Week 2 – January 17, 2018

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Compound | Lewis Structure | Electronic Geometry | Molecular Geometry, Bond Angle | Is this molecule polar? | Hybridization of  central atom |
| XeF3- |  |  |  |  |  |
| SBr2 |  |  |  |  |  |
| I3- |  |  |  |  |  |
| SF5– |  |  |  |  |  |
| PF3 |  |  |  |  |  |

|  |  |
| --- | --- |
| **Time (s)** | **Moles of H2** |
| 0 | 8.54 |
| 15 | 7.44 |
| 30 | 6.29 |
| 45 | 5.16 |
| 60 | 4.09 |

1. The data to the right was collected for the reaction below. What is the average rate of ammonia (NH3) formation from 30-60s if this experiment was performed in a 2.00 L flask?

2N2 (g) + 3H2 (g) → 2NH3 (g)

|  |  |  |
| --- | --- | --- |
| **[HgCl2]** | **[C**2**O**4**2-]** | **Initial Rate (mol/Ls)** |
| 0.10 | 0.10 | 1.3 x 10-7 |
| 0.10 | 0.20 | 5.2 x 10-7 |
| 0.20 | 0.20 | 1.0 x 10-6 |
| 0.20 | 0.10 | 2.6 x 10-7 |

1. The rate of the reaction, HgCl2(*aq*) + C2O42-(*aq*) → Cl-(*aq*) + CO2(*g*) + Hg2Cl2(*s*), is followed by measuring the number of moles of Hg2Cl2 that precipitate per liter per second. What is the rate constant and overall rate order?
2. The rate law for the reaction: NH4+(*aq*) + NO2 –(*aq*) → N2(*g*) + 2H2O(*l*)

is given by rate = *k*[NH4+][NO2 –]. At 25°C, the rate constant is 3.0×10–4 M–1 s–1. Calculate the rate of reaction at this temperature if [NH4+] = 0.36 M and [NO2 –] = 0.075 M. What is the rate of H2O production?

1. Determine the overall orders of the reactions to which the following rate laws apply:
   1. rate = *k*[NO2]2
   2. rate = *k*
   3. rate = *k*[H2]2[Br2]1/2
   4. rate = *k*[NO]2[O2]
2. Write the reaction rate expressions for the following reactions in terms of the disappearance of the reactants and the appearance of products:
   1. 2NO2 → 2NO + O2
   2. 4NH3 + 5O2 → 4NO + 6H2O
   3. 2NO2 (g) + Cl2 (g) → 2NO2Cl (g)