Multiple Choice

1. In the following reaction sequence choose the correct structure for compound (1). text 18.26

\[
\text{EtO} \quad \text{O} \quad \text{O} \quad \text{CH}_3 \quad \xrightarrow{\Theta \text{Et}} \quad (1) \quad \xrightarrow{1. \Theta \text{OH}} \quad \xrightarrow{2. \text{H}_2\text{O}^+ \text{heat}} \quad \text{CO} \quad \text{C}_6\text{H}_{13}\text{CH}_3
\]


2. Choose those compounds that will undergo racemization when treated with base (\(\Theta \text{OH}\)). text 18.2

\[
\text{C}_6\text{H}_5\text{CH}_3 \quad \xrightarrow{\Theta \text{OH}} \quad \text{C}_6\text{H}_5\text{CH}_3
\]

A. i  B. ii  C. iii  D. i and ii  E. i and iii  F. ii and iii
3. Choose the major product of the following reaction sequence. text 18.20d and class quiz

$$\text{ phenyl} \quad \overset{+ \text{Li} \text{N(i-Pr)}_2}{\text{LDA}} \quad \overset{\text{Br-CH}_3}{?} \quad \text{A. i} \quad \text{B. ii} \quad \text{C. iii}$$

D. i and ii  E. i and iii  F. ii and iii

$$\text{i} \quad \text{ii} \quad \text{iii}$$

4. Choose the product of the following reaction sequence. text 19.37b

$$\text{cyclohexene} \quad 1. \text{O}_3 \quad 2. \text{Me}_2\text{S} \quad \overset{\text{OH}}{\text{heat}} \quad ?$$

A  B  C  D  E  F
5. Choose the reactant(s) that would give the product shown in the following reaction sequence. class quiz

\[
\begin{align*}
? & \xrightarrow{\text{EtOH}} \xrightarrow{\text{OH}} \xrightarrow{\text{H}_3\text{O}^+} \text{heat} \rightarrow \\
& \quad \xrightarrow{\text{OEt}} \xrightarrow{\text{OH}} \xrightarrow{\text{H}_3\text{O}^+} \text{heat} \rightarrow \\
& \quad \text{A} \quad \text{B} \quad \text{C} \quad \text{D} \quad \text{E}
\end{align*}
\]

6. Choose the correct structure for cycrimine, a drug used in the treatment of Parkinson’s disease. class quiz

\[
\begin{align*}
\text{benzylketone} & \xrightarrow{\text{MgBr}} \xrightarrow{\text{H}_2\text{O}} \text{cycrimine} \\
\text{A} & \quad \text{B} \quad \text{C} \quad \text{D} \quad \text{E}
\end{align*}
\]
7. Choose the reactant(s) that would give the following compound by an aldol reaction. class quiz

\[
\begin{align*}
\text{?} & \xrightleftharpoons{\text{heat}} \xrightarrow{\text{H}^+} \ \text{CO} \\
\text{O} & \text{H} \\
\text{O} & \text{H} \\
\text{CH}_3\text{OH} & \text{C} \\
\text{O} & \text{H} \\
\text{O} & \text{E} \\
\text{O} & \text{F}
\end{align*}
\]

8. Tobacco smoke contains the following chemicals. From the following extraction procedure on a sample of condensed tobacco smoke where the nicotine would be found? class quiz

\[
\text{H}_3\text{C} \quad \text{N} \quad \text{H}_2\text{N} \quad \text{CH}_3\text{(CH}_2\text{)}_n\text{CO}_2\text{H}
\]

\[
\begin{align*}
\text{phenanthrene} & \xrightarrow{1. \text{dilute HCl}} \xrightarrow{2. \text{ether}} \text{A} \\
\text{nicotine} & \xrightarrow{1. \text{dilute HCl}} \xrightarrow{2. \text{ether}} \xrightarrow{\text{dilute NaOH}} \text{B} \\
\text{steric acid} & \xrightarrow{1. \text{dilute NaOH}} \xrightarrow{2. \text{ether}} \xrightarrow{\text{dilute HCl}} \text{C} \\
\end{align*}
\]

\[
\begin{align*}
\text{ether} & \rightarrow \text{ether} \\
\text{ether} & \rightarrow \text{ether} \\
\text{ether} & \rightarrow \text{ether}
\end{align*}
\]
9. From the following reactions choose those that could be used to prepare aniline.

\[ \begin{align*}
\text{heat} & \quad \text{H}_2\text{O} \\
\text{H}_2\text{O} & \quad \text{H}_2\text{O}
\end{align*} \]

A. i  
B. ii  
C. iii  
D. i and ii  
E. i and iii  
F. ii and iii

10. Choose the order that has the following compounds correctly arranged with respect to increasing basicity.

\[ \begin{align*}
\text{NH}_2 & \quad \text{NH}_2 & \quad \text{HN} & \quad \text{O} \\
i & \quad \text{ii} & \quad \text{iii}
\end{align*} \]

A. i  
B. ii  
C. iii  
D. i and ii  
E. i and iii  
F. ii and iii
Short Answer

11. Give the structure of the major product of the following retro-aldol reaction. 5 pts (WS10 online quiz; q3)

![Retro-aldol reaction diagram]

12. Give the structure of the major product of the following reaction sequence. 5 pts (WS10 pt2; q1)

![Reaction sequence diagram]
13. One of the nitrogen atoms of the following amine is more basic. Draw the conjugate acid derived from the more basic nitrogen atom along with its best resonance structures. (all atoms in these best resonance structures must have an octet of electrons) class quiz 5 pts

\[
\begin{align*}
\text{H}_3\text{C} & \quad \text{N} & \quad \text{CH}_3 \\
\text{Ph} & \quad + & \quad \text{H}^+ \\
\text{conjugate acid and all of its octet resonance structures}
\end{align*}
\]

14. Give reagents that could be used to accomplish the following transformation. The number of arrows does not necessarily correspond to the number of required steps, but more than one reaction will be necessary. Your answer only needs to show the reagents. 5 pts (WS11 pt2; q4)

\[
\begin{align*}
\text{C}_6\text{H}_6 & \quad \rightarrow & \quad ? \\
& \quad \rightarrow & \quad \text{C}_6\text{H}_6\text{F} \\
& \quad & \quad \text{Br}
\end{align*}
\]
15. Using the curved arrow formalism show the bond breaking and bond breaking in the following reaction.

10 pts  class quiz

\[
\begin{array}{c}
\text{O} \\
\text{N} \\
\text{N} \\
\text{HO-CH}_3 \\
\text{heat} \\
\end{array}
\rightarrow
\begin{array}{c}
\text{C} \\
\text{O} \\
\text{A} \\
\text{CH}_3 \\
\text{N} \\
\text{N} \\
\end{array}
\]

16. Three equivalents of formaldehyde undergoes the aldol reaction with compound A to give B. Compound B then reacts with hydroxide ion and formaldehyde to give pentaerythritol, an important industrial material.

10 pts  text 18.31b.

A. Give the structure of A.

B. Give the reaction mechanism for the transformation of B into pentaerythritol
17. Propose a synthesis of norpseudoephedrine from benzene and any other compounds containing four carbon atoms or less. 10 pts, text 20.43