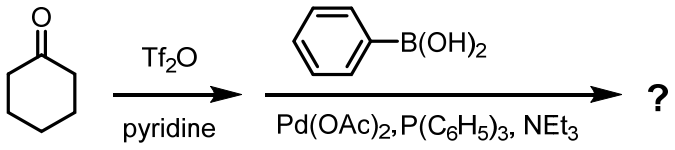
(C) 

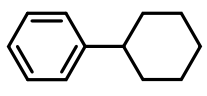
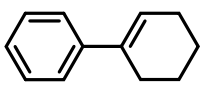
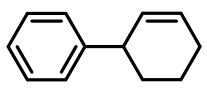
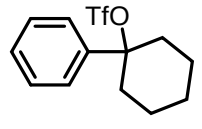
(D) 

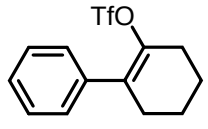
(E) 

71. Identify the monomer(s) which are used to prepare the following segment of polymer:
- $CH_2CH=CHCH_2CH(C_6H_5)CH_2CH_2CH=CHCH_2CH(C_6H_5)CH_2$-
(A) $CH_2=CH_2$ and $CH_2=CHC_6H_5$
(B) $CH_2=CHCH=CH_2$ and $CH_2=CHC_6H_5$
(C) $CH_2=C(C_6H_5)CH=CH_2$
(D) $C_6H_5CH=CHCH=CH_2$
(E) $CH_2=C=CH_2$ and $CH_2=CHC_6H_5$

72. What is the **major** product for the following reaction

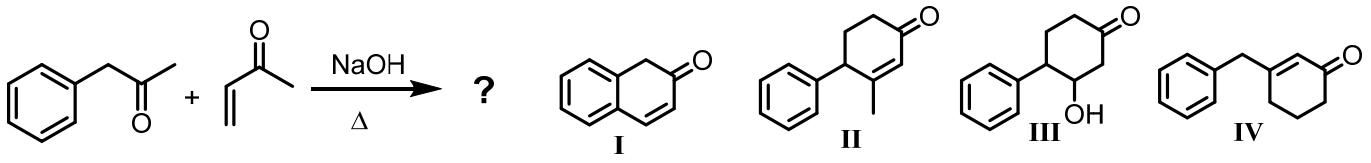


(A)  (B)  (C)  (D) 

(E) 

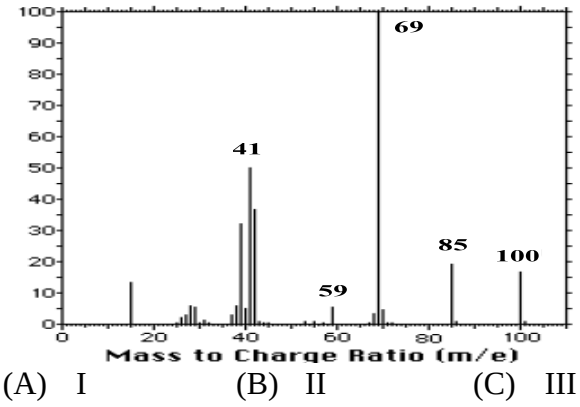
73. Which is the **best** procedure for the preparation of 2,4-dinitrobenzoic acid from benzene?
(A) 1. HNO_3/H_2SO_4 2. $CH_3Br/AlCl_3$ 3. HNO_3/H_2SO_4 4. $KMnO_4/H^+$
(B) 1. $CH_3Br/AlCl_3$ 2. HNO_3/H_2SO_4 3. $KMnO_4/H^+$ 4. HNO_3/H_2SO_4
(C) 1. $CH_3Br/AlCl_3$ 2. $KMnO_4/H^+$ 3. HNO_3/H_2SO_4 (excess)
(D) 1. HNO_3/H_2SO_4 2. $CH_3Br/AlCl_3$ 3. $KMnO_4/H^+$ 4. HNO_3/H_2SO_4
(E) 1. $CH_3Br/AlCl_3$ 2. HNO_3/H_2SO_4 (excess) 3. $KMnO_4/H^+$

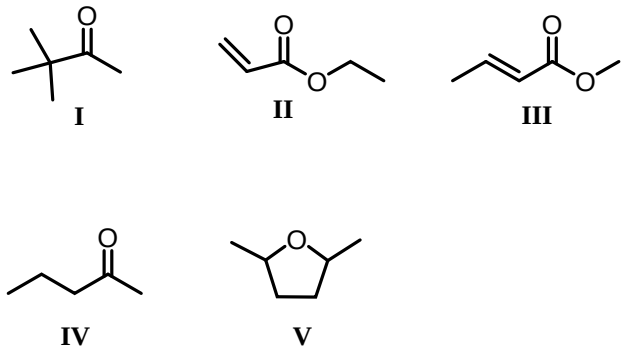
74. Predict the **major** product for the following reaction.



