

大同大學 九十 學年度 轉學考試 試題

考試科目：有機化學 系別：生物工程學系 級別：三年級 第 1 頁，共 7 頁

註：本次考試不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

請針對下列問題寫出其中一個最適切的答案，每題答對得兩分

b 1. What is the ground state electron configuration of chlorine?

- a) $1s^2 2s^2 2p^6 3s^2 3p^4$ b) $1s^2 2s^2 2p^6 3s^2 3p^5$ c) $1s^2 2s^2 2p^6 3s^2 3p^6$
 d) $1s^2 2s^2 2p^6 3s^2 3p^7$ e) $1s^2 2s^2 2p^6 3s^1 3p^6$

e 2. In which region of the periodic table is the electronegativity of the elements highest?

- a) upper left corner b) lower left corner c) lower right corner
 d) upper right corner e) near center of table

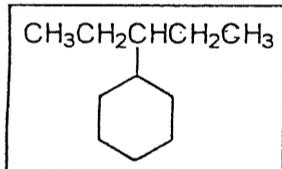
3. Which statement concerning bond polarity is true?

- a) polarity is greatest when the difference in electronegativity of the two elements is large
 b) polarity is smallest when the difference in electronegativity of the two elements is large
 c) polarity is greatest when both elements have high electronegativity
 d) polarity is smallest when both elements have high electronegativity

f 4. Which of the following has/have a dipole moment of zero?

- a) BH_3 b) CH_4 c) NH_3 d) H_2O e) HF
 f) a and b g) a and c h) a and d i) d and e

b 5. Which is the best name for the following compound?



- a) 3-cyclopentylpentane b) 3-cycloheptylpentane
 c) 3-cyclopentylhexane d) 3-hexylcyclopentane
 e) (3-pentyl)cyclohexane

c 6. How many isomers (cis, trans and constitutional) are possible for the dichlorocyclohexanes?

- a) 7 b) 8 c) 9 d) 10 e) 11

c 7. Which anion is the weakest base?

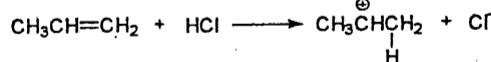
- a) $CH_3CO_2^-$ b) $CH_3CH_2^-$ c) Cl^- d) $CH_3CH_2O^-$

d 8. Oxygen, sulfur, selenium (Se), and tellurium (Te) are in the same family and are arranged in order of increasing atomic numbers. Which has the largest pK_a ?

- a) H_2O b) H_2S c) H_2Se d) H_2Te

e 9. Which species is the conjugate base in this reaction?

- a) $CH_3CH=CH_2$ b) HCl
 c) $C_3H_7^+$ d) Cl^-
 e) there is no conjugate base



10. Which statement is true?

- a) All mirror images are enantiomers.
 b) All molecules that have chiral centers are enantiomers.
 c) All isomers which are not superimposable on their mirror images are enantiomers.
 d) Superimposable structural isomers are enantiomers.
 e) All non-superimposable, mirror reflection isomers are enantiomers.

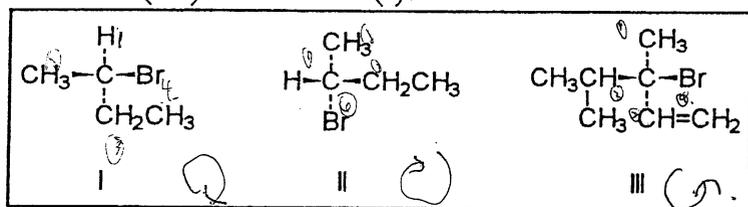
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b 11. Which is a (are) *R* enantiomer(s)?



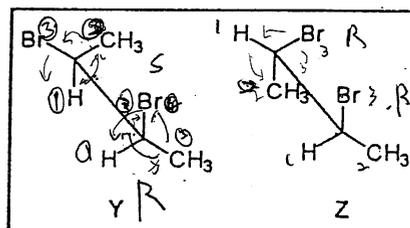
- a) I
b) I and III
c) II
d) I, II, and III
e) none of these

12. Which statement is true about all *S* stereoisomers?

- a) they are *levorotatory* b) they are *dextrorotatory*
c) they are mirror images of *R* enantiomers d) they are racemic mixtures
e) they consist of equal amounts of (+) and (-) isomers

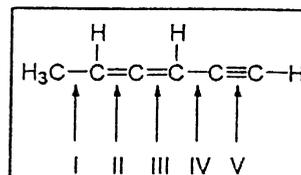
b 13. What is the relationship between Y and Z?

