Review Booklet (white)

11-1

$$Cu(NO_3)_2 \rightarrow CuO + 2NO_2 + .5O_2 \quad \times 2$$

(6 on the reactant; 1, 4, 1 on the products)

$$2Cu(NO_3)_2 \rightarrow 2CuO + 4NO_2 + O_2$$

11-2

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

(6 on the CO_2; 4 on the H_2O)

11-3

$$2Fe + 1.5O_2 + 3H_2O \rightarrow 2Fe(OH)_3 \quad \times 2$$

(3 on the O_2; 3 on the H_2O; 6 on the $Fe(OH)_3$)

$$4Fe + 3O_2 + 6H_2O \rightarrow 4Fe(OH)_3$$

11-4

$$2NH_3 + 3.5O_2 \rightarrow 2NO_2 + 3H_2O \quad \times 2$$

($2NO_2$ and $3H_2O$)

$$4NH_3 + 7O_2 \rightarrow 4NO_2 + 6H_2O$$

11-5

$$\left(2FeS_2 + 4.5O_2 \rightarrow Fe_2SO_3 + 3SO_2\right)^{\times 2}$$

$$4FeS_2 + 9O_2 \rightarrow 2Fe_2SO_3 + 6SO_2$$

11-6

$$\left(C_2H_2 + 2.5O_2 \rightarrow 2CO_2 + H_2O\right)^{\times 2}$$

$$2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$$

11-7

$$P_4 + 5O_2 \rightarrow 2P_2O_5$$

11-8

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$$

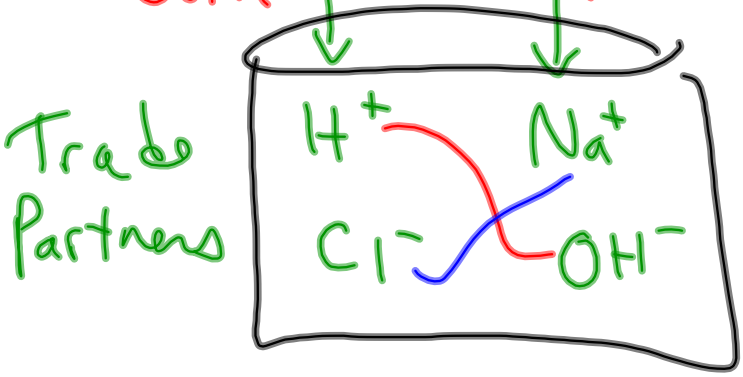
6 12 12 6

Acid - Base Neutralization

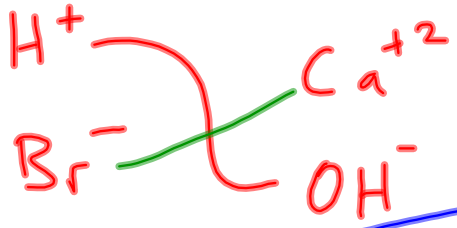
pH < 7 pH > 7 pH = 7

e.g. $HCl + NaOH \rightarrow NaCl + HOH$ (H_2O)

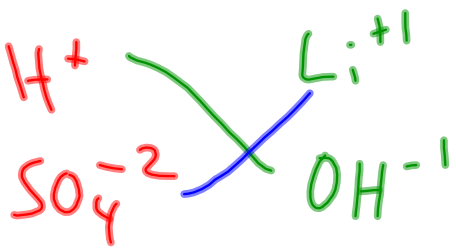
Acids + bases are both ionic, so they'll both dissociate in aqueous solution.



e.g. $2HBr + Ca(OH)_2 \rightarrow 2H_2O + CaBr_2$



e.g. $H_2SO_4 + 2LiOH \rightarrow 2H_2O + Li_2SO_4$



e.g.

$$2CH_3COOH + Mg(OH)_2 \rightarrow 2H_2O + Mg(CH_3COO)_2$$

$CH_3COO^- \text{ — } Mg^{+2}$

$H^+ \text{ —— } OH^-$

e.g

$$2HNO_3 + Sr(OH)_2 \rightarrow 2H_2O + Sr(NO_3)_2$$

H^+ Sr^{+2}

NO_3^- OH^-

You try:

