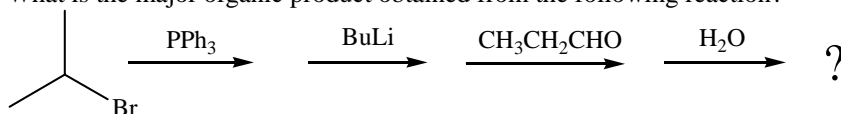


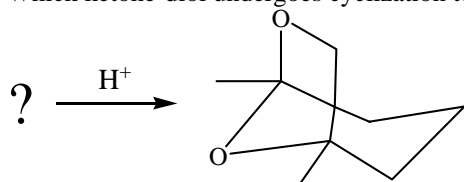
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(c)1. What is the major organic product obtained from the following reaction?



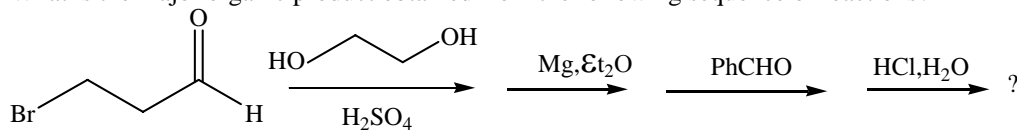
- (a)(E)-3-methyl-2-pentene (b)(Z)-3-methyl-2-pentene (c)2-methyl-2-pentene
(d)4-methyl-1-pentene

(d)2. Which ketone-diol undergoes cyclization to form the following ketal?



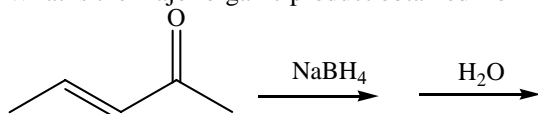
- (a) (b)
- (c) (d)

(a)3. What is the major organic product obtained from the following sequence of reactions?



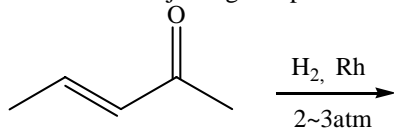
- (a) (b)
- (c) (d)

(b)4. What is the major organic product obtained from the following reaction?



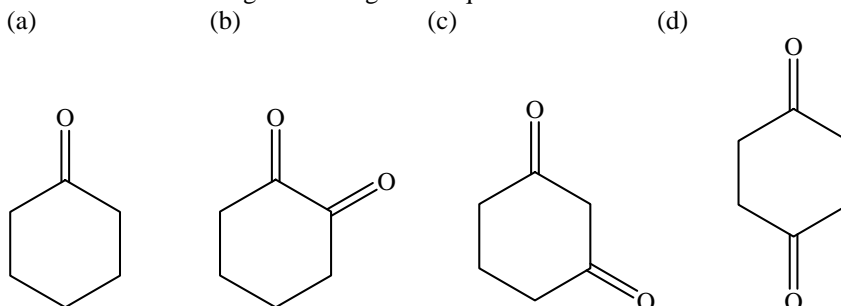
(a)2-pentanone (b)(E)-3-penten-2-ol (c)2-pentanol (d)4-hydroxy-2-pentanone

(a)5. What is the major organic product obtained from the following reaction?



(a)2-pentanone (b)(E)-3-penten-2-ol (c)2-pentanol (d)4-hydroxy-2-pentanone

(c)6. Which of the following has the highest K_{eq} for enolization?

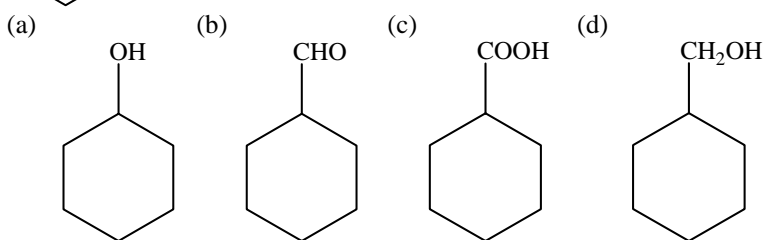
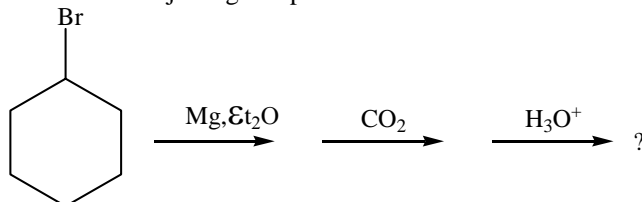


(c)7. Which of the following is a reactive intermediate in the base-catalyzed racemization of (R)-3-phenyl-2-butanone?

