$N(H^+)/N(H)$, neglecting Helium. However, since we expect that $N(H^+)/N(H)\sim 1$ in the BALR, the values for U are essentially the same.

We have also used CLOUDY to investigate the effect of a change in n_e on these curves. For n_e from 10^4 to 10^{10}, the value of U at the peak fractional abundance of C^{+3}, hereafter given as $U_p(C^{+3})$, changes by only 0.03 dex, and the fractional abundance at the peak only changes by $\sim 3\%$. This means that a low density BALR far from the source is equivalent to a high density BALR close to the source, as long as U remains the same. We used $n_e \sim 10^8$ for all calculations. The temperature, as calculated by CLOUDY, varies from about 15,000 to 20,000 °K for $\log(U)$ from -2.5 to -0.5.

3.3 : Fractional Abundances of Relevant Ions

In figure 3-3, we have plotted fractional abundances for nine elements which are included in the CLOUDY code and are relevant to us. Only the first eight ionization levels are shown for the higher Z elements. We have used $N(H)=10^{18}$ and averaged the values in the front and back of slab (which are essentially the same).

In figure 3-4, we show the curves relevant to the BALs that we can observe, *e.g.* C IV λ1549, Si IV λ1397, O VI λ1034, etc. See table 9-1 for a search list of high-ionization BALs. The $1s^2 2s^1$ isoelectronic sequence (see chapter 9) is shown in solid lines, the $1s^2 2s^2 2p^6 3s^1$ sequence is shown as dotted lines, and the curve for neutral hydrogen is shown as a dashed line. CLOUDY has no parameters for phosphorus, yet P V λ1121 BALs may be seen in some QSOs (Turnshek 1988, Junkkarinen *et al.* 1992), so we have made a rough estimate for P^{+4} by averaging the curves for Si^{+4} and S^{+4} which have similar values of U_p (see figure 3-3). The peaks of these ions, in order of increasing Z, are: $U_p(C^{+3})=-1.86$, $U_p(N^{+4})=-1.29$, $U_p(O^{+5})=-0.64$, $U_p(Al^{+2})=-2.68$, $U_p(Si^{+3})=-2.08$, $U_p(S^{+5})=-1.27$, and the rough estimate for the peak for Phosphorus is $U_p(P^{+4})=-1.59$.