- a) diastereomers
b) enantiomers
c) constitutional isomers
d) different conformations of the same molecule
e) a mixture of the two is racemic



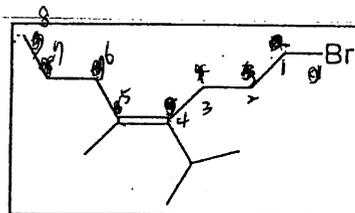
c 14. The expected bond distances in the following compound are:

- a) II ≈ III > I > IV > V b) I > IV > II ≈ III > V
c) IV ≈ I > II ≈ III > V d) IV > I > II ≈ III > V
e) V > II ≈ III > IV > I



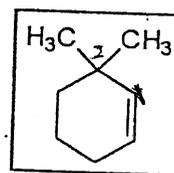
b 15. What is the IUPAC name for this compound?

- a) (Z)-1-bromo-4-isopropyl-5-methyl-4-octene
b) (E)-1-bromo-4-isopropyl-5-methyl-4-octene
c) (Z)-8-bromo-5-isopropyl-4-methyl-4-octene
d) (E)-8-bromo-5-isopropyl-4-methyl-4-octene



c 16. What is the IUPAC name for this compound?

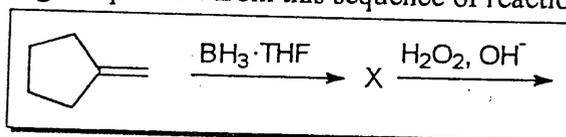
- a) 1,1-dimethylcyclohexene b) 1,1-dimethylcycloheptene
c) 2,2-dimethylcyclohexene d) 2,2-dimethylcycloheptene
e) 3,3-dimethylcyclohexene f) 3,3-dimethylcycloheptene



c 17. Which is the major product from the reaction of 2-methyl-2-butene with HCl?

- a) $\text{CH}_2\text{CH}(\text{Cl})\text{CH}_2\text{CH}_3$ b) $\text{CH}_3\text{C}(\text{Cl})(\text{CH}_3)\text{CH}_2\text{CH}_3$ c) $\text{CH}_3\text{CH}(\text{Cl})\text{CH}(\text{CH}_3)\text{CH}_3$ d) $\text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{CH}_2\text{CH}_3$ e) $\text{CH}_3\text{CH}(\text{Cl})\text{CH}_2\text{CH}_2\text{CH}_3$

b 18. What is the major organic product from this sequence of reactions?

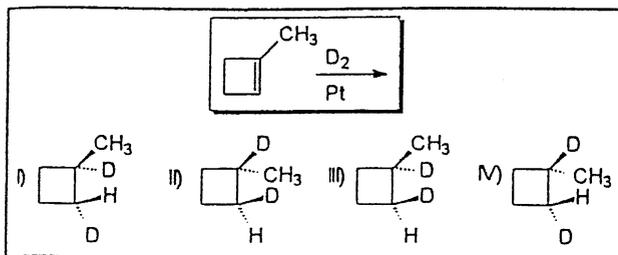


- a) b) c) d) e) mixture of isomers

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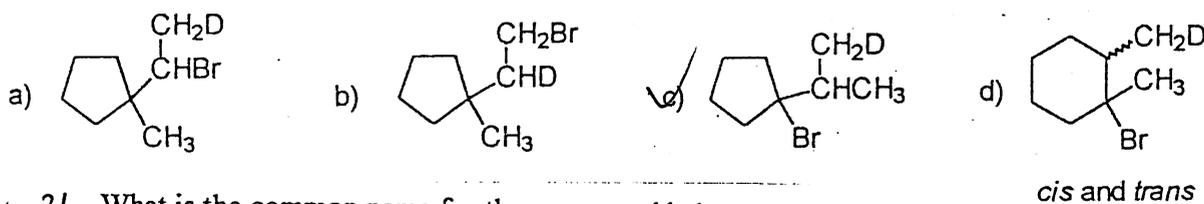
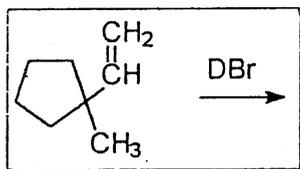
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19. Deuterium (i.e., $^2\text{H}_2$ or D_2) undergoes the same type of reactions as does hydrogen, although the rates of the reactions are usually different. Which products result from this reaction?