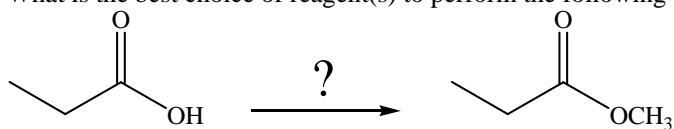
(a)carbanion (b)enol (c)enolate (d)radical

(a)8. Which of the following is the most soluble in water?
 (a)butanoic acid (b)2-butanol (c)hexanoic acid (d)3-heptanone

(c)9. What is the major organic product obtained from the following reaction?

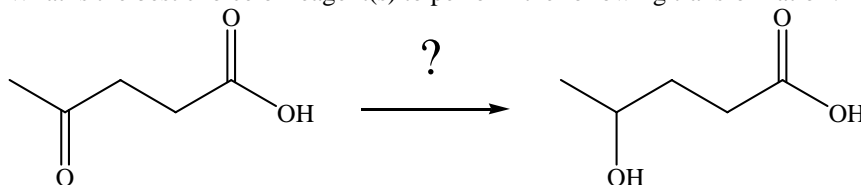


(d)10. What is the best choice of reagent(s) to perform the following transformation?



- (a) $\text{CH}_3\text{I}, \text{H}_2\text{SO}_4$ (b) CH_3MgBr (c) CH_3OLi (d) CH_2N_2

(c)11. What is the best choice of reagent(s) to perform the following transformation?

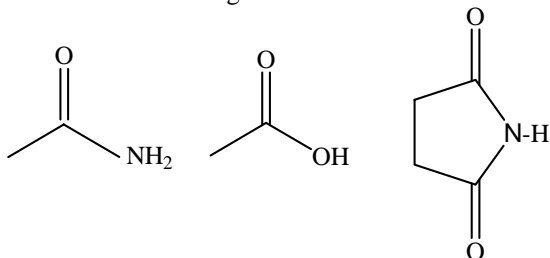


- (a) 1. LiAlH_4 2. H_3O^+ (b) H_2, Pt (c) 1. NaBH_4 2. H_3O^+ (d) NaH

(a)12. Which of the following best describes the key mechanistic steps in the esterification of a carboxylic acid upon treatment with an alcohol in the presence of a strong acid?

- (a) addition followed by elimination (b) substitution followed by addition
(c) elimination followed by addition (d) addition followed by decarboxylation

(b)13. Which of the following is the correct order of decreasing acid strength of the following compounds?

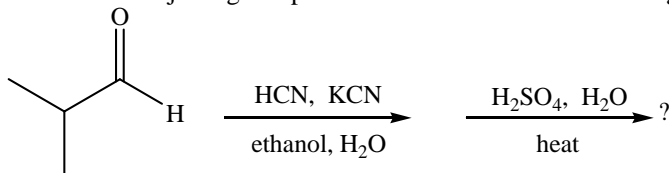


- (a) $1 > 2 > 3$ (b) $2 > 3 > 1$ (c) $1 > 3 > 2$ (d) $3 > 2 > 1$

(c)14. Which of the following is the correct order of decreasing reactivity in hydrolysis reactions?

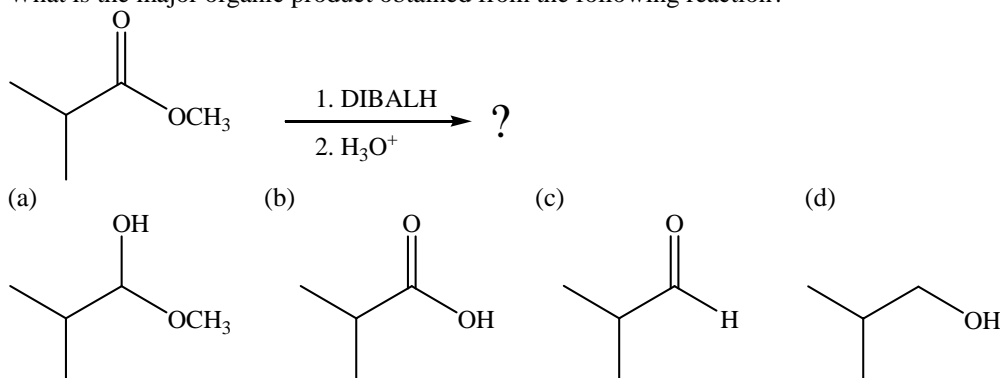
- (a) esters > amides > acid chlorides (b) amides > acid chlorides > esters (c) acid chlorides > esters > amides
(d) esters > acid chlorides > amides

(a)15. What is the major organic product obtained from the following reaction?

