1. 
   (6) 
   Draw the various resonance structures for the intermediate carbocation ("arenium ion") formed in the bromination of benzene. There are three total resonance structures.

2. 
   (6) 
   Indicate whether the following structures are aromatic according to the Hückel rule. You must explain your answer.

   ![Resonance Structures](attachment:structures.png)
3. (6) Draw the major organic product for the following reactions.

\[
\text{\begin{array}{c}
\text{苯} + \text{CH}_3\text{CH}_2\text{Cl} \xrightarrow{\text{AlCl}_3} \\
\text{苯} + \text{HNO}_3 \xrightarrow{\text{H}_2\text{SO}_4} \\
\text{苯} + \text{Cl}_2 \xrightarrow{\text{Fe}} 
\end{array}}
\]

4. (6) Note the following transformation:

\[
\text{\begin{array}{c}
\text{苯} + \text{C}_4\text{H}_7\text{OCl} \xrightarrow{1) \text{AlCl}_3} \xrightarrow{2) \text{H}_2\text{O}} \text{C}_{10}\text{H}_{12}\text{O} 
\end{array}}
\]

On the following two pages are the \(^{13}\text{C}\) and \(^1\text{H}\) NMR spectra of the product B. Deduce the structure of both B and A.
$^{13}$C spectrum of product ($C_{10}H_{12}O$)

Two signals here!
The multiplicity and integration values are given below the resonances.