

38. The electric potential energy is

$$\begin{aligned}U &= k \sum_{i \neq j} \frac{q_i q_j}{r_{ij}} = \frac{1}{4\pi\epsilon_0 d} \left(q_1 q_2 + q_1 q_3 + q_2 q_4 + q_3 q_4 + \frac{q_1 q_4}{\sqrt{2}} + \frac{q_2 q_3}{\sqrt{2}} \right) \\&= \frac{\left(8.99 \times 10^9 \frac{\text{N}\cdot\text{m}^2}{\text{C}^2} \right)}{1.3 \text{ m}} \left[(12)(-24) + (12)(31) + (-24)(17) + (31)(17) \right. \\&\quad \left. + \frac{(12)(17)}{\sqrt{2}} + \frac{(-24)(31)}{\sqrt{2}} \right] (10^{-19} \text{ C})^2 \\&= -1.2 \times 10^{-6} \text{ J} .\end{aligned}$$