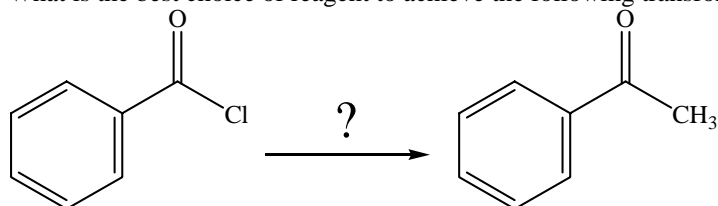


- (a) (b) (c) (d)

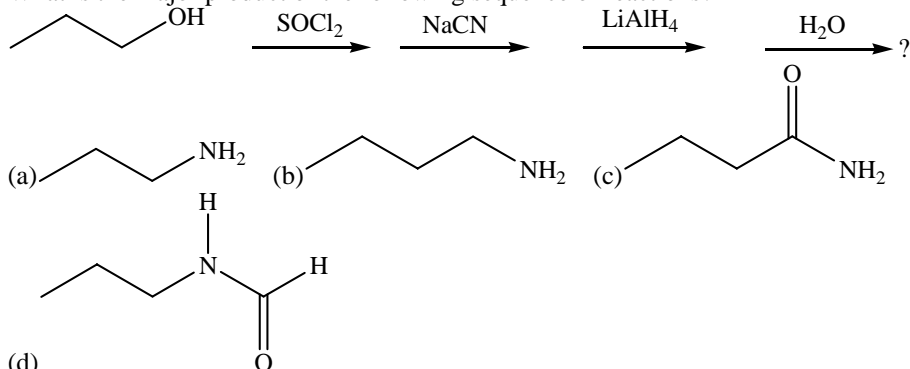
(c)16. What is the major organic product obtained from the following reaction?



(d)17. What is the best choice of reagent to achieve the following transformation?



(b)18. What is the major product of the following sequence of reactions?



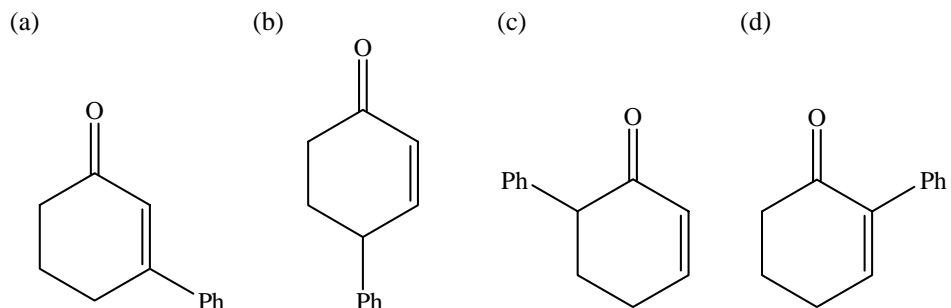
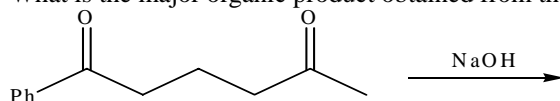
(a)19. Which of the following undergoes the most rapidly sulfonation upon treatment with fuming sulfuric acid?

(a)benzene (b)benzoic acid (c)benzonitrile (d)nitrobenzene

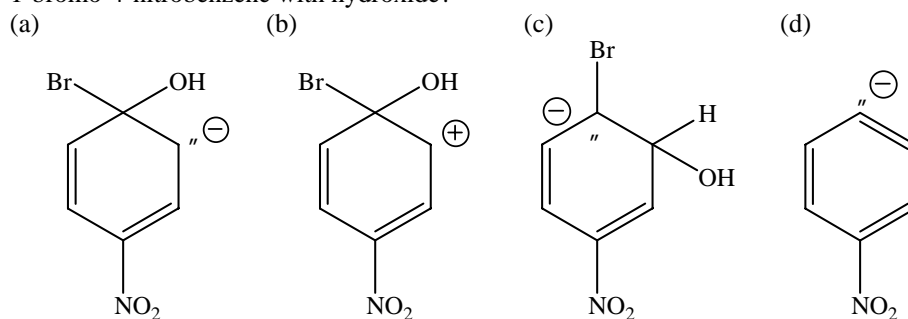
(c)20. Which of the following sets of substituents are all ortho/para directing in electrophilic aromatic substitution reactions?

