L.T 8.2 Work

① $2C_3H_6 + 9O_2 \longrightarrow 6CO_2 + 6H_2O$

(2 L) (34.0 L)

At STP (1 mol = 22.4 L)

$$\frac{34\text{ L } O_2}{} \left| \frac{1\text{ mol } O_2}{22.4\text{ L } O_2} \right| \frac{2\text{ mol } C_3H_6}{9\text{ mol } O_2} \left| \frac{22.4\text{ L } C_3H_6}{1\text{ mol } C_3H_6} \right| =$$

or

$$\frac{34\text{ L } O_2}{} \left| \frac{2\text{ L } C_3H_6}{9\text{ L } O_2} \right| =$$

② $NH_4NO_3 \longrightarrow N_2O + 2H_2O$

(? g) (0.1 L)

$$\frac{0.1\text{ L } N_2O}{} \left| \frac{1\text{ mol } N_2O}{22.4\text{ L } N_2O} \right| \frac{1\text{ mol } NH_4NO_3}{1\text{ mol } N_2O} \left| \frac{80\text{ g } NH_4NO_3}{1\text{ mol } NH_4NO_3} \right| =$$

③ $2H_2 + O_2 \longrightarrow 2H_2O$

(? L) (5.0 L)

At STP (1 mol = 22.4 L)

$$\frac{5.0\text{ L } O_2}{} \left| \frac{1\text{ mol } O_2}{22.4\text{ L } O_2} \right| \frac{2\text{ mol } H_2}{1\text{ mol } O_2} \left| \frac{22.4\text{ L } H_2}{1\text{ mol } H_2} \right| =$$

or

$$\frac{5.0\text{ L } O_2}{} \left| \frac{2\text{ L } H_2}{1\text{ L } O_2} \right| =$$

(4) $CaCO_3 \rightarrow CaO + CO_2$

2.38 kg ; 2. L

At STP (1 mol = 22.4 L)

$$\frac{2{,}380\ g\ CaCO_3}{} \left| \frac{1\ mol\ CaCO_3}{100\ g\ CaCO_3} \right| \frac{1\ mol\ CO_2}{1\ mol\ CaCO_3} \left| \frac{22.4\ L\ CO_2}{1\ mol\ CO_2} \right| =$$

(5) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

2.36 L ; 2. L

At STP (1 mol = 22.4 L)

$$\frac{2.36\ L\ CH_4}{} \left| \frac{1\ mol\ CH_4}{22.4\ L\ CH_4} \right| \frac{2\ mol\ O_2}{1\ mol\ CH_4} \left| \frac{22.4\ L\ O_2}{1\ mol\ O_2} \right|$$

or

$$\frac{2.36\ L\ CH_4}{} \left| \frac{2\ L\ O_2}{1\ L\ CH_4} \right| =$$

(6) $2Fe + O_2 \rightarrow 2FeO$

52 g ; ? L

At STP (1 mol = 22.4 L)

$$\frac{52\ g\ Fe}{} \left| \frac{1\ mol\ Fe}{55.8\ g\ Fe} \right| \frac{1\ mol\ O_2}{2\ mol\ Fe} \left| \frac{22.4\ L\ O_2}{1\ mol\ O_2} \right| =$$

(7) $2N_2 + O_2 \longrightarrow 2N_2O$

$?\,L$ $\quad$ $34\,L$

$$\frac{34\,L\ N_2O}{2\,L\ N_2O} \left| \frac{1\,L\ O_2}{} \right. =$$

(8) * All ratios are 1:1 (Balanced)

$$\frac{28\,g\ BS}{84\,g\ BS} \left| \frac{1\,mol\ BS}{1\,mol\ BS} \right| \frac{1\,mol\ CO_2}{} = 0.33\,mol\ CO_2$$

$P = 1\,atm$
$V = ?$
$n = 0.33$
$R = 0.0821$
$T = 293$

$1V = 0.33(0.0821)(293)$

$\boxed{V = 7.9\ L\ CO_2}$

(9) $2H_2 + O_2 \longrightarrow 2H_2O$

$5\,L$ $\quad$ $?\,g$

* must find n using $PV = nRT$

$P = 80.1\,KPa$
$V = 5\,L$
$n = ?$
$R = 8.31$
$T = 293$

$80.1(5) = n\,8.31\,(293)$

$n = 0.16\ mol\ H_2$

$$\frac{0.16\,mol\ H_2}{2\,mol\ H_2} \left| \frac{1\,mol\ O_2}{1\,mol\ O_2} \right| \frac{32\,g\ O_2}{} =$$

(10) $2NaN_3 \longrightarrow 2Na + 3N_2$

? g 36 L

P = 1.15 $1.15(36) = n\,0.0821(299)$

V = 36 L

n = ? N_2 $n = 1.69$ mol N_2

R = 0.0821

T = 299

$$\frac{1.69 \text{ mol } N_2}{} \left| \frac{2 \text{ mol } NaN_3}{3 \text{ mol } N_2} \right| \frac{65 \text{ g } NaN_3}{1 \text{ mol } NaN_3} =$$

(14) $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$

? L 1 mol

$$\frac{1 \text{ mol } O_2}{} \left| \frac{4 \text{ mol } NH_3}{5 \text{ mol } O_2} \right| = 0.8 \text{ mol } NH_3$$

P = 5 atm $5V = 0.8(0.0821)(1123)$

V = ?

n = 0.8 $\boxed{V = 14.8 \text{ L}}$

R = 0.0821

T = 1123