Homework Answers 2/07/12

→12. [a] $C_{12}H_{22}O_{11}(s) \rightarrow C(s) + H_2O(g)$

STEP 1. Balance equation: $C_{12}H_{22}O_{11}(s) \rightarrow \underline{12}\, C(s) + \underline{11}\, H_2O(g)$

STEP 2. Multiply through: $.250\,(C_{12}H_{22}O_{11}(s) \rightarrow \underline{12}\, C(s) + \underline{11}\, H_2O(g))$

$.250\, C_{12}H_{22}O_{11}(s) \rightarrow 3\, C(s) + 2.75\, H_2O(g)$

STEP 3. Clarify answer: .250 moles of $C_{12}H_{22}O_{11}$ will form

$\therefore$ 3.00 moles of C + 2.75 moles H_2O

[b] 0.750 moles of SO_2 + .500 moles of H_2O

[c] 0.500 moles Bi + 0.375 moles O_2

[d] 0.250 moles SO_2 + 0.250 moles H_2O

16. [a] $KO_2(s) + H_2O(l) \rightarrow O_2(g) + KOH(s)$

STEP 1. Balance equation: $4\,KO_2(s) + 2\,H_2O(l) \rightarrow 3O_2(g) + 4\,KOH(s)$

STEP 2. Divide by 4 to get a "1" in front of the second product: $\left(4\,KO_2(s) + 2\,H_2O(l) \rightarrow 3O_2(g) + 4\,KOH(s)\right)/4$

$KO_2(s) + \frac{1}{2}\,H_2O(l) \rightarrow \frac{3}{4}\,O_2(g) + KOH(s)$

STEP 3. Multiply by 0.625: $0.625(KO_2(s) + \frac{1}{2}\,H_2O(l) \rightarrow \frac{3}{4}\,O_2(g) + KOH(s))$

$.625\,KO_2(s) + .313\,H_2O(l) \rightarrow .469\,O_2(g) + .625\,KOH(s)$

STEP 4. Clarify answer: .625 moles of KOH will form
$\therefore$ .469 moles O_2

[b] 0.938 mol Se

[c] 0.625 mol CH_3CHO

[d] 1.25 mol Fe

→ 30. $Cl_2(g) + KI(aq) \rightarrow I_2(s) + KCl(aq)$

STEP 1. Balance: $Cl_2(g) + \underline{2}\ KI(aq) \rightarrow I_2(s) + \underline{2}\ KCl(aq)$

STEP 2. Solve:

$$2.55\,g\,Cl_2 \times \frac{1\ mol\ Cl_2}{70.90\,g\,Cl_2} \times \frac{1\ mol\ I_2}{1\ mol\ Cl_2} \times \frac{253.8\,g\ I_2}{1\ mol\ I_2} = ?$$

$\therefore 9.13\ g\ I_2$

→ 32. $C_2H_5OH(l) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$

STEP 1 Balance: $\overset{1}{\underline{2}}\ C_2H_5OH(l) + \overset{3}{\underline{6}}\ O_2(g) \rightarrow \overset{2}{\underline{4}}\ CO_2(g) + \overset{3}{\underline{6}}\ H_2O(l)$

STEP 2 Solve:

$$25.0\,g\,C_2H_5OH \times \frac{1\ mol\ C_2H_5OH}{46.07\,g\,C_2H_5OH} \times \frac{4\ mol\ CO_2}{2\ mol\ C_2H_5OH} \times \frac{44.01\,g\ CO_2}{1\ mol\ CO_2} =$$

$\therefore 47.8\ g\ CO_2$