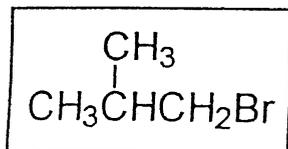


- a) mostly a 50:50 mixture of I and II
 b) mostly a 50:50 mixture of I and III
 c) mostly a 50:50 mixture of II and III
 d) mostly a 50:50 mixture of III and IV
 e) 50:50 mixture of II and IV

20. What is the major product from this reaction?

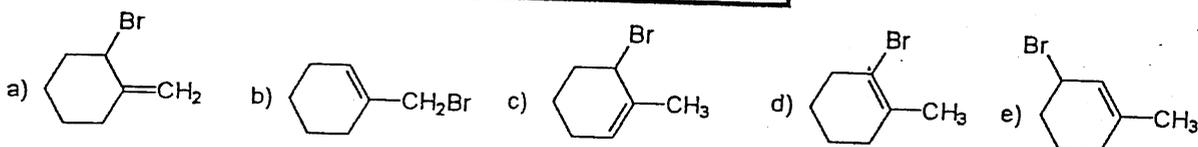
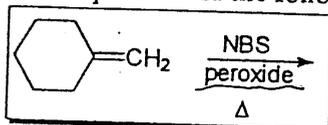


21. What is the common name for the compound below?



- a) butyl bromide
 b) *sec*-butyl bromide
 c) isobutyl bromide
 d) *tert*-butyl bromide
 e) none of the above

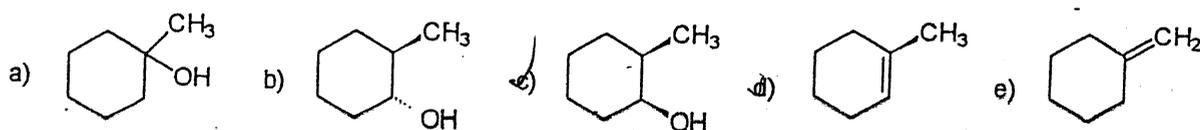
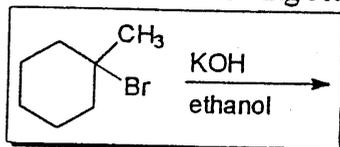
22. What is the major monobromination product of the following?



23. Which statement is false?

- a) Strong bases tend to be good nucleophiles.
 b) The conjugate base of an acid tends to be a better nucleophile than the acid itself.
 c) Secondary alkyl halides react with methoxide to give more *substitution* product than they do with *tert*-butoxide.
 d) The rate equation for *tert*-butyl chloride and methoxide is second order.
 e) The major product from the reaction of *tert*-butyl chloride and methoxide is isobutylene.

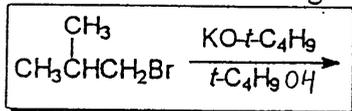
24. What is the major organic product from the following reaction?



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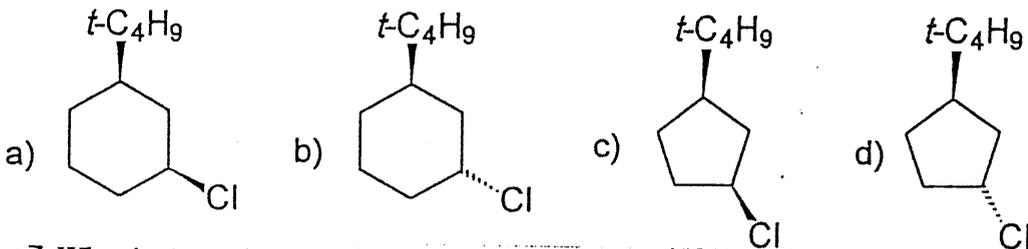
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25. What is the major organic product from the following reaction?