(a)Cl, CH_3 , CN (b)Br, OH, COCH_3 (c)Cl, OH, CH_3 (d)CN, NO_2 , COCH_3

(a)21. What is the major organic product obtained from the following reaction?



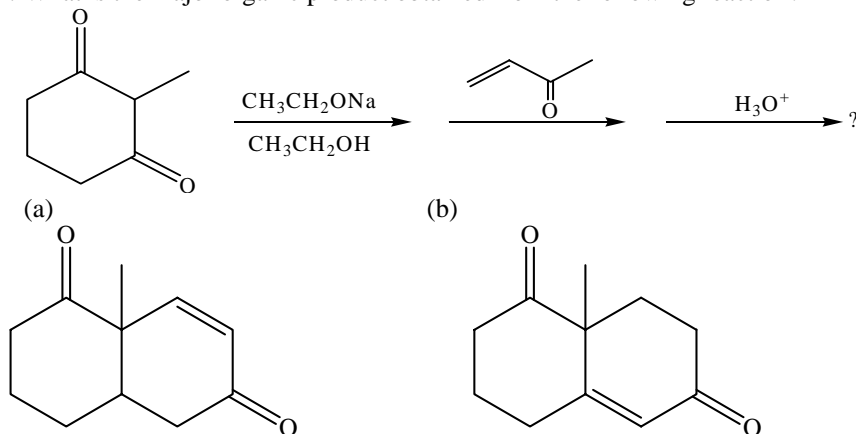
(a)22. Which of the following is the Meisenheimer complex intermediate in the nucleophilic substitution of 1-bromo-4-nitrobenzene with hydroxide?



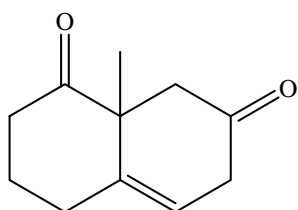
(d)23. Which of the following is not true about benzenes?

- (a) They are planar
- (b) They are formed upon dehydrohalogenation of aryl halides
- (c) They are aromatic
- (d) They are intermediates in nucleophilic aromatic substitution reaction which take place by an addition - elimination mechanism

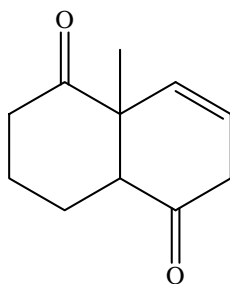
(b)24. What is the major organic product obtained from the following reaction?



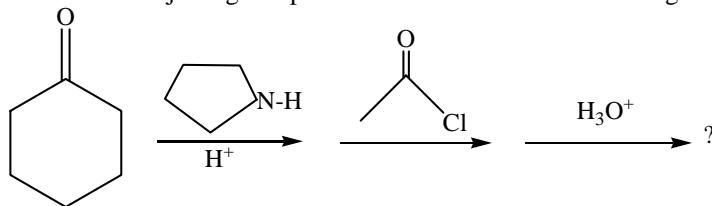
(c)



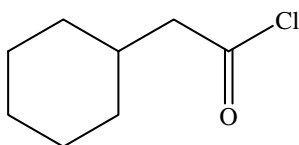
(d)



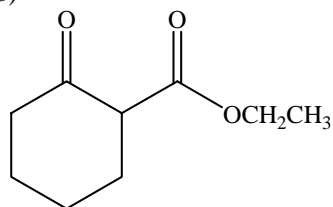
(c)25. What is the major organic product obtained from the following sequence of reactions?