(A) I (B) II (C) III (D) IV (E) II & IV

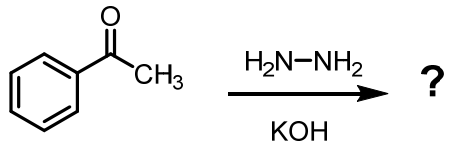
75. Which of the following molecules below **best** fits the fragmentation pattern of the mass spectrum below.

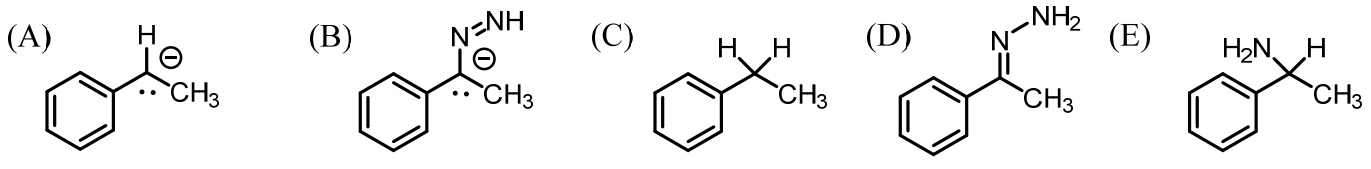




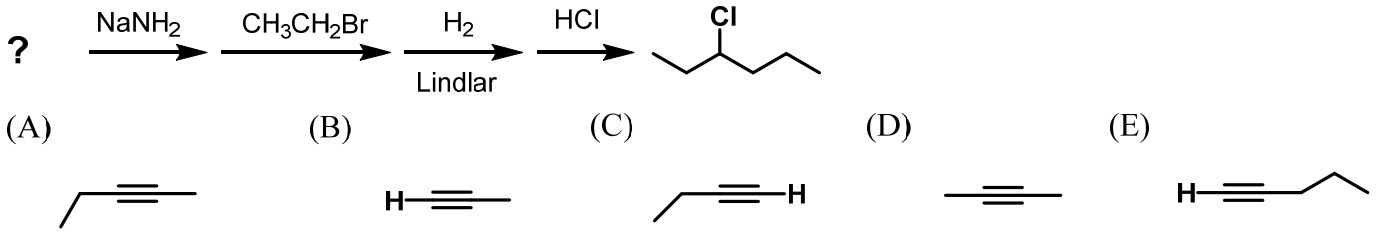
(A) I (B) II (C) III (D) IV (E) V

76. Choose the structure that is **NOT** an intermediate or product in the Wolff-Kischner reduction of acetophenone.

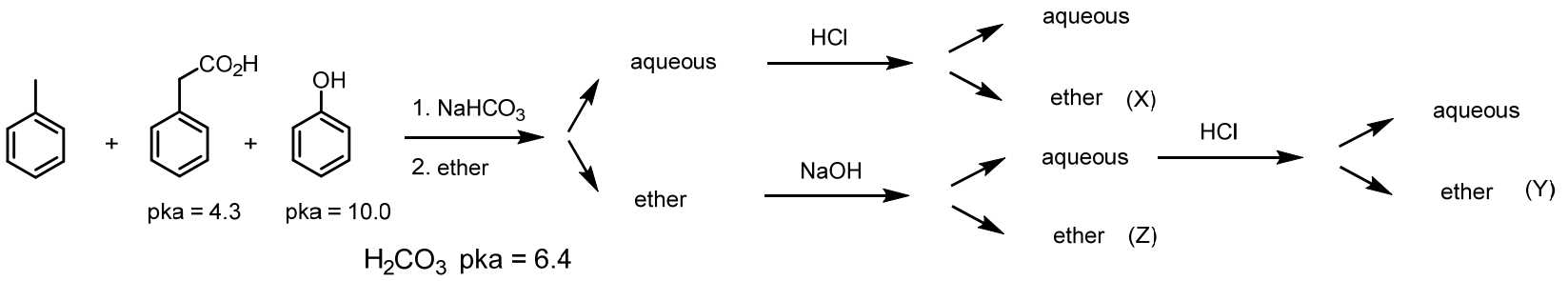




77. Choose the **best** alkyne reactant to complete the following reaction sequence.

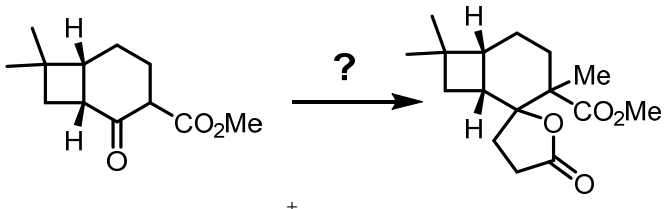


78. Extraction of a mixture of toluene, phenol and phenylacetic acid under various conditions can be used to separate them. What are the correct compound X, Y and Z from the separation scheme.



