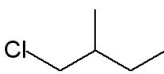

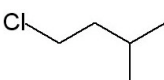
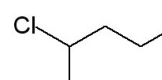


Organic Chemistry

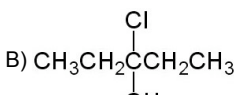
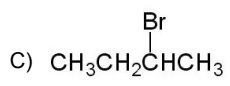
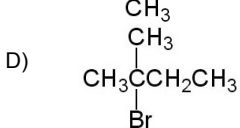
Question 1

Which alkyl chloride will react faster with NaI in acetone?

- A)  B) 
- C)  D) 

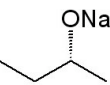
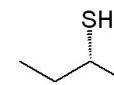
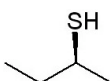
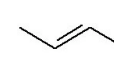
Question 2

Which alkyl halide will react faster with CH_3OH under $\text{S}_{\text{N}}1$ conditions?

- A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ B) 
- C)  D) 

Question 3

Select the major organic product when (*S*)-2-propanol is reacted with SOCl_2 in pyridine followed by the addition of NaSH in ethanol.

- A)  B) 
- C)  D) 

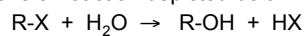
Question 4

Which of the following is not a good nucleophile for an $\text{S}_{\text{N}}1$ reaction?

- A) NaOCH_3
 B) CH_3OH
 C) $\text{CH}_3\text{CH}_2\text{OH}$
 D) H_2O

Question 5

Select the most reactive alkyl halide for the general reaction depicted below:



- A) methyl halide
 B) primary
 C) secondary
 D) tertiary

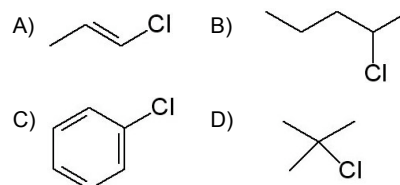
Question 6

The reaction of butyl iodide with NaSCH_3 will proceed at a faster rate in which solvent?

- A) acetone
- B) acetic acid
- C) propanol
- D) water

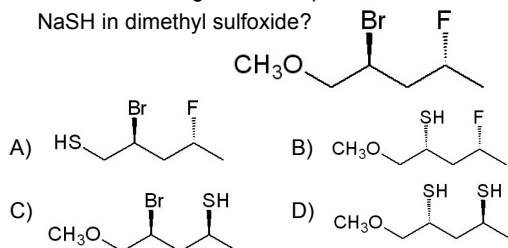
Question 7

Which chloride will react faster with NaI in acetone?



Question 8

What is the major product of the reaction of the dihalide at the right with 1 equivalent of NaSH in dimethyl sulfoxide?



Question 9

Methyl bromide reacts with sodium ethoxide in ethanol by this mechanism:

- A) $\text{S}_\text{N}1$
- B) $\text{S}_\text{N}2$
- C) $\text{E}1$
- D) $\text{E}2$

Question 10

3-bromo-3-methylpentane reacts with sodium ethoxide in ethanol by this mechanism:

- A) $\text{S}_\text{N}1$
- B) $\text{S}_\text{N}2$
- C) $\text{E}1$
- D) $\text{E}2$

Question 11

Reactions proceeding through this mechanism give a racemic mixture:

- A) $\text{S}_\text{N}1$
- B) $\text{S}_\text{N}2$
- C) $\text{E}1$
- D) $\text{E}2$

Question 12

Which one of the following statements is **true**?

- A) $\text{CH}_3\text{CH}_2\text{-S}^-$ is both a stronger base and more nucleophilic than $\text{CH}_3\text{CH}_2\text{-O}^-$
- B) $\text{CH}_3\text{CH}_2\text{-S}^-$ is a stronger base but less nucleophilic than $\text{CH}_3\text{CH}_2\text{-O}^-$
- C) $\text{CH}_3\text{CH}_2\text{-S}^-$ is a weaker base but is more nucleophilic than $\text{CH}_3\text{CH}_2\text{-O}^-$
- D) $\text{CH}_3\text{CH}_2\text{-S}^-$ is both a weaker base and less nucleophilic than $\text{CH}_3\text{CH}_2\text{-O}^-$

Question 13

Which one of the following statements is **true** concerning substitution and elimination in *tert*-butyl bromide?

- A) the mechanism generally believed to be available to $(\text{CH}_3)_3\text{CBr}$ are $\text{S}_{\text{N}}1$ and E1
- B) the mechanism generally believed to be available to $(\text{CH}_3)_3\text{CBr}$ are $\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$ and E1
- C) the mechanism generally believed to be available to $(\text{CH}_3)_3\text{CBr}$ are $\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$ and E2
- D) the mechanism generally believed to be available to $(\text{CH}_3)_3\text{CBr}$ are $\text{S}_{\text{N}}1$, E1 and E2

Question 14

Which one of the solvents below is the most **polar protic** solvent? Dielectric constants (ϵ) are given in parenthesis.

- A) acetic acid ($\epsilon = 6$)
- B) water ($\epsilon = 78$)
- C) methanol ($\epsilon = 33$)
- D) formic acid ($\epsilon = 58$)

Question 15

The best combination of reactants for preparing $(\text{CH}_3)_3\text{CSCH}_3$ is:

- A) $(\text{CH}_3)_3\text{CCl} + \text{CH}_3\text{SK}$
- B) $(\text{CH}_3)_3\text{CBr} + \text{CH}_3\text{SNa}$
- C) $(\text{CH}_3)_3\text{CSK} + \text{CH}_3\text{OH}$
- D) $(\text{CH}_3)_3\text{CSNa} + \text{CH}_3\text{Br}$

Question 16

What combination is the best choice in order to prepare 3-chloro-1-iodobutane?

- A) 1-iodobutane + Cl_2 (400°C)
- B) 1,3-dichlorobutane + NaI (1 equiv) in acetone
- C) 1,3-iodobutane + NaCl (1 equiv) in acetone
- D) 3-bromo-1-iodobutane + NaCl (1 equiv) in acetone

Question 17

Which one of the following compounds gives the highest substitution-to-elimination ratio (most substitution least elimination) on reaction with 2-bromobutane?

- A) NaOCH_3
- B) NaNH_2
- C) $\text{NaC}\equiv\text{N}$
- D) $\text{NaC}\equiv\text{CH}$

Question 18

Which one of the following alkyl halides would be expected to give the highest ratio of substitution to elimination on treatment with sodium ethoxide in ethanol (50°C)?

- A) 1-bromopentane
- B) 2-bromopentane
- C) 3-bromopentane
- D) 2-bromo-3-methylbutane

Question 19

Which combination of reactants will give 1-iodobutane as the major product?

- A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3 + \text{HI} \rightarrow$
- B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} + \text{KI} \rightarrow$
- C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} + \text{NaI}$ in acetone \rightarrow
- D) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 + \text{I}_2$ in water \rightarrow

Question 20

Which one of the following statements does not correctly describe unimolecular nucleophilic substitution ($\text{S}_{\text{N}}1$) reactions of alkyl halides? (" $>$ " means "reacts faster than")

- A) Carbocations are intermediates in unimolecular nucleophilic substitutions.
- B) The order of decreasing reactivity as a function of leaving group is $\text{RI} > \text{RBr} > \text{RCI}$.
- C) The order of alkyl bromide reactivity is $\text{R}_3\text{CBr} > \text{R}_2\text{CHBr} > \text{RCH}_2\text{Br} > \text{CH}_3\text{Br}$.
- D) The rate of an $\text{S}_{\text{N}}1$ reaction depends on the concentration of the nucleophile.