Chemical Kinetics II **Name:** _____ **due next class**

1) Write out a plausible rate expression for each elementary reaction below: (1pt each)

a. **$H_{2\,(g)} + Br_{2\,(g)} \rightarrow 2\,HBr_{\,(g)}$** **rate $\propto [H_2]\,[Br_2]$**

b. $Cl_{2\,(g)} + Br_{2\,(g)} \rightarrow 2\,ClBr_{\,(g)}$ rate $\propto [Cl_2][Br_2]$

c. $2\,H_{2\,(g)} + O_{2\,(g)} \rightarrow 2\,H_2O_{\,(g)}$ rate $\propto [H_2]^2[O_2]$

d. $N_{2\,(g)} + 2\,O_{2\,(g)} \rightarrow 2\,NO_{2\,(g)}$ rate $\propto [N_2][O_2]^2$

2) What would happen to the rate of reaction in **1b** above if: (1 pt each)

a. The $[Cl_2]$ were suddenly tripled?

×3

b. The $[Cl_2]$ were halved?

½

c. The $[Cl_2]$ were doubled and the $[Br_2]$ were doubled?

×4

d. The $[Cl_2]$ were quadrupled (x 4) and the $[Br_2]$ were doubled?

×8

3) What would happen to the rate of reaction in **1d** above if: (1 pt each)

a. The $[N_2]$ were suddenly doubled?

×2

b. The $[O_2]$ were doubled?

×4

c. The $[N_2]$ were doubled and the $[O_2]$ were tripled?

$2 \times 3^2 = 2 \times 9 = 18$

4) Explain, using the collision theory, why the rate of rxn 1a would double if the $[H_2]$ were to double. (2)

If $[H_2]$ were to double it would be twice as likely for a Br_2 molecule to collide with a H_2 molecule. ∴ the rate doubles

5) What is a catalyst and how does it work? (3)

- Speeds up a reaction
- Lowers the Ea (multiple steps)
- Does not get used up (not consumed)