Reaction Order and Rate Law

1. Consider the general reaction,

$aA + bB \rightarrow cC + dD$

The rate law for this reaction is: $rate = k[A]^m[B]^n$

If the order with respect to [A] is one and the order with respect to [B] is 2, write the rate law. What is the overall reaction order? What are the units for k if time is in seconds?

Rate = $k[A][B]^2$ Overall order is 3. The units for k are $M^{-2}\ s^{-1}$

2. Consider the following reaction.

$BrO_3^- + 5Br^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$

The rate law is: $rate = k[BrO_3^-][Br^-][H^+]^2$

a) what is the order with respect to each reactant?

First order w.r.t BrO_3^- and Br^-
Second order w.r.t H^+

b) what is the overall order of reaction?

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c) by what factor will the rate change if the concentration of $[BrO_3^-]$ is quadrupled?

The rate will quadruple

d) by what factor will the rate change if the concentration of Br^- is decreased by one-half?

The rate will decrease by 1/2

e) by what factor will the rate change if Br^- and BrO_3^- are both doubled?

The rate will double