a) $H_2CO_3 + 2KOH \rightarrow K_2CO_3 + 2H_2O$

H^+ — K^+

CO_3^{-2} — OH^-

easy

b) $HI + CsOH \rightarrow H_2O + CsI$ ✓

H^+ — Cs^{+1}

I^- — OH^{-1}

c) $H_2C_2O_4 + 2NaOH \rightarrow 2H_2O + Na_2C_2O_4$

H^+ — Na^+

$C_2O_4^{-2}$ — OH^-

easy

d) $HNO_3 + LiOH \rightarrow H_2O + LiNO_3$

H^+ — Li^+

NO_3^- — OH^-

e) $CH_3COOH + CsOH \rightarrow CsCH_3COO + H_2O$

CH_3COO^{-1} — Cs^{+1}

H^{+1} — OH^{-1}

f) $H_2CrO_4 + RbOH \rightarrow$

H^{+1} — Rb^{+1}

CrO_4^{-2} — OH^{-1}

g) $2HNO_2 + Ba(OH)_2 \rightarrow Ba(NO_2)_2 + 2H_2O$

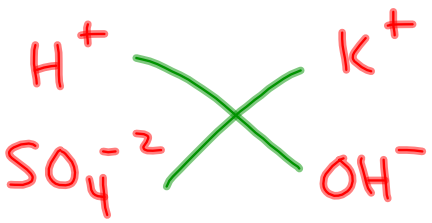
H^+ — Ba^{+2}

NO_2^{-1} — OH^{-1}

h) $2HNO_3 + Mg(OH)_2 \rightarrow Mg(NO_3)_2 + 2H_2O$

(i)

$$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$$



(j)

$$Ba(OH)_2 + 2CH_3COOH \rightarrow Ba(CH_3COO)_2 + 2H_2O$$

k)

$$Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$$

Ca^{+2} H^+

OH^{-1} Cl^-

l)

$$HF + NaOH \rightarrow NaF + H_2O$$

H^+ Na^+

F^- OH^-

Chemical Stoichiometry

22.19 mol

① $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

Balance eqn (1 mark)

400 g → convert to moles

$1CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

The coefficients give you the mole : mole ratios for amounts of reactants & products

e.g. The amount of H_2O produced will always be twice the amount CH_4 used (in moles).

Convert 400 g H_2O into moles:

$$400\text{ g } H_2O \times \frac{1\text{ mol}}{18.02\text{ g}} = 22.19\text{ mol } H_2O \text{ produced}$$

$22.19\text{ mol} \div 2$

$= 11.1\text{ mol } CH_4$ used.

2. $2\,NaHCO_3 \rightarrow Na_2CO_3 + 1\,CO_2 + H_2O$

3.8 mol → (÷2) → 1.9 mol CO_2

? mol

$1.9\ mol\ CO_2 \times \frac{44.01\ g}{1\ mol}$

$= 83.6\ g\ CO_2$

③

11.33 —xs→ O_2

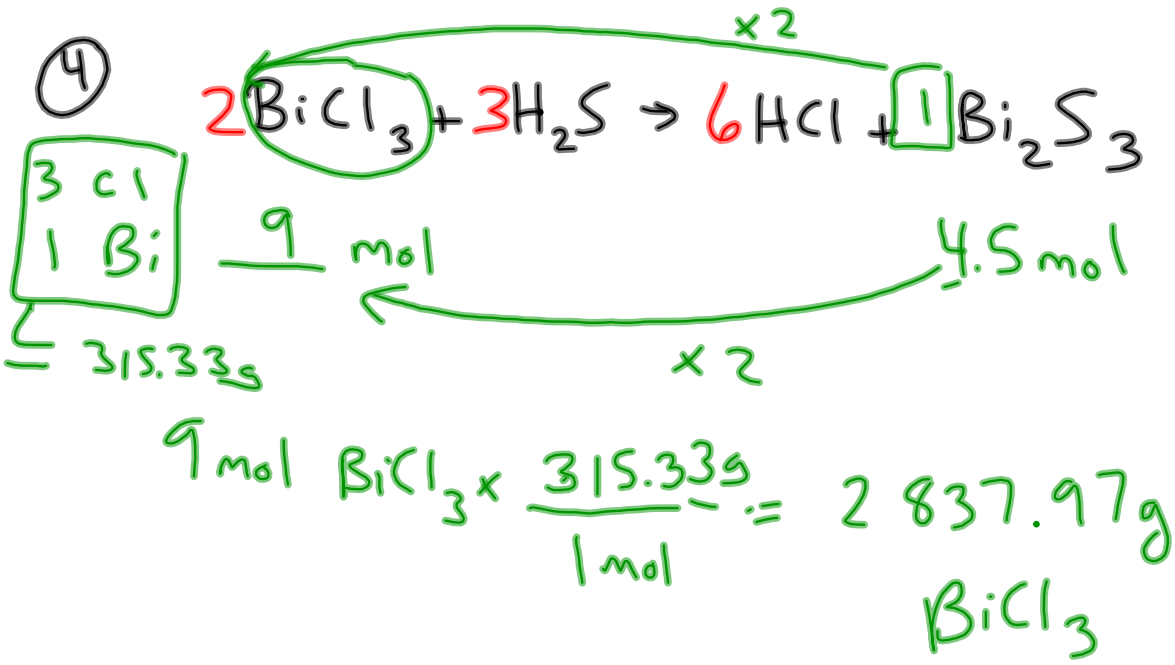
$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

500 g —(÷ mol)→ mol —xs→ mol O_2

→ However many moles of C_3H_8 reacted, there will be 5X that number of O_2 reacting.