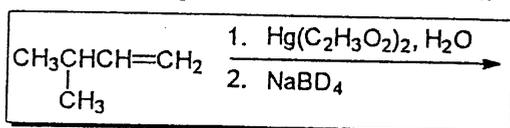


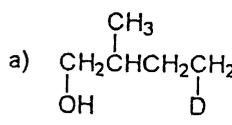
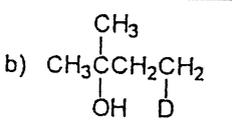
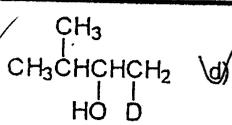
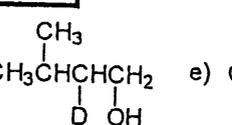
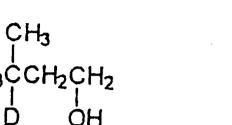
- a) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{O-t-C}_4\text{H}_9$ b) $(\text{CH}_3)_2\text{C}=\text{CH}_2$ c) $\text{CH}_3\text{C}(\text{CH}_3)(\text{O-t-C}_4\text{H}_9)\text{CH}_3$ d) $\text{CH}_3\text{CH}=\text{CHCH}_3$ e) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{OK}$

26. Which of the following alkyl chlorides should undergo dehydrochlorination most rapidly?



27. What is the major organic product expected from the reaction?

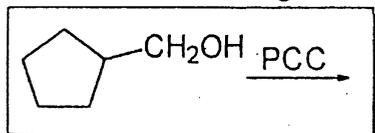


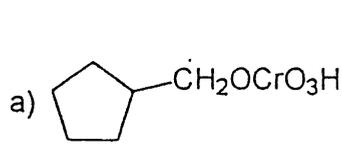
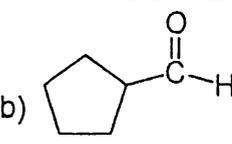
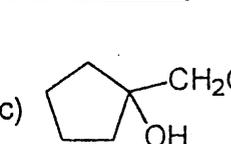
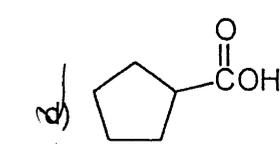
- a)  b)  c)  d)  e) 

28. Which of the following dehydrate most readily when heated with sulfuric acid?

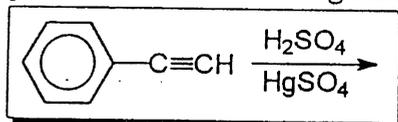
- a) 1° alcohols b) 2° alcohols c) 3° alcohols d) methanol

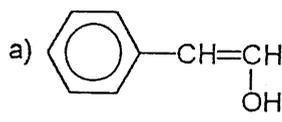
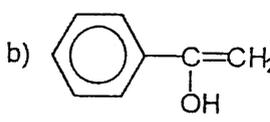
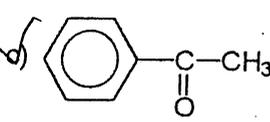
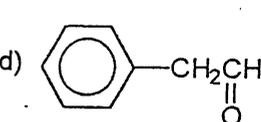
29. What is the major organic product from the following reaction?



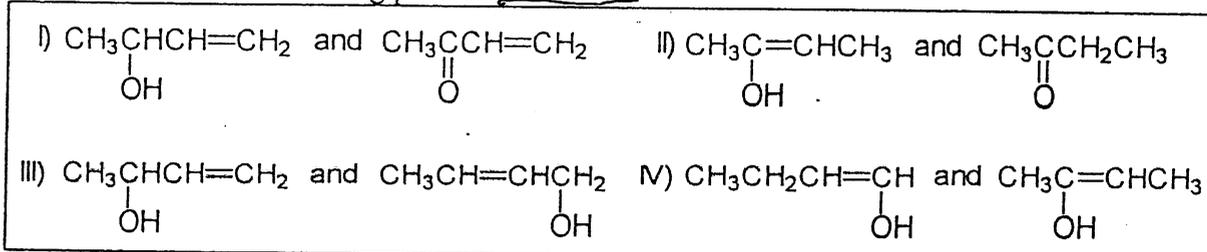
- a)  b)  c)  d) 

