

Chem 115
Sample Exam 1
Answer Key

Part I. Multiple choice

page 2:

- 1. B
- 2. E
- 3. D
- 4. A

page 3:

- 5. A
- 6. A
- 7. B
- 8. A
- 9. C
- 10. C

page 4:

- 11. A
- 12. B
- 13. A
- 14. B

page 5:

- 15. D
- 16. D
- 17. A
- 18. B

Part II. Problems

1. each answer worth 2 points, give 1 point partial credit if half correct

- a) sodium chloride
hydrochloric acid
chlorous acid
methane
nickel (II) nitrite

- b) CaF_2
 N_2O_4
 NH_4MnO_4
HOBr or HBrO
 FeSO_4

2. a) worth 4 pts

one correct conversion: 2 pts
both conversions correct: 4 pts
sig fig error: -1 pt

$$1.39 \text{ g Cl}_2 \times \frac{1 \text{ mol}}{70.90 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 1.18 \times 10^{23} \text{ molecules}$$

intermediate answers possible: 0.0196 mol

b) worth 6 pts

one correct conversion: 2 pts
two correct conversions: 4 pts
three correct conversions: 6 pts
sig fig error: -1 pt

$$1.39 \text{ g Cl}_2 \times \frac{1 \text{ mol Cl}_2}{70.90 \text{ g Cl}_2} \times \frac{2 \text{ mol NO}_2\text{Cl}}{1 \text{ mol Cl}_2} \times \frac{81.46 \text{ g NO}_2\text{Cl}}{1 \text{ mol NO}_2\text{Cl}} = 3.19 \text{ g NO}_2\text{Cl}$$

intermediate answers possible:

0.0196 mol Cl_2 and 0.0392 mol NO_2Cl

Extra credit: There are many ways to approach this. Here is one.
Max moles of NO_2Cl that could be made from each reactant if all of it is consumed:

$$2.10 \text{ g NO}_2 \times \frac{1 \text{ mol NO}_2}{46.01 \text{ g NO}_2} \times \frac{2 \text{ mol NO}_2\text{Cl}}{2 \text{ mol NO}_2} = 0.0456 \text{ mol NO}_2\text{Cl}$$

$$2.00 \text{ g Cl}_2 \times \frac{1 \text{ mol Cl}_2}{70.90 \text{ g Cl}_2} \times \frac{2 \text{ mol NO}_2\text{Cl}}{1 \text{ mol Cl}_2} = 0.0564 \text{ mol NO}_2\text{Cl}$$

NO_2 would get used up first, so it is the limiting reagent