(18) Empirical Formula

94.1% O ; 5.9% H

WHAT IS EMPIRICAL FORMULA

$$94.1\text{ g O}\left(\frac{1\text{ mol O}}{16.0\text{ g O}}\right) = 5.88\text{ mol O} \qquad \frac{5.88}{5.90} = 1$$

$$5.9\text{ g H}\left(\frac{1\text{ mol H}}{1.0\text{ g H}}\right) = 5.90\text{ mol H} \qquad \frac{5.90}{5.90} = 1$$

1 : 1 RATIO

Empirical Formula = HO

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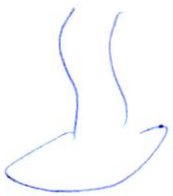
(19) Balanced Equations

$$Zn(OH_2) + H_3PO_4 \rightarrow Zn_3(PO_4)_2 + H_2O$$



$$3\,Zn(OH_2) + 2\,H_3PO_4 \rightarrow Zn_3(PO_4)_2 + 6\,H_2O$$

- Metals
- Polyatomics
- save O til end
- reduce

6/1/20 EXAM 12:30 - 1:50

(20) Single Replacement

$$Fe(s) + Pb(NO_3)_2(aq) \rightarrow Fe(NO_3)_2^{(aq)} + Pb(s)$$

can Fe replace Pb - ACTIVITY series!

→ works with HALOGENS as well!

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(21) Double Replacement

$$NaOH(aq) + Fe(NO_3)_3(aq) \rightarrow$$

$$Fe(OH)_3(s) + 3\,NaNO_3(aq)$$

solubility Table tells you this

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(22) $C_6H_{12}O_6 + 6O_2 \Rightarrow 6CO_2 + 6H_2O$

COMBUSTION REACTION)

$$C_xH_y + O_2 \rightarrow CO_2 + H_2O$$

(23) NET IONIC EQUATIONS

$$Ca^{2+}(aq) + OH^-(aq) + H^+(aq) + PO_4^{3-}(aq) \rightarrow Ca^{2+}(aq) + PO_4^{3-}(aq) + H_2O(l)$$

$$H^+(aq) + OH^-(aq) \Rightarrow H_2O(l)$$

Solids and liquids do NOT get broken up into individual ions

(24) STOICHIOMETRY

Acetylene gas (C_2H_2) is produced by adding water to calcium carbide (CaC_2)

Balance ✓

$$CaC_2(s) + 2H_2O(l) \Rightarrow C_2H_2(g) + Ca(OH)_2(aq)$$

How many grams of Acetylene are produced by adding WATER to 5.00 g CaC_2?

get into moles

mole ratios

$$5.00\text{ g } CaC_2 \left(\frac{1\text{ mol } CaC_2}{64.1\text{ g } CaC_2}\right)\left(\frac{1\text{ mol } C_2H_2}{1\text{ mol } CaC_2}\right)\left(\frac{26.0\text{ g } C_2H_2}{1\text{ mol } C_2H_2}\right) =$$

$$2.03\text{ g } C_2H_2$$

(25) Gas Unit Conversion

1 atm = 101.3 kPa = 14.7 psi = 760 mm Hg = 760 torr

$$385 \text{ mm Hg} \left(\frac{101.3 \text{ kPa}}{760 \text{ mm Hg}}\right) = 51.3 \text{ kPa}$$

↑ EQUIVILENCY STATEMENT

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(26) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ COMBINED GAS LAW

Convert C to K!

155 kPa, 25°C, 1.00 L ⇒ 605 kPa, 125°C, V_2

✱ $K = C + 273$ $\quad T = t + 273$

$$\frac{(155 \text{ kPa})(1.00 \text{ L})}{(298 \text{ K})} = \frac{(605 \text{ kPa})(V_2)}{(398 \text{ K})}$$

$$(155 \text{ kPa})(1.00 \text{ L})(398 \text{ K}) = (298 \text{ K})(605 \text{ kPa})(V_2)$$

$$\frac{(155 \text{ kPa})(1.00 \text{ L})(398 \text{ K})}{(298 \text{ K})(605 \text{ kPa})} = V_2$$

$$0.342 \text{ L} = V_2$$

(27) Henry's Law

$$\frac{S_1}{P_1} = \frac{S_2}{P_2}$$

↑ pressure above liquid increased, solubility increased

open a soda bottle

0.16 g/L at 104 kPa → ? at 288 kPa

$$\frac{(0.16\ g/L)}{(104\ kPa)} = \frac{S_2}{(288\ kPa)}$$

$$(0.16\ g/L)(288\ kPa) = S_2(104\ kPa)$$

$$\frac{(0.16\ g/L)(288\ kPa)}{(104\ kPa)} = S_2$$

$$0.44\ g/L = S_2$$

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(28) Molarity

$$M = \frac{\text{mol solute}}{\text{L soln}}$$

$V = 250\ mL$

$mol = 0.70\ mol$

$M = ?$

$$= \frac{0.70\ mol}{0.250\ L} = 2.8\ mol/L$$

$$= 2.8\ M$$

(29) Specific Heat

$q = m \cdot c \cdot \Delta T$

→ change in temp

temp in C

C = specific heat varies

q = heat

Specific heat of H_2O

$4.18\ J/g \cdot {}^\circ C$

How many kilojoules of heat are absorbed when 1.00 L of water is heated from 18°C to 85°C?

$q = 1000\ g \cdot 4.18\ J/g \cdot {}^\circ C \cdot 67\ {}^\circ C$

$= 280{,}060$ Joules

$= 2.8 \times 10^2\ kJ$

(30) Le Chatelier's

⇒ Undo whatever disrupted equilibrium

$C(s) + H_2O(g) + \text{heat} \rightleftharpoons CO(g) + H_2(g)$

increase temp? move to right

(31) Equilibrium Constant

$$K_{eq} = \frac{[C]^c \times [D]^d}{[A]^a \times [B]^b}$$ products / reactants

$K_{eq} > 1$ favors products

$K_{eq} < 1$ favors reactants.

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(32) pH ↓

$[H^+] = 1.0 \times 10^{-4}\ M$ $\quad pH = 4$

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(33) REDOX

LEO says GER

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(34) NUKE

$^{1}_{0}n$

$^{1}_{1}p$ or $^{1}_{1}H$

$^{0}_{-1}e$

$^{0}_{1}e$

$^{4}_{2}He$ $\quad \alpha$ alpha

$^{0}_{-1}e$ $\quad \beta$ beta