30. What is the major organic product from the following reaction?



- a)  b)  c)  d) 

31. Which of the following pairs are tautomers?

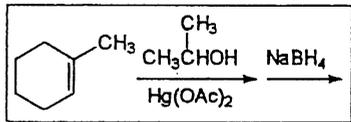


- a) I b) II c) III d) IV e) I and IV f) I and II

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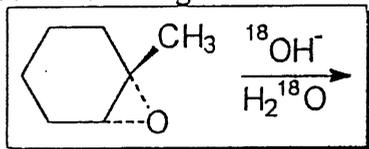
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32. Based on your knowledge of oxymercuration-reduction, what is the major organic product from the following reaction? 算器。



- a) b) c) d) e)

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

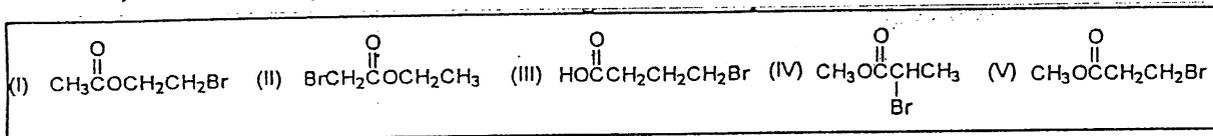


- a) b) c) d)

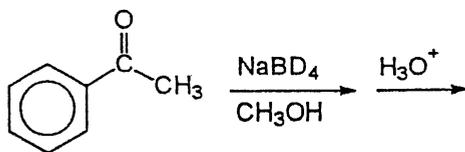
34. Which compound of formula $C_4H_7BrO_2$ would have the following 1H NMR spectrum?

δ 1.27 (3H, triplet); δ 3.89 (2H, singlet); δ 4.20 (2H, quartet)

- a) I b) II c) III d) IV e) V



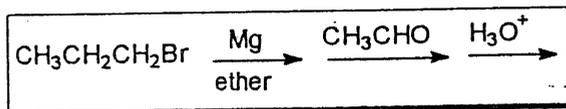
35. Which of the following polyenes would have ultraviolet absorption at the *longest* wavelength?
 a) $CH_3CH=CHCH=CHCH_2CH=CH_2$ b) $CH_2=CHCH=CHCH=CHCH_2CH_3$ c) $CH_2=CHCH=CHCH=CHCH=CH_2$
 36. What is the product from this reaction?



- a) b) c) d)

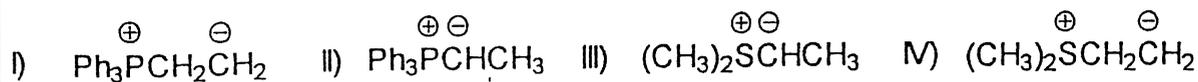
- e) None of the above

37. What is the major organic product from this series of reactions?



- a) $CH_3CH_2CH_2CH_2OH$ b) $CH_3CH_2CH_2CH(OH)CH_3$ c) $CH_3CH_2CH(OH)CH_2CH_3$ d) $CH_3CH_2CH_2OCH_2CH_3$

38. Which are ylides?

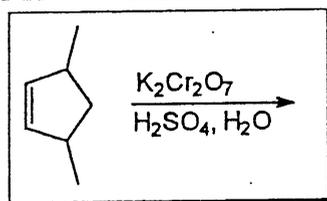


- a) all of the above b) I, II c) III, IV d) I, IV e) II, III

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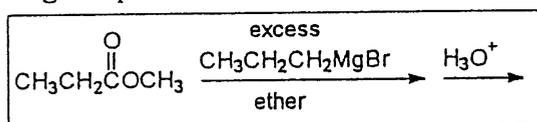
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39. Which compound is formed in this reaction?



