9/11/13

Homework Due Tonight, Tomorrow Night

Exam in 2 weeks.

Wednesday or Thursday evening
or by appointment.

Location to be announced.

Practice exam will be posted soon

\[
\begin{align*}
\text{F} & \quad \text{HNO}_3 \quad \text{H}_2\text{SO}_4 \\
\text{H} & \quad \text{NO}_2 \\

\end{align*}
\]

\[
\begin{align*}
\text{F} & \quad \text{HNO}_3 \quad \text{H}_2\text{SO}_4 \\
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\end{align*}
\]

F is O,P-directing

\[
\begin{align*}
\text{F} & \quad \text{HNO}_3 \quad \text{H}_2\text{SO}_4 \\
\text{H} & \quad \text{NO}_2 \\

\end{align*}
\]
Reaction Rates

\[
\text{Br}_2 \xrightarrow{\text{FeBr}_3 \text{ heat}} \cdot \text{Br}^+ \cdot
\]

1. o, p-directing deactivating
2. 
3. Fastest
4. Slowest

0, p-directors react faster than benzene
activated
m-directors react slower than benzene
deactivated
Fastest

NH₂ is so activated that it reacts at Room Temperature.

Which substituents react at room temperature?

Ar–N  Ar–O  (No catalyst needed)
$\text{C}_3\text{H}_4$ $\xrightarrow{\text{HNO}_3, \text{H}_2\text{SO}_4, \text{heat}} \text{C}_3\text{H}_4\text{NO}_2$

$\text{C}_3\text{H}_4$ $\xrightarrow{\text{fuming, } \text{H}_2\text{SO}_4, \text{heat}} \text{SO}_3$

$\text{SO}_3$ $\xrightarrow{\text{H}_2\text{SO}_4}$

$\text{H}_2\text{O}$ $\xrightarrow{\text{heat}} \text{C}_3\text{H}_4$

$\text{NO}_2$ $\xrightarrow{\text{H}_2\text{O, heat}}$ No Reaction
PENN'S RULE

Acid/Base always occur faster than anything else

N - watch out for m vs o, p-directing

O - no problem. Does not complex with $\text{H}^+$ or Fe
Reaction with $\text{Br}_2 / \text{FeBr}_3$

1. $\text{NH}_2$
2. $\text{CH}_3$
3. $\text{NO}_2$
4. $\text{OCH}_3$

Comparison:
- Reaction of 1 with $\text{NH}_2$ is faster than 3 with $\text{Br}_2$.
- Reaction of 2 with $\text{Br}_2$ is faster than 4 with $\text{FeBr}_3$. Better.
Give the major organic product(s) of the following reaction. Give your answer as a text answer, with the correct answers being listed in alphabetical order. (Example: xxx a b)

\[ \text{H}_2\text{SO}_4, \text{heat} \]

A C

Order the following compounds in their reactivity to \( \text{Br}_2 \), with A being the fastest reacting compound and D being the slowest reacting compound. Give your answer as a text answer, with each letter being separated by a space (Example: xxxx A B C D)

A D B C

Give the major organic product(s) of the following reaction. Give your answer as a text answer, with the correct answers being listed in alphabetical order. (Example: xxx a b)

\[ \text{HNO}_3, \text{H}_2\text{SO}_4, \text{heat} \]

A B C

Give the major organic product(s) of the following reaction. Give your answer as a text answer, with the correct answers being listed in alphabetical order. (Example: xxx a b)

\[ \text{HNO}_3, \text{H}_2\text{SO}_4, \text{heat} \]

E - There is no reaction or the correct product is not listed here.