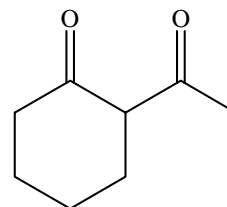
(a)



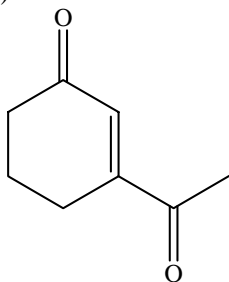
(b)



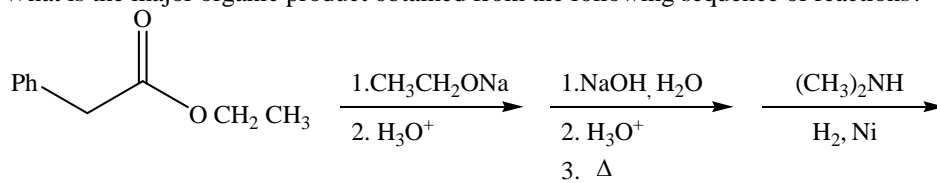
(c)



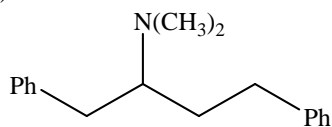
(d)



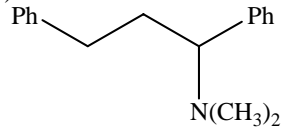
(c)26. What is the major organic product obtained from the following sequence of reactions?

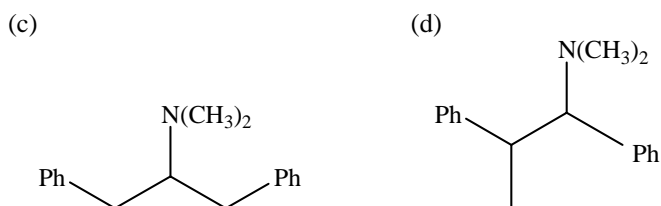


(a)

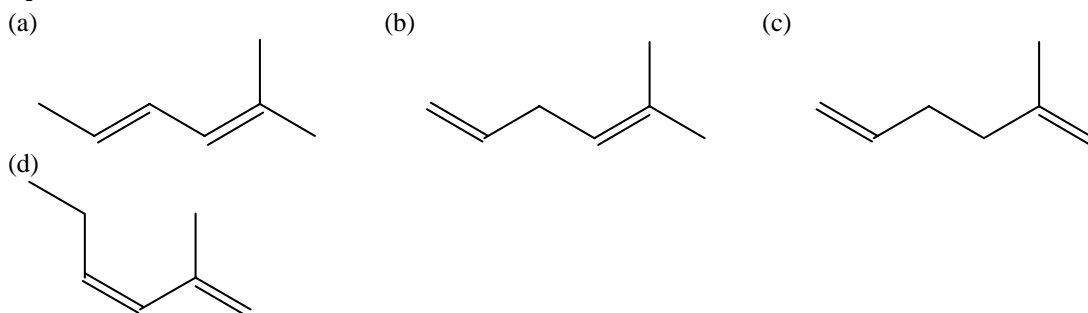


(b)

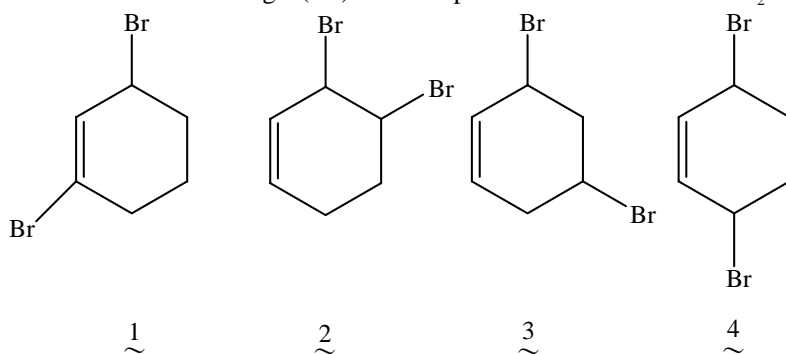




(a)27. Which of the following alkenes undergoes the least exothermic hydrogenation upon treatment with H_2 / Pd ?



(c)28. Which of the following is(are) formed upon addition of 1 mol of Br_2 to 1,3-cyclohexadiene?



