Chem 142 Quiz 1 Spring 2015

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Key\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Instructor: Martin Larter

Last First

1. Write the rate expression for the reaction N2 + 3 H2 🡪 2 NH3

Rate = 

1. According to the following **unbalanced** reaction, if the rate of appearance of oxygen gas is 4.00 x 10-2 M/s, what is the rate of disappearance of KClO3 (g)?

**\_\_\_\_**KClO3(g) →  **\_\_\_\_** KCl(g) +  **\_\_\_\_\_**O2(g) *(high Temp rxn)*

-[KClO3] / 2t = [O2] / 3t

-[KClO3] / t = (2/3)(0.0400 M/s) = **-0.0267 M/s,** so choice A (disappearance implies the negative)

1. The following data were collected for the reaction of BF3(g) + NH3(g) 🡪 F3BNH3(g):

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment | [BF3] (M) | [NH3] (M) | Rate (M/s) |
| 1 | 0.250 | 0.250 | 0.2130 |
| 2 | 0.250 | 0.125 | 0.1065 |
| 3 | 0.200 | 0.100 | 0.0544 |
| 4 | 0.350 | 0.100 | 0.1666 |
| 5 | 0.175 | 0.100 | 0.0417 |

1. What is the overall rate law for this reaction (show mathematically)?

\_\_**rate = k[BF3]2[NH3]**\_\_\_\_\_\_\_\_

rate 1 / rate 2: constant [BF3], rate doubles and [NH3] doubles; [NH3] is 1st order

rate 4 / rate 5: constant [NH3], rate quadruples and [BF3] doubles; [BF3] is 2nd order

b) What is the overall order of the reaction? \_\_\_1+2 = **3rd order**\_\_\_\_\_\_\_\_\_\_

c) What is the value of the rate constant (with correct units)? \_\_**k = 13.6 M-2 s-1**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

experiment 1: 0.2130 M/s = k(0.250 M)2(0.250 M)

1. Am-241 is used in smoke detectors found in homes. Its half-life is 432.2 years. How long will it take (for this first order reaction) 14.5% of Am-241 to decay to Np-237?

