25. If a nucleus contains Z protons and N neutrons, its binding energy is $\Delta E_{\rm be} = (Zm_H + Nm_n - m)c^2$, where m_H is the mass of a hydrogen atom, m_n is the mass of a neutron, and m is the mass of the atom containing the nucleus of interest. If the masses are given in atomic mass units, then mass excesses are defined by $\Delta_H = (m_H - 1)c^2$, $\Delta_n = (m_n - 1)c^2$, and $\Delta = (m - A)c^2$. This means $m_H c^2 = \Delta_H + c^2$, $m_n c^2 = \Delta_n + c^2$, and $mc^2 = \Delta + Ac^2$. Thus $E = (Z\Delta_H + N\Delta_n - \Delta) + (Z + N - A)c^2 = Z\Delta_H + N\Delta_n - \Delta$, where $A = Z + N$ is used. For ${}^{197}_{79}\mathrm{Au}$, $Z = 79$ and $N = 197 - 79 = 118$. Hence,

$$\Delta E_{\rm be} = (79)(7.29\,\mathrm{MeV}) + (118)(8.07\,\mathrm{MeV}) - (-31.2\,\mathrm{MeV}) = 1560\,\mathrm{MeV}\ .$$

This means the binding energy per nucleon is $\Delta E_{\rm ben} = (1560\,\mathrm{MeV})/197 = 7.92\,\mathrm{MeV}$.