(a) only 1 (b) only 1 and 3 (c) only 2 and 4 (d) 1, 2, and 3

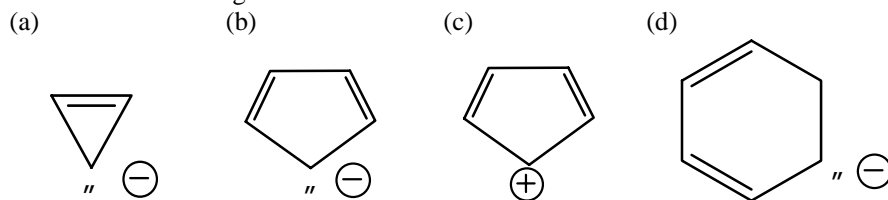
(d)29. Which of the following relationships is not valid as applied to ultraviolet-visible spectroscopy?

(a) $A = \log(I_0 / I)$ (b) $A = \epsilon c l$ (c) $\Delta E = h\nu$ (d) $A = \lambda_{\max} l$

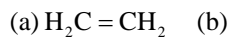
(b)30. What quantity is abbreviated as ϵ in ultraviolet-visible spectroscopy?

(a) absorbance (b) molecular absorptivity (c) intensity of transmitted light
(d) wavelength of maximum absorbance

(b)31. What of the following ions is aromatic?

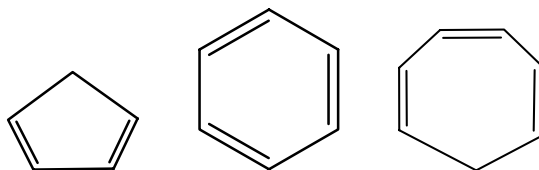


(b)32. Which of the following molecules possesses the most acidic hydrogen atoms?
If the temperature is increased :

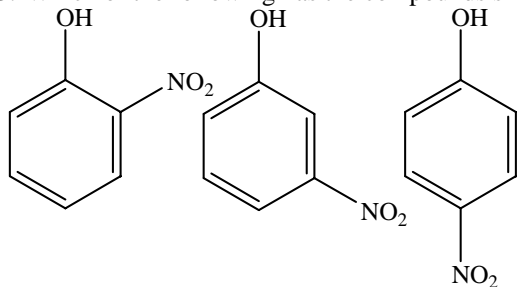


(c)

(d)

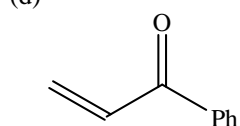
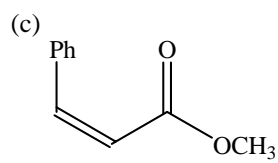
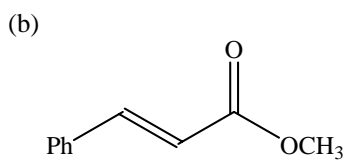
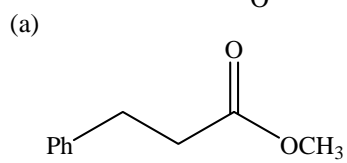
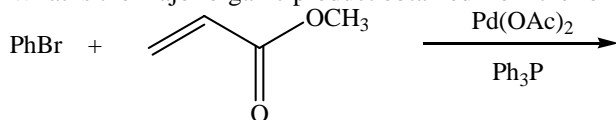


(c)33. Which of the following has the compounds shown in the correct order of decreasing acidity?

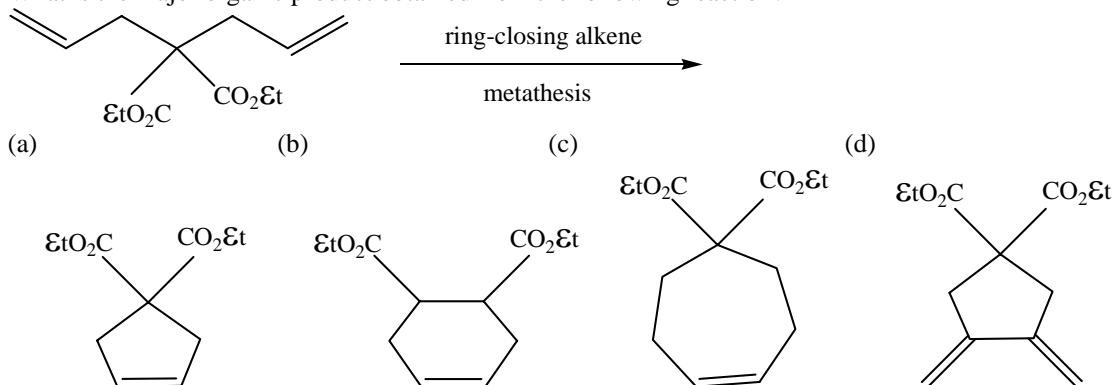


(a) $1 > 2 > 3$ (b) $2 > 3 > 1$ (c) $3 > 1 > 2$ (d) $1 > 3 > 2$

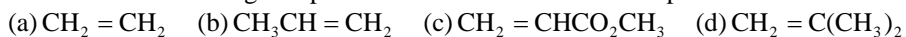
(b)34. What is the major organic product obtained from the following reaction?



