2.47 balanced equation: $CO + 2H_2 \longrightarrow CH_3OH$

(a) molar amounts of CO & H_2 initially present:

$10.0\ g\ CO \times \frac{1\ mol\ CO}{28.0109\ g\ CO} = 0.357\ mol\ CO$

$10.0\ g\ H_2 \times \frac{1\ mol\ H_2}{2.0159\ g\ H_2} = 4.96\ mol\ H_2$

carbon monoxide is the limiting reagent, because, Give 0.357 mole CO, only 0.714 mol H_2 will react.

(b) $0.357\ mol\ CO \times \frac{1\ mol\ CH_3OH}{mol\ CO} \times \frac{32.042\ g\ CH_3OH}{1\ mol\ CH_3OH} = 11.4\ g\ CH_3OH$

(c) CO, the limiting reagent, disappears completely. Of the original 4.96 mol H_2, only 0.714 mol reacts. the amount H_2 left is:

$(4.96 - 0.714)\ mol\ H_2 \times \frac{2.0159\ g\ H_2}{mole\ H_2} = 8.56\ g\ H_2$ "in excess"

2.48 theoretical yield = 11.4 g

actual yield = 10.0 g.

percent yield = $\frac{10.0\ g}{11.4\ g} \times 100\% = 87.7\%$

Chapter 3

3.2 Sulfite: SO_3^{2-} $-2 = 3(-2) + x$ $x = +4$

so charge of S is +4

Sulfate: SO_4^{2-} $-2 = 4(-2) + x$ $x = +6$

so charge on S is +6

3.5 (as above) PO_4^{3-} contains phosphorous +5 while PO_3^{3-} contains phosphorous +3

3.6 carbon attracts more e^- in C_3H_8

(in CO_3^{2-} & CO, oxygen attracts more e^-)