verion 555
001-150 in WEL 1.308
151-300 in WEL ?.???
signature:
Be sure and write your name on this test copy. Turn in ALL materials (exam, bubblesheet, and scratch paper) when you are finished with the exam. A periodic table and other constants are located on the bubble sheet.

| $P V=n R T \quad x_{\mathrm{A}}=P_{\mathrm{A}} / P_{\text {total }}$ | $\Delta U=q+w \quad H=U+P V$ |
| :---: | :---: |
| $P(V-n b)=n R T$ | $w=-P \Delta V \quad w=-\Delta n R T$ |
| $\left(P+a \frac{n^{2}}{V^{2}}\right)(V-n b)=n R T$ | $\Delta U=\Delta H-P \Delta V$ |
| $P_{\text {total }}=P_{\mathrm{A}}+P_{\mathrm{B}}+P_{\mathrm{C}}+\cdots$ | $\Delta U=\Delta H-\Delta n R T$ |
|  | $\Delta U=q_{\mathrm{v}}={ }^{2} C \Delta T$ |
|  | $\Delta H=q_{\mathrm{p}}={ }^{\text {n }} C \Delta T$ |
| Unit 2 | $q_{\text {cal }}=q_{\text {water }}+q_{\text {hardware }} \quad q_{\text {sys }}=-q_{\text {cal }}$ |
| $E=h \nu \quad c=\lambda \cdot \nu$ | $\Delta S=q_{\mathrm{rev}} / T \quad S=k \ln \Omega$ |
| $\frac{1}{2} m v^{2}=h \nu-\Phi$ | $\Delta S=n C \ln \left(\frac{T_{2}}{T_{1}}\right)$ |
| Rydberg : $\nu=\mathcal{R}\left(\frac{1}{n_{1}^{2}}-\frac{1}{n_{2}^{2}}\right)$ | $\Delta H_{\mathrm{rxn}}=\Delta H_{1}+\Delta H_{2}+\Delta H_{3}+\cdots$ |
| $\mathcal{R}=2.178 \times 10^{-18} \mathrm{~J}$ | $\Delta H_{\mathrm{r} \times \mathrm{n}}^{\circ}=\sum n \Delta H_{\mathrm{f}}^{\circ}(\mathrm{prod})-\sum n \Delta H_{\mathrm{f}}^{\circ}(\mathrm{react})$ |
| $\mathcal{R}=1.097 \times 10^{7} \mathrm{~m}^{-1}$ | $\Delta H_{\mathrm{rxn}}=\sum B E_{\text {reactants }}-\sum B E_{\text {products }}$ |
| $\mathcal{R}=3.29 \times 10^{15} \mathrm{~s}^{-1}$ | $\Delta G_{\mathrm{rxn}}^{\circ}=\sum n \Delta G_{\mathrm{f}}^{\circ}(\mathrm{prod})-\sum n \Delta G_{\mathrm{f}}^{\circ}($ react $)$ |
| Unit 3 | $\Delta S_{\mathrm{rxn}}^{\circ}=\sum n S^{\circ}($ prod $)-\sum n S^{\circ}($ react $)$ |
| (no formulas for unit 3) | $G=H-T S \quad \Delta G=\Delta H-T \Delta S$ |
|  | $\Delta S_{\text {trans }}=\Delta H_{\text {trans }} / T_{\text {trans }}$ |

