Practice Set: CHEM 1211 Refresher KEY

1) [redacted]

[redacted]

[redacted]

First, ALWAYS make sure that the equation you are working with is balanced. When comparing the two sides of the equation, we can see that the number of hydrogen and sulfur atoms is not even. The balanced equation for this reaction is shown below:

$$CH_4(g) + 4\ S(g) \rightarrow CS_2(g) + 2\ H_2S(g)$$

We know that the equation for percent yield is:

$$\%\ \text{yield} = \frac{actual\ yield}{theoretical\ yield}\ x\ 100\%$$

In our problem, we are given the %yield and the actual yield, leaving us to solve for theoretical yield.

$.84 = \frac{77.34}{x}$ x = 92.07 g CS_2

Finally, we will use dimensional analysis to arrive at our answer:

$$\frac{92.07\ g\ CS_2}{} \left| \frac{1\ mol\ CS_2}{76.13\ g\ CS_2} \right| \frac{4\ mols\ S}{1\ mol\ CS_2} \left| \frac{32.06\ g\ S}{1\ mol\ S} \right| = \underline{155.1\ g\ S}$$

2) [redacted]

[redacted]

[redacted]

a) [redacted]

$$\frac{77.77\ g\ Br_2}{} \left| \frac{1\ mol\ Br_2}{159.89\ g\ Br_2} \right| \frac{1\ mol\ Al_2Br_6}{3\ mol\ Br_2} \left| \frac{533.36\ g\ Al_2Br_6}{1\ mol\ Al_2Br_6} \right| = 86.48\ g\ Al_2Br_6$$

Limiting reagent

9.760 g Al	1 mol Al	1 mol Al_2Br_6	533.36 g Al_2Br_6 =	96.47 g Al_2Br_6
	26.98 g Al	2 mol Al	1 mol Al_2Br_6	

Excess reagent

b) [redacted]

77.77 g Br_2	1 mol Br_2	1 mol Al_2Br_6	533.36 g Al_2Br_6	= 86.48 g Al_2Br_6
	159.89 g Br_2	3 mol Br_2	1 mol Al_2Br_6	

Remember: you can't make more product than there is limiting reagent present!

c) [redacted]

77.77 g Br_2	1 mol Br_2	2 mol Al	26.98 g Al	= 8.749 g
	159.89 g Br_2	3 mol Br2	1 mol Al	

9.760 g – 8.749 g = 1.011 g remaining of excess reagent.

3) [redacted]

Cl

[redacted]

[redacted]: $SiFCl_2$

[redacted]: H_3AsO_4

[redacted]: $Si_2F_2Cl_4$

[redacted]: H_3AsO_4

4) [redacted]

Empirical formula = CH_2 = 14 g/mol

Ratio = $\frac{molecular}{empirical}$ → $\frac{70.1\ g}{14\ g}$ ~ 5

CH_2 x 5 = C_5H_{10} for the molecular formula

5) [redacted]

[redacted]

C-H < C-N < N-H < C-O < O-H

The greater the difference the electronegativity is between two atoms, the more polar the bond is!

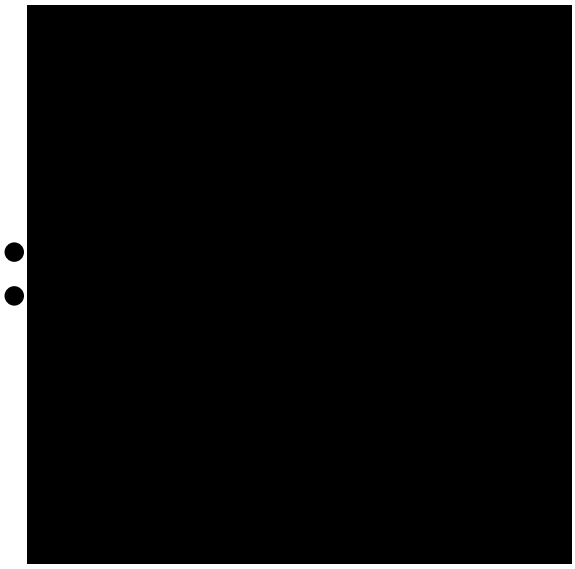
6) [redacted]

a) [redacted]

[redacted] Trigonal planar

[redacted] Trigonal planar

b) [redacted]



[redacted] Seesaw

[redacted] Trigonal bipyramidal

c) [redacted]

[redacted]: Linear

[redacted] Linear

7) [redacted]

[redacted]

a) [redacted]

The left most structure is not likely to be found in nature due to the large formal charge that is present.

b) [redacted]

The right most structure is better than the middle structure because the negative formal charge is present on the most electronegative element.

8) [redacted]

a) [redacted]

Not a valid resonance structure.

b) [redacted]

Not a valid resonance structure.

c)

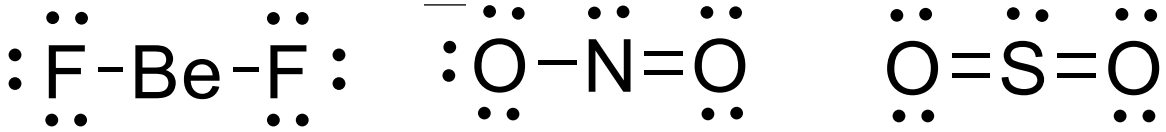
[redacted]

Valid resonance structure.

9) [redacted]

Molecule 1 would have a lower amount of intermolecular forces since it boils at a lower temperature.

10) [redacted]



Linear Bent Bent

BeF2 is different