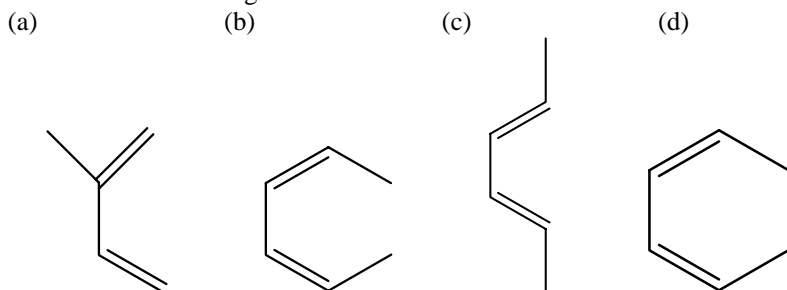
(a)35. What is the major organic product obtained from the following reaction?



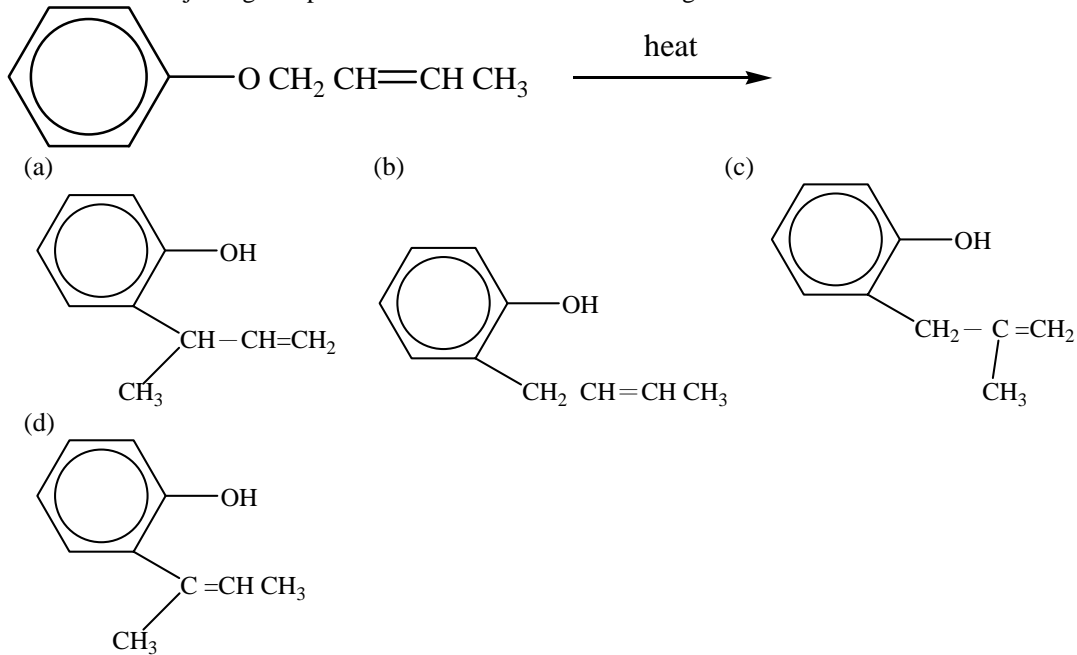
(c)36. Which of the following compounds is the most reactive dienophile?



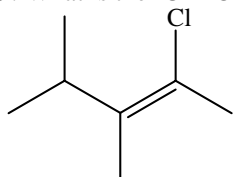
(b)37. Which of the following is the least reactive diene in Diels-Alder reactions?



(a)38. What is the major organic product obtained from the following reaction?



(d)39. What is the IUPAC name of the following compound?



