Chemistry 115 Name

Dr. Cary Willard

Quiz 7a (20 points) March 31, 2011

All work must be shown to receive credit. Avogadro’s number = 6.022 x 1023/mol

Acetonitrile, C3H3N, is the starting material for the production of a kind of synthetic fiber (acrylics). It can be made from propylene, C3H6, by reaction with nitric oxide, NO.

4 C3H6*(g)* + 6 NO*(g)* 🡪 4 C3H3N*(g)* + 6 H2O*(g)* + N2*(g)*

1. (3 points) How many molecules of water will be formed by the reaction of 16 molecules of propylene with excess nitric oxide?

$$?molec H\_{2}O=16 molec C\_{3}H\_{6}×\frac{6 molec H\_{2}O}{4 molec C\_{3}H\_{6}}=24 molec H\_{2}O$$

1. (10 points) How many grams of nitrogen gas will result from the reaction of 10.0 grams of propylene with 10.0 grams of nitric oxide?

$$?g N\_{2}=10.0 g C\_{3}H\_{6}×\frac{1 mol C\_{3}H\_{6}}{42.08 g C\_{3}H\_{6}}×\frac{1 mol N\_{2}}{4 mol C\_{3}H\_{6}}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=1.62 g N\_{2} $$

$$?g N\_{2}=10.0 g NO×\frac{1 mol NO}{30.01 g NO}×\frac{1 mol N\_{2}}{6 mol NO}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=$$

 Which reagent is in excess? Propylene, C3H6

 Which reagent is limiting? Nitric oxide, NO

 If 2.47 grams of nitrogen gas are produced, what is the percent yield?

$$\% yield=\left(\frac{mass N\_{2} produced }{mass N\_{2} expected}\right)×100\left(\%\right)=\left(\frac{2.47 g}{1.56 g}\right)×100\left(\%\right)=158 \% yield$$

1. (7 points) Draw Lewis electron dot structures for each of the following atoms/molecules. Be sure to show all valence electrons as either bonds or lone pairs!
	1. Cl 
	2. O2 
	3. PBr3 

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Quiz 7b (20 points) March 31, 2011

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Acetonitrile, C3H3N, is the starting material for the production of a kind of synthetic fiber (acrylics). It can be made from propylene, C3H6, by reaction with nitric oxide, NO.

4 C3H6*(g)* + 6 NO*(g)* 🡪 4 C3H3N*(g)* + 6 H2O*(g)* + N2*(g)*

1. (3 points) How many molecules of water will be formed by the reaction of 24 molecules of propylene with excess nitric oxide?

$$?molec H\_{2}O=24 molec C\_{3}H\_{6}×\frac{6 molec H\_{2}O}{4 molec C\_{3}H\_{6}}=36 molec H\_{2}O$$

1. (10 points) How many grams of nitrogen gas will result from the reaction of 15.0 grams of propylene with 15.0 grams of nitric oxide?

$$?g N\_{2}=15.0 g C\_{3}H\_{6}×\frac{1 mol C\_{3}H\_{6}}{42.08 g C\_{3}H\_{6}}×\frac{1 mol N\_{2}}{4 mol C\_{3}H\_{6}}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=2.50 g N\_{2} $$

$$?g N\_{2}=15.0 g NO×\frac{1 mol NO}{30.01 g NO}×\frac{1 mol N\_{2}}{6 mol NO}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=$$

 Which reagent is in excess? Propylene, C3H6

 Which reagent is limiting? Nitric oxide, NO

 If 1.87 grams of nitrogen gas are produced, what is the percent yield?

$$\% yield=\left(\frac{mass N\_{2} produced }{mass N\_{2} expected}\right)×100\left(\%\right)=\left(\frac{1.87 g}{2.33 g}\right)×100\left(\%\right)=80.3\% yield$$

1. (7 points) Draw Lewis electron dot structures for each of the following atoms/molecules. Be sure to show all valence electrons as either bonds or lone pairs!
	1. S 
	2. N2 
	3. NF3 

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Quiz 7c (20 points) April 5, 2011

All work must be shown to receive credit. Avogadro’s number = 6.022 x 1023/mol

Acetonitrile, C3H3N, is the starting material for the production of a kind of synthetic fiber (acrylics). It can be made from propylene, C3H6, by reaction with nitric oxide, NO.