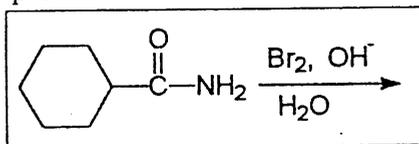
- a) b) c) d) e)

40. What is the major organic product from this series of reactions?



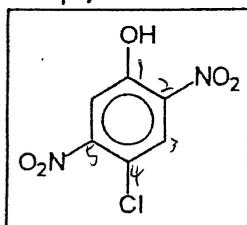
- a) b) c) d)

41. Which is the major organic product from this reaction?



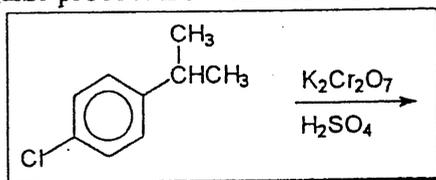
- a) b) c) d)

42. Which is the best name for this compound?



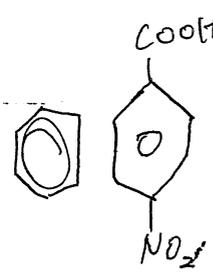
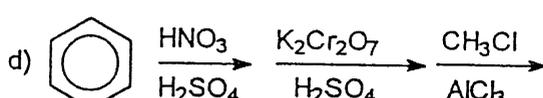
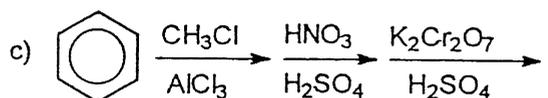
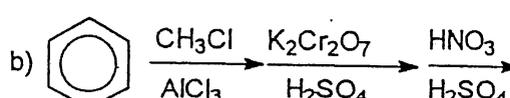
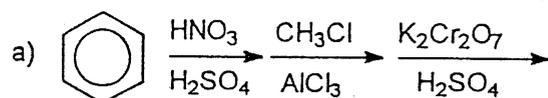
- a) 4-hydroxy-2,5-dinitrochlorobenzene
 b) 4-hydroxy-3,6-dinitrochlorobenzene
 c) 4-chloro-2,5-dinitroaniline
 d) 4-chloro-3,6-dinitroaniline
 e) 4-chloro-2,5-dinitrophenol
 f) 4-chloro-3,6-dinitrophenol

43. Which is the major organic product from this reaction?



- a) b) c) d)

44. Which method provides the highest yield of *p*-nitrobenzoic acid?

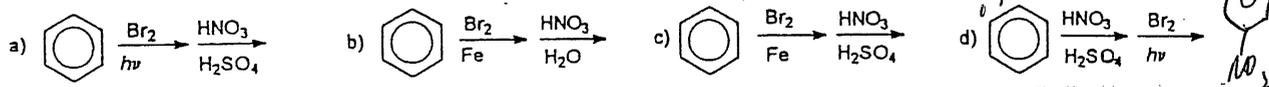


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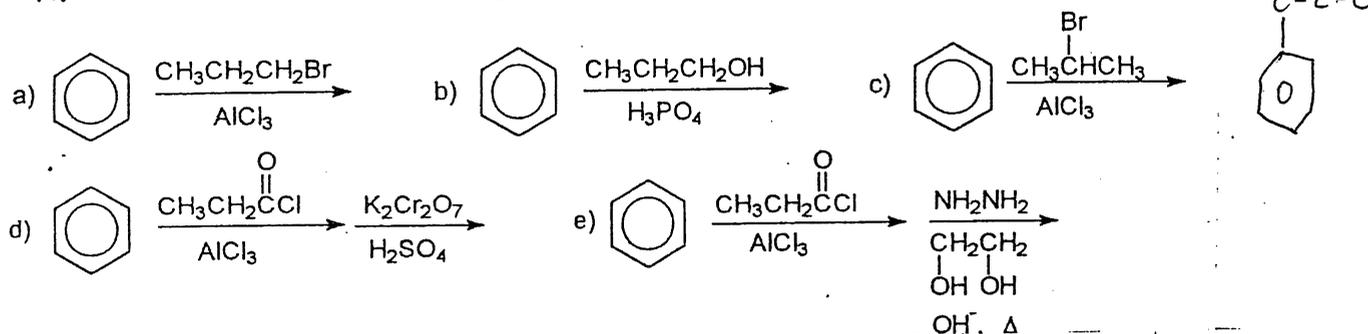
考試科目：有機化學 系別：生物工程學系

