

The following is a list of constants, conversions and equations which are given-if-needed on exams this semester in all Chem 201 classes. Changes are possible, and may be announced at any time during the semester.

## CONSTANTS AND CONVERSIONS

Temperature

$$\begin{aligned} & T(\text{K}) = T(^{\circ}\text{C}) + 273 \\ \text{or} & T(\text{K}) = T(^{\circ}\text{C}) + 273.15 \\ & T(^{\circ}\text{F}) = \frac{9}{5} T(^{\circ}\text{C}) + 32 \end{aligned}$$

Avogadro's number

$$6.022 \times 10^{23}$$

Pressure units

$$\text{atm} = 760 \text{ mmHg} = 760 \text{ Torr}$$

Gas constant

$$R = 0.08206 \text{ L} \cdot \text{atm}/(\text{mol} \cdot \text{K}) = 8.314 \text{ J/K or J}/(\text{mol} \cdot \text{K})$$

Energy

$$\begin{aligned} \text{cal} &= 4.184 \text{ J} \\ \text{Cal} &= 4.184 \text{ kJ} \end{aligned}$$

Electromagnetic radiation

$$\begin{aligned} c &= 3.00 \times 10^8 \text{ m/s} \\ h &= 6.626 \times 10^{-34} \text{ J} \cdot \text{s} \\ R &= 1.097 \times 10^7 \text{ m}^{-1} \end{aligned}$$

## EQUATIONS

Gases

$$PV = nRT$$

$$d = \frac{PM}{RT}$$

$$v_{\text{rms}} = \sqrt{\frac{3RT}{M}}$$

$$\frac{v_A}{v_B} = \sqrt{\frac{M_B}{M_A}}$$

Specific heat

$$q = \Delta T \times \text{mass} \times c$$

Electromagnetic radiation  $c = \lambda\nu$   
 $E = h\nu = hc/\lambda$

Electron energies

H  $E = -2.18 \times 10^{-18} \text{ J} \times \frac{1}{n^2}$

any one  $e^-$  system  $E = -2.18 \times 10^{-18} \text{ J} \times \frac{Z^2}{n^2}$

transitions for H  $\Delta E = -2.18 \times 10^{-18} \text{ J} \left( \frac{1}{n_{\text{final}}^2} - \frac{1}{n_{\text{initial}}^2} \right)$

CONFIGURATIONS (Molecular Orbital Approach)

