Chemistry Test 2 Equations

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1 Gases

Equations

$$PV = nRT \tag{1}$$

$$\frac{p_1 v_1}{n_1 t_1} = \frac{p_2 v_2}{n_2 t_2} = R \tag{2}$$

$$P_T = P_1 + P_2 \tag{3}$$

$$P = \frac{nRT}{V - nb} - a(\frac{n}{v})^2 \tag{4}$$

Where a represents the attractive forces
Where b represents the finite size of the gas particles

$$\frac{Ra}{Rb} = \sqrt{\frac{mb}{ma}} \tag{5}$$

$$\frac{Ta}{Tb} = \sqrt{\frac{ma}{mb}} \tag{6}$$

$$KE = \frac{3}{2}RT \tag{7}$$

$$V_{rms} = \sqrt{\frac{3RT}{M}} \tag{8}$$

Collecting Over Water 1. When collecting over water, $P_t = P_{H_2O} + Psubstance$

Note: $P_{atmospheric}$ is the same as P_t

KMT 1. A gas is made up of small particles in constant random motion

2. Gas particles are small compared to the distance between them

3. Ellastic collision between particles and walls(No loss of KE). This also means there are no forces between particles.

4. Average kinetic energy of gas particles is proportional to temperature (see equation no7)

2 Atomic Structure

$$c = \lambda\nu \tag{9}$$

$$E = h\nu \tag{10}$$

$$E_n = \frac{-Z^2 B}{n^2} \tag{11}$$

Where Z is the number of protons

$$\lambda = \frac{h}{mv} \tag{12}$$

$$Z_{eff} = Z - S \tag{13}$$

Where Z_{eff} is the effective nuclear charge
Where Z is the Nuclear Charge (no. of protons)
Where S is the Number of Screening Electrons

Atomic Spectroscopy If atoms are excited or heated, discrete radiation is emitted, but only at one specific frequency.

Schrodinger's Equation Equation that gives waves $\psi(x)$ as solutions.

$\psi^2(x)$ represents the probability of finding an electron at position x.

Note: x represents a 3 dimensional vector.

Energies agree with the bohr model, but the understanding here is deeper and can be used for multi-electron systems.

Aufbau Principle Put electrons into the lowest energy orbitals available.

Polyexclusion Principle Each electron must have a unique set of quantum numbers.

Hund's Rule Electrons go into different orbitals with same spin before pairing up in the same orbital with different spins.

Groups 1A Alkali Metals ns^1
2A Alkaline Earth ns^2
7A Halogens ns^2np^5
8A Noble Gases ns^2np^6