



$$H = \frac{1}{2} \sum_{\mathbf{r}} \mathbf{k} \cdot \mathbf{r} \mathcal{T} + \sum_{\mathbf{r}} \sum_a \frac{z_a}{\|\mathbf{r} - \mathbf{R}_a\|} \mathcal{V} + \sum_{\mathbf{r}} \frac{1}{2} \sum_{i=1}^N V(\mathbf{r}_i) \mathcal{W} - V(\mathbf{r})$$

$$\mathcal{H} = \mathcal{T} + \mathcal{V} + \mathcal{W},$$

$$\mathcal{H} = \frac{1}{2} \sum_{\mathbf{r}} \mathbf{k} \cdot \mathbf{r} \mathcal{T} - \frac{1}{2} \sum_{i=1}^N \sum_{\mathbf{r}} \frac{z_a}{\|\mathbf{r} - \mathbf{R}_a\|} \mathcal{V} + \sum_{\mathbf{r}} \sum_a \frac{z_a}{\|\mathbf{r} - \mathbf{R}_a\|} \mathcal{V} + \sum_{\mathbf{r}} \sum_{i=1}^N V(\mathbf{r}_i) \mathcal{W} - V(\mathbf{r})$$