

# CHM 1001 General Chemistry

## Assignment Answers

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### Part 1: Multiple-choice questions

Question No.	Answers
1	A
2	D
3	E
4	E
5	D
6	A
7	B
8	D
9	A
10	E
11	B
12	B
13	A
14	C
15	<del>B</del> D
16	<del>A</del> B
17	D
18	E
19	C
20	C
Grades	

### Part 2: Short answer questions (You can add pages if needed)

$$1) m_{H_2O} = \frac{100 \text{ gr}}{35.7 \text{ gr}} \cdot 500.0 \text{ gr} = 1400.56 \text{ gr}$$

$$V_{H_2O} = \frac{m_{H_2O}}{\rho_{H_2O}} = \frac{1400.56 \text{ gr}}{1.0 \text{ gr/ml}} = 1400.56 \text{ ml} \approx 1.4 \text{ L}$$

$$2) \text{rate} = k [NO_3]^2 [O_2]^3$$

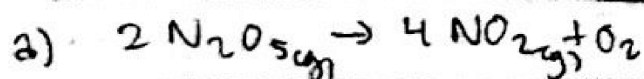
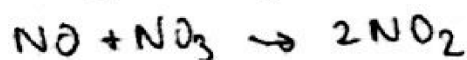
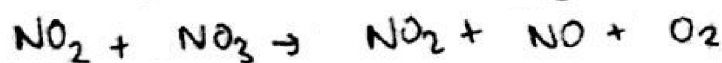
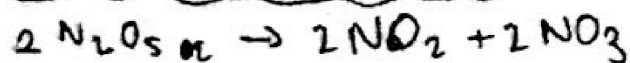
$$\frac{(2)}{(1)} = \frac{1 \cdot 10^{-5} \text{ mol/L}}{2 \cdot 10^{-5} \text{ mol/L}} = \frac{k (4.6 \cdot 10^{-5})^2 (3.0 \cdot 10^{-5})^3}{k (2.3 \cdot 10^{-5})^2 (3.0 \cdot 10^{-5})^3} = 2 \cdot 10^{-5} (2 \cdot 10^{-5})^2$$

$$\frac{(3)}{(2)} = \frac{2 \cdot 10^{-5} \text{ mol/L}}{1 \cdot 10^{-5} \text{ mol/L}} = \frac{k (4.6 \cdot 10^{-5})^2 (6.0 \cdot 10^{-5})^3}{k (4.6 \cdot 10^{-5})^2 (3.0 \cdot 10^{-5})^3} = (2.0 \cdot 10^{-5})^3$$

$$1.0 \cdot 10^{-5} = k (2.3 \cdot 10^{-5})^2 (3.0 \cdot 10^{-5})^3 \Rightarrow k = 14492.75 \text{ mol}^{-1} \text{ L s}^{-1}$$

rate law =  $(14492.75 [NO_3]^2 [O_2]^3) \text{ mol/Ls}$

3. (2) step 1 + step 2 + step 3:



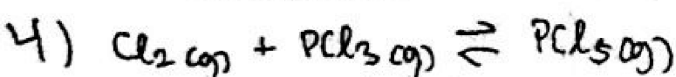
The mechanism is plausible

b)  $\text{NO}$  and  $\text{NO}_3$

c) step 1: unimolecular

step 2: bimolecular

step 3: bimolecular



$$0.015 \text{ M} \quad 0.050 \text{ M} \quad -$$

$$-x \text{ M} \quad -x \text{ M} \quad +x \text{ M}$$

$$0.015 \text{ M} - x \text{ M} \quad 0.050 \text{ M} - x \text{ M} \quad +x \text{ M}$$

$$K_c = 33 = \frac{[\text{PCl}_5]}{[\text{PCl}_3][\text{Cl}_2]}$$

$$33 (0.015 - x)(0.050 - x) = x$$

$$x_1 = 0.08665 \dots \text{ (impossible)}$$

$$x_2 = 0.00866 \dots$$

when equilibrium state:

$$[\text{PCl}_5] = 0.00866 \text{ M}$$

$$[\text{PCl}_3] = 0.04134 \text{ M}$$

$$[\text{Cl}_2] = 0.00634 \text{ M}$$