Problem of the Day 15  
Section 4.3  
Question 4.13

Products $P$, $Q$, and $R$ result from adding HBr to 1,3-butadiene. Each of these products still contains a double bond and could add another equivalent of HBr. Which, if any, of the second addition reactions is expected to be regioselective? Explain.

**ORIGINAL**

1,3-butadiene  \[ \xrightarrow{\text{HBr}} \]  product $P$  \[ \xrightarrow{\text{HBr}} \]  product $Q$  \[ \xrightarrow{\text{HBr}} \]  product $R$

**POD**

**product $P$**

**regioselectivity predicted in this direction**

**product $Q$**

no significant regioselectivity predicted based upon carbocation differences

**product $R$**

$Q$ and $R$ result in the same mixture of compounds, relative proportions are not predictable

no significant regioselectivity predicted based upon carbocation differences