級別：三年級 第 7 頁，共 7 頁

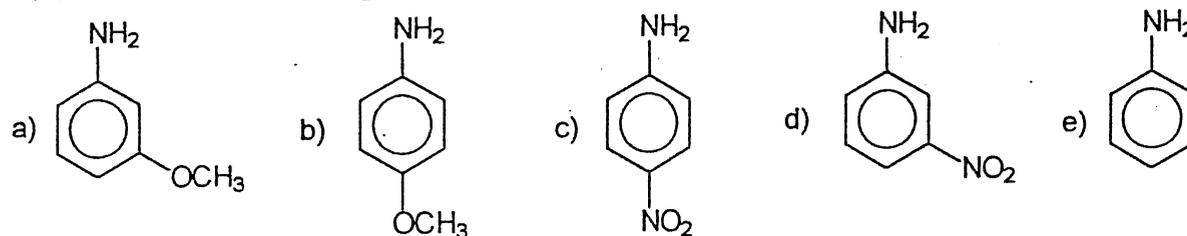
45. Which method provides the highest yield of 4-nitrobromobenzene?



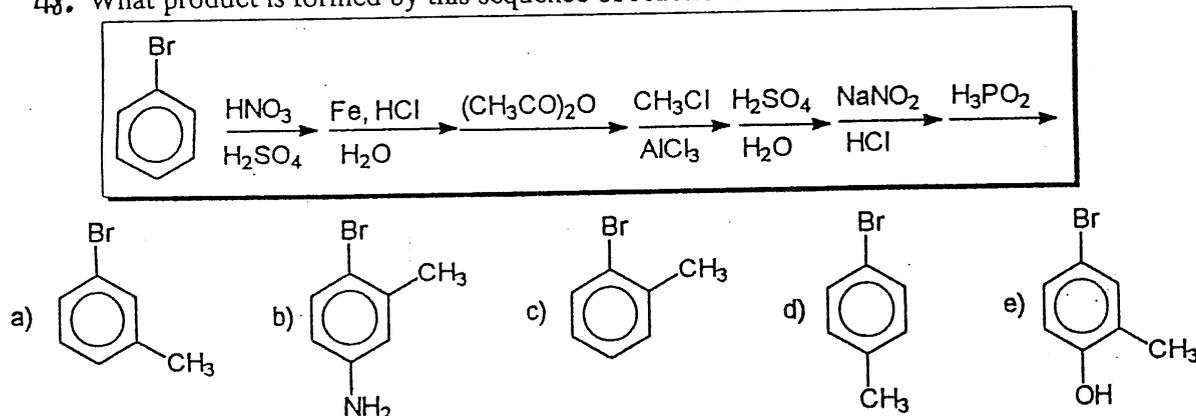
46. Which is the best method for the preparation of propylbenzene?



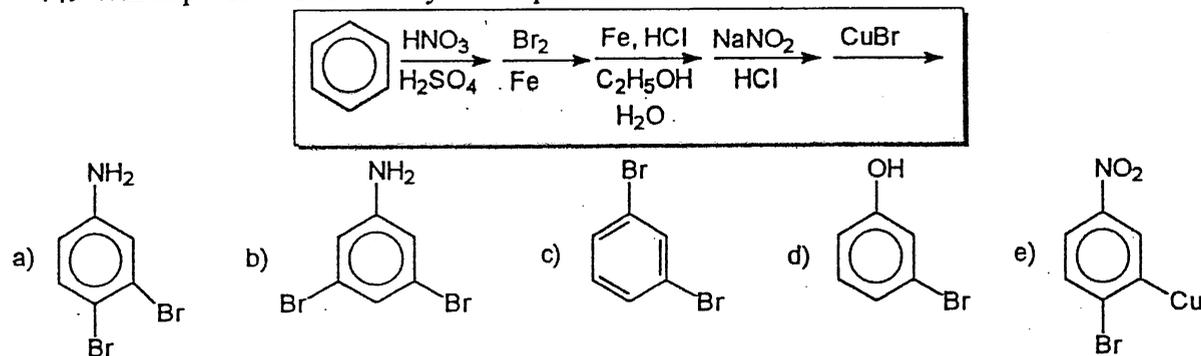
47. Which of the following is the *strongest* base?



48. What product is formed by this sequence of reactions?



49. Which product is formed by this sequence of reactions?



50. Which is the major product of this reaction?

