Exercise 8: Let’s make polystyrene and other aromatic issues

1. As a review:

\[
\begin{align*}
\text{Mg} & \quad \rightarrow \\
\text{ether} & \\
\text{C}_2\text{H}_5\text{Br} & \\
\rightarrow & \\
\text{CO}_2 & \\
\rightarrow & \\
\text{CH}_3\text{Li} & \\
\rightarrow & \\
\text{H}_3\text{O}^+ & \\
\end{align*}
\]
Many polymers are made through a radical polymerization mechanism. Styrene is the monomer of polystyrene, and has the following structure:

\[
\begin{array}{c}
\text{H}_2\text{C} = \text{CH} \\
\text{\includegraphics[width=1cm]{styrene.png}}
\end{array}
\]

Assume this mechanism needs a radical initiator, such as a peroxide of the form \( \text{RO—OR} \)

2. Write the initiation step of the peroxide homolytically cleaving.

3. Write the initiation step of the radical adding to the styrene and forming a radical.

4. Write the propagation step of the radical created in step 3 reacting with another styrene and forming another radical.
5. Write another propagation step of the radical created in step 4 reacting with another styrene and forming another radical.

6. Write a termination step in which the radical created in step 5 meets the radical created in step 4.

7. Decide if the following molecules are aromatic, anti-aromatic or simply not aromatic.

![Molecule 1](image1.png)
![Molecule 2](image2.png)
![Molecule 3](image3.png)
8. If

and then, using those pieces of information, supply the missing reactant in the following reaction: