Quiz 7A

1. Complete the sentences below (2 points):
	1. (Oxidation/Reduction) is the gain of electrons.
	2. In the reaction below (Mg/H) is the less active species.

Mg (s) + 2 HCl (aq) 🡪 MgCl2 (aq) + H2 (g)

1. Sodium metal and nitrogen gas, N2, combine to form solid sodium nitride, Na3N.
	1. Write the balanced chemical equation (14 points).

6 Na (s) + N2 (g) 🡪 2 Na3N (s)

* 1. If 55.01 g of nitrogen gas is mixed with excess sodium metal, what mass of sodium nitride is formed?

$$55.01 g N\_{2} ×\frac{1 mol N\_{2}}{28.02 g N\_{2}}×\frac{2 mol Na\_{3}N}{1 mol N\_{2}}×\frac{82.98 g Na\_{3}N }{1 mol Na\_{3}N}=325.8 g Na\_{3}N$$

* 1. If the reaction in part b has a percent yield of 75.2%, how much sodium nitride is actually produced?

$$\% yield=\frac{m\_{produced}}{m\_{expected}}×100⇒m\_{produced}=\frac{\left(\% yield\right)(m\_{expected})}{100}$$

$$m\_{produced}=\frac{(75.2)(325.8 g)}{100}=245 g Na\_{3}N actually produced$$

* 1. How many atoms of sodium metal react with excess nitrogen gas if 0.578 moles of sodium nitride are produced?

$0.578 mol Na\_{3}N×\frac{6 mol Na}{2 mol Na\_{3}N}×\frac{6.022 ×10^{23} atoms Na}{1 mol Na}=1.04 ×10^{24} atoms Na $

1. Describe the following equation in terms of number of moles:

2 Ga (s) + 3 Cl2 (g) 🡪 2 GaCl3 (s)

Two moles of solid gallium react with 3 moles of chlorine gas to produce 2 moles of gallium chloride.

Quiz 7B

1. Describe the following equation in terms of the number of particles (4 points):

4 HCl (g) + O2 (g) 🡪 2 Cl2 (g) + 2 H2O (g)

Four molecules of hydrogen chloride gas react with one molecule of oxygen gas to produce two molecules of chlorine gas and two molecules of water vapor.

1. Sodium metal and nitrogen gas, N2, combine to form solid sodium nitride, Na3N.
	1. Write the balanced chemical equation (14 points).

6 Na (s) + N2 (g) 🡪 2 Na3N (s)

* 1. If 75.0 g of sodium is mixed with excess nitrogen gas, what mass of sodium nitride is formed?

$$75.0 g Na×\frac{1 mol Na}{22.99 g Na}×\frac{2 mol Na\_{3}N}{6 mol Na}×\frac{82.98 g Na\_{3}N }{1 mol Na\_{3}N}=90.2 g Na\_{3}N$$

* 1. If the reaction in part b has a percent yield of 90%, how much sodium nitride is actually produced?

$$\% yield=\frac{m\_{produced}}{m\_{expected}}×100⇒m\_{produced}=\frac{\left(\% yield\right)(m\_{expected})}{100}$$

$$m\_{produced}=\frac{(90)(90.2 g)}{100}=81 g Na\_{3}N actually produced$$

* 1. How many moles of nitrogen gas react with excess sodium metal if 4.56 x 1024 molecules of sodium nitride are produced?

$$4.56×10^{24} molecules Na\_{3}N×\frac{1 mol Na\_{3}N}{6.022 ×10^{23} molecles Na\_{3}N}×\frac{1 mol N\_{2}}{2 mol Na\_{3}N}=3.786117569 mol N\_{2}≈3.79 mol N\_{2} $$

1. Complete the sentences below (2 points):
	1. (Oxidation/Reduction) is the loss of electrons.
	2. In the reaction below (Mg/H) is the more active species.

Mg (s) + 2 HCl (aq) 🡪 MgCl2 (aq) + H2 (g)