خدمتكم طريق خضناه لرضى الله

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الكيمياء العامة

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Summary of Laws

$$\text{(mol) Mole} = \frac{\text{mass (g)}}{\text{molar mass (g/mol)}}$$

$$\text{Mole (mol)} = \frac{\text{number of Atoms}}{6.022 \times 10^{23}}$$

$$\%\ \text{element} = \frac{\text{mass of element}}{\text{mass of whole compound}} \times 100\%$$

$$\%\ \text{element} = \frac{(\text{At.Wt} \times \text{subscript}) \times 100\%}{\text{molar mass of compound}}$$

$$\text{molecular formula} = (\text{emp. formula})_n$$

$$n = \frac{\text{molar mass of compound}}{\text{molar mass of emp.}}$$

Summary of Laws

* In this rxn:-

$$2C_6H_6 + 15O_2 \longrightarrow 12CO_2 + 6H_2O$$

$$\frac{\text{moles } "C_6H_6"}{2} = \frac{\text{mol } "O_2"}{15} = \frac{\text{mol } "CO_2"}{12} = \frac{\text{mol } "H_2O"}{6}$$

* This relationship is used to find the largest percentage of the material to be produced.

$$\text{Percantag yield} = \frac{\text{actal Yield (g, mol)}}{\text{Theoritical Yield (g or mol)}} \times 100\%$$

actal < Theoritical

$$\text{Molarity (molar consetration) (M)} = \frac{\text{moles solute (mol)}}{\text{Liters solution (L)}}$$

$$(W/W)\% = \frac{\text{mass of solute (g)}}{\text{mass of solution (g)}} \times 100\%$$

$$\text{density} = \frac{\text{mass (gram)}}{\text{volem (mL)}} \quad g/L$$

mass solvent + mass solute = mass solution

Volume flask ≅ V. (water) = V. solution

Summary of Laws

* Dilution:-

$$M_1 V_1 = M_2 V_2$$

* Volume of water add:-

$$\text{Volume of water add} = V_2 - V_2$$

* First law of Thermodynamics.

$$\Delta E_{sys} = q_{sys} + w_{sys}$$

$$\Delta E_{sys} = -\Delta E_{surr}$$

* P-V work:-

$$-P_{ext}^{kPa} \cdot \Delta V_L = W = -\Delta n_g \cdot R \frac{J}{mol.K} \cdot T_K$$

* heat (q):-

$$\underset{(mol)}{\text{moles}} \times \underset{(J/mol.C^\circ)}{\text{molar sp.ht}} \times \underset{(C^\circ)}{\Delta T} = q = \underset{(g)}{\text{mass}} \times \underset{(J/g.C^\circ)}{\text{sp.ht}} \times \underset{(C^\circ)}{\Delta T}$$

Summary of laws

* Boyl's Law :-

→ $P_{gas_1} V_1 = P_{ext_2} V_2$

* Ideal gas :→

→ $\Delta E = \Delta P_E + \Delta K_E = w + q = 0$

* cup-calorimeter :- "P" is constant

→ $q_{surr} = q_{cup} + q_{air} + q_{water}$

→ $\Delta H_{rxn} = \frac{q_{rxn} \times coff}{moles}$

→ $\Delta E_{rxn} = w + q_{rxn}$

* Bomb calorimeters :- "V" is constant.

→ $q_{surr} = q_{calo} + q_{water}$

→ $\Delta E = \frac{q_{rxn} \times coff}{moles}$

→ $\Delta E_{rxn} = \Delta H_{rxn} - \Delta n_g \cdot R.T$

* Entropy

$\Delta S = \frac{q_{rev}}{T(K)}$

* Gibbs Free Energy (G)

$\Delta G_{rxn} = \underset{KJ}{\Delta H_{rxn}} - T \underset{\frac{J}{K}}{\Delta S_{rxn}}$

Jihad

Constants

Avogadro's number :- $= 6.022 \times 10^{23}$

Solvent water density $= 1\ g/mL$ $\overset{(g)}{\underset{H_2O}{mass}} \equiv \overset{(mL)}{\underset{(H_2O)}{Volum}}$

"R" Universal gas Constant :- $8.314\ J/mol.K$

"P" pressure :→ $1\ atm = 101.3\ Kpa = 720\ mmHg$

"T" temprature :→ $K = C^{\circ} + 273^{\circ}$

"V" Volume :→ $1L = 1dm^3 = 1000\ mL = 1000\ cm^3$