(A) (X)-toluene; (Y)-phenylacetic acid; (Z)-phenol
(B) (X)-toluene; (Y)-phenol; (Z)-phenylacetic acid
(C) (X)-phenylacetic acid; (Y)-toluene; (Z)-phenol
(D) (X)-phenol; (Y)-toluene; (Z)-phenylacetic acid
(E) (X)-phenylacetic acid; (Y)-phenol; (Z)-toluene

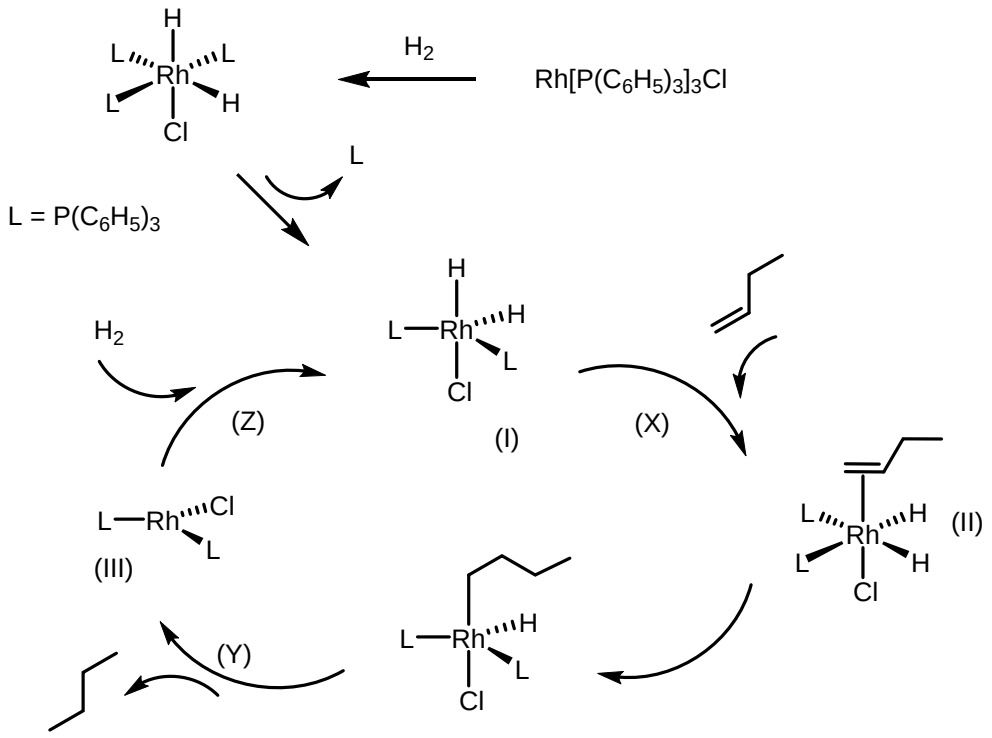
79. Which of the following series of synthetic steps could be used to carry out the transformation shown below?



(**I**) H_2, Pd/C; (**II**) H_3O^+, H_2O; (**III**) $LiC{\equiv}CCH(OMe)_2$; (**IV**) NaH, MeI; (**V**) CrO_3

(A) IV → II → I → III → V (B) V → IV → III → II →I (C) IV → III → I → II → V
(D) III → II → VI → V → I (E) None of the above

80. The scheme describes the catalytic hydrogenation pathway of 1-butene to butane. Which of the following statements below correctly shows the steps?



(A) (X)-oxidative addition, (Y)-reductive elimination, (Z)- ligand association
(B) (X)-ligand association, (Y)-reductive elimination, (Z)-oxidative addition
(C) (X)-reductive elimination, (Y)- oxidative addition, (Z)-ligand association
(D) (X)-reductive elimination, (Y)-ligand association, (Z)-oxidative addition
(E) (X)- ligand association, (Y)- oxidative addition, (Z)-reductive elimination