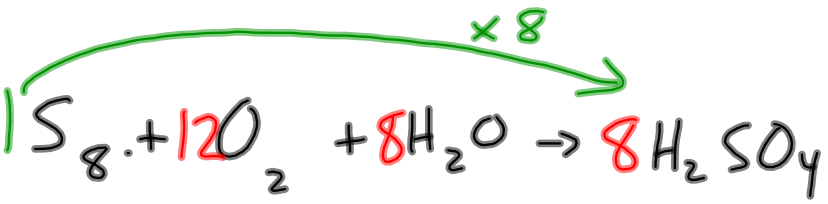
$500\,g\ C_3H_8 \times \frac{1\,mol}{44.11\,g} = 11.33\,mol\ C_3H_8$

$11.33\,mol \times 5 = 56.6\,mol\ O_2$


4
2 BiCl3 + 3 H2S → 6 HCl + 1 Bi2S3
x 2
3 Cl
1 Bi
9 mol
4.5 mol
315.33g
x 2
9 mol BiCl3 x 315.33g / 1 mol = 2837.97g BiCl3

5.

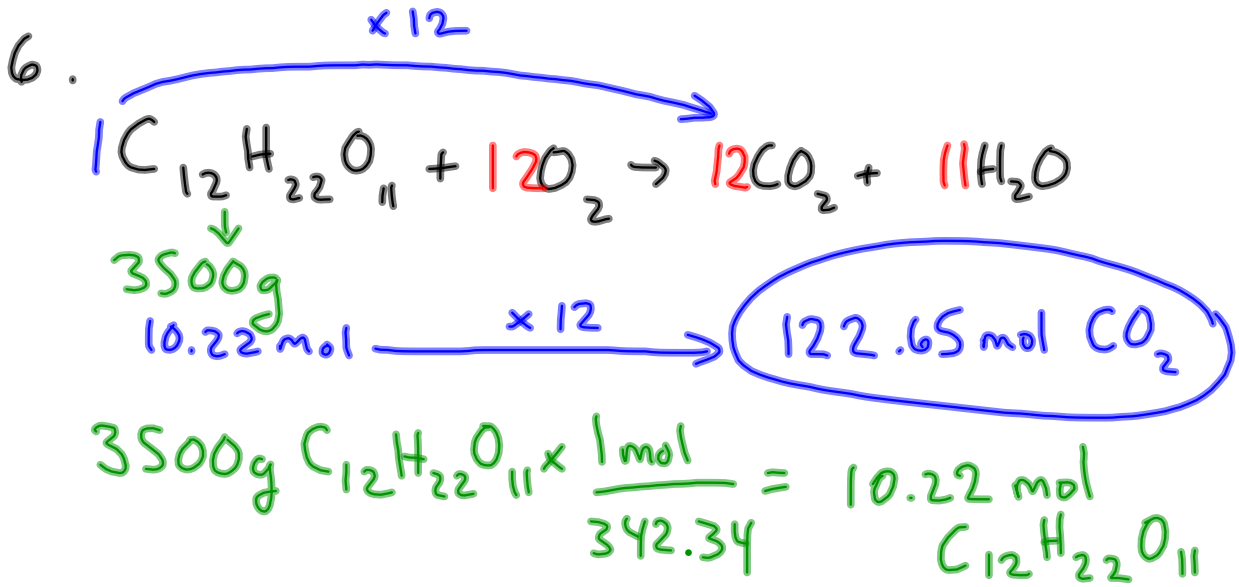
MM S_8



$460\,g\,S_8 \times \frac{1\,mol}{256.48\,g} = 1.79\,mol\,S_8$

$1.79\,mol\,S_8 \times 8 = \boxed{14.34\,mol\,H_2SO_4}$

6.


×12
1 C12H22O11 + 12 O2 → 12 CO2 + 11 H2O
3500 g
10.22 mol
×12
122.65 mol CO2
3500 g C12H22O11 × 1 mol / 342.34 = 10.22 mol C12H22O11