- (a)(E)-1-chloro-1, 2, 3-trimethyl-1-butene (b)(Z)-1-chloro-1, 2, 3-trimethyl-1-butene
 (c)(E)-2-chloro-3, 4-dimethyl-2-pentene (d)(Z)-2-chloro-3, 4-dimethyl-2-pentene

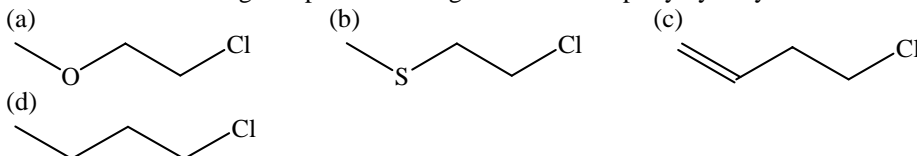
(c)40. Which of the following has the list of compounds in the correct order of decreasing molecular polar?

- (a) $\text{CH}_3\text{I} > \text{CH}_3\text{Br} > \text{CH}_3\text{Cl} > \text{CH}_3\text{F}$
 (b) $\text{CH}_3\text{F} > \text{CH}_3\text{Cl} > \text{CH}_3\text{Br} > \text{CH}_3\text{I}$
 (c) $\text{CH}_3\text{Cl} > \text{CH}_3\text{F} > \text{CH}_3\text{Br} > \text{CH}_3\text{I}$
 (d) $\text{CH}_3\text{Cl} > \text{CH}_3\text{I} > \text{CH}_3\text{F} > \text{CH}_3\text{Cl}$
- (c)41. Which of the following compounds is most susceptible to radical autooxidation?
 (a)propene (b)1, 3-butadiene (c)1, 4-pentadiene (d)1, 5-hexadiene
 (e) none of these

(d)42. Which of the following compounds is the most nucleophilic in polar protic solvents?

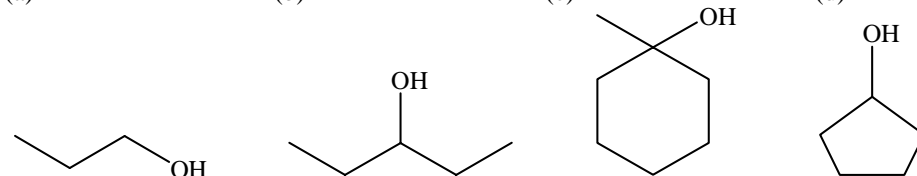
- (a) H_2O (b) NH_3 (c) H_2S (d) PH_3

(b)43. Which of the following compounds undergoes the most rapidly hydrolysis reaction?

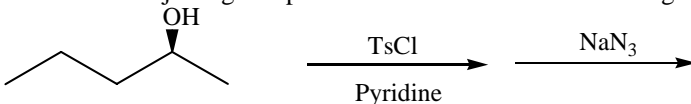


(d)44. Which of the following most favors elimination rather substitution in a reaction with 2-bromopropane?

- (a)sodium methoxide (b)ethanol (c)diisopropyl amine (d)sodium tert-butoxide
- (c)45. Which of the following alcohols reacts fastest with HBr to give the corresponding alkyl bromide?

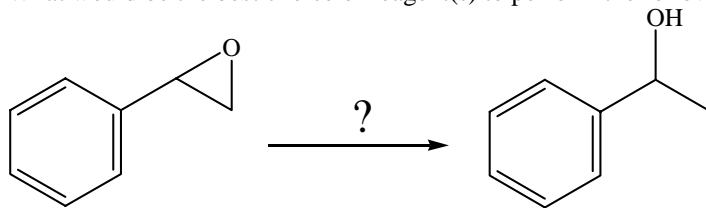


(b)46. What is the major organic product obtained from the following sequence of reactions?



- (a) (\pm) -2-azidopentane (b)(R)-2-azidopentane (c)(S)-2-azidopentane (d)(S)-2-pentyl tosylate

(c)47. What would be the best choice of reagent(s) to perform the following transformation?



- (a) H₂O (b) H₂SO₄, H₂O (c) LiAlH₄ followed by H₃O⁺ (d) KMnO₄
- (c)48. What range of wavelengths corresponds to the infrared region of the electromagnetic spectrum?
(a) 200 - 400 nm (b) 400 - 700 nm (c) 2.5 - 50 μm (d) 2 - 10 mm
- (a)49. Which of the following bonds undergoes stretching at the highest frequency?
(a) O - H (b) C - H (c) C = O (d) C ≡ C
- (b)50. How many positive and negative peaks appear in the DEPT spectrum of 2-methylpentane?
(a) two positive and one negative (b) three positive and two negative
(c) four positive and three negative (d) six positive and one negative