1. The general reaction is:

\[ \text{H}_2\text{N-S-} \xrightarrow{\text{NH}_2} \text{NH}_2 \xrightarrow{\text{HCl}} \text{H}_2\text{N-} \xrightarrow{\text{N}_2\text{O}_2} \text{N}_2 \xrightarrow{\text{R}} \text{R} \]

2. Vary substituents on the aromatic rings to access the analogs shown in the problem.

\[ \text{R} \xrightarrow{\text{O}=\text{N-}} \text{OH}_2 \xrightarrow{\text{H}^+} \text{R} \xrightarrow{\text{O}=\text{N-}} \text{OH}_2 \xrightarrow{\text{H}^+} \]

3. Common reactions of aromatic diazonium ions involve DISPLACEMENT. Sandmeyer Rxn is an example.

\[ \text{R-N}_2 \xrightarrow{\text{CuCl}} \text{R-Cl} + \text{N}_2 \]
5. Two possible reasons:

1. The target in vivo may be different than the target utilized in the in vitro assay.

2. Based upon our understanding of prontosil, we could guess that the compound is a prodrug and is reduced to the two arylamines—one of which is the true active drug.
6. a) \[ \text{structure image} \]
   
   b) 1. \( \text{HSO}_3\text{Cl}, H^+ \)
   
   2. \( \text{structure image} \)

   c) 1. \( \text{HSO}_3\text{Cl}, H^+ \)
   
   2. \( \text{structure image} \)