4 C3H6*(g)* + 6 NO*(g)* 🡪 4 C3H3N*(g)* + 6 H2O*(g)* + N2*(g)*

1. (3 points) How many molecules of acetonitrile will be formed by the reaction of 24 molecules of nitric oxide with excess polypropylene?

$$?molec C\_{3}H\_{6}N=24 molec NO×\frac{4 molec C\_{3}H\_{6}N}{6 molec NO}=16 molec C\_{3}H\_{6}N$$

1. (10 points) How many grams of nitrogen gas will result from the reaction of 25.0 grams of propylene with 25.0 grams of nitric oxide?

$$?g N\_{2}=25.0 g C\_{3}H\_{6}×\frac{1 mol C\_{3}H\_{6}}{42.08 g C\_{3}H\_{6}}×\frac{1 mol N\_{2}}{4 mol C\_{3}H\_{6}}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=4.16 g N\_{2} $$

$$?g N\_{2}=25.0 g NO×\frac{1 mol NO}{30.01 g NO}×\frac{1 mol N\_{2}}{6 mol NO}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=$$

 Which reagent is in excess? Propylene, C3H6

 Which reagent is limiting? Nitric oxide, NO

 If 2.87 grams of nitrogen gas are produced, what is the percent yield?

$$\% yield=\left(\frac{mass N\_{2} produced }{mass N\_{2} expected}\right)×100\left(\%\right)=\left(\frac{2.87 g}{3.89 g}\right)×100\left(\%\right)=73.8\% yield$$

1. (7 points) Draw Lewis electron dot structures for each of the following atoms/molecules. Be sure to show all valence electrons as either bonds or lone pairs!
	1. B 
	2. CO2 
	3. PCl3 

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Quiz 7d (20 points) April 5, 2011

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Acetonitrile, C3H3N, is the starting material for the production of a kind of synthetic fiber (acrylics). It can be made from propylene, C3H6, by reaction with nitric oxide, NO.

4 C3H6*(g)* + 6 NO*(g)* 🡪 4 C3H3N*(g)* + 6 H2O*(g)* + N2*(g)*

1. (3 points) How many molecules of acetonitrile will be formed by the reaction of 36 molecules of nitric oxide with excess polypropylene?

$$?molec C\_{3}H\_{6}N=36 molec NO×\frac{4 molec C\_{3}H\_{6}N}{6 molec NO}=24 molec C\_{3}H\_{6}N$$

1. (10 points) How many grams of nitrogen gas will result from the reaction of 35.0 grams of propylene with 35.0 grams of nitric oxide?

$$?g N\_{2}=35.0 g C\_{3}H\_{6}×\frac{1 mol C\_{3}H\_{6}}{42.08 g C\_{3}H\_{6}}×\frac{1 mol N\_{2}}{4 mol C\_{3}H\_{6}}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=5.83 g N\_{2} $$

$$?g N\_{2}=35.0 g NO×\frac{1 mol NO}{30.01 g NO}×\frac{1 mol N\_{2}}{6 mol NO}×\frac{28.02 g N\_{2}}{1 mol N\_{2}}=$$

 Which reagent is in excess? Propylene, C3H6

 Which reagent is limiting? Nitric oxide, NO

 If 4.71 grams of nitrogen gas are produced, what is the percent yield?

$$\% yield=\left(\frac{mass N\_{2} produced }{mass N\_{2} expected}\right)×100\left(\%\right)=\left(\frac{4.71 g}{5.45 g}\right)×100\left(\%\right)=86.4\% yield$$

1. (7 points) Draw Lewis electron dot structures for each of the following atoms/molecules. Be sure to show all valence electrons as either bonds or lone pairs!
	1. Na 
	2. CO2 
	3. PBr3 