

Marks
6

- An “excimer laser” is a type of ultraviolet laser used for lithography, micromachining and eye surgery. In one type of laser, an electrical discharge through HCl and Xe in a helium buffer gas yields metastable XeCl molecules, described like an ion pair. These then emit 308 nm light and dissociate into Xe and Cl atoms.

| element | Ionisation energy / kJ mol^{-1} | Electron affinity / kJ mol^{-1} |
|---------|---|---|
| Xe | 1170.4 | – |
| Cl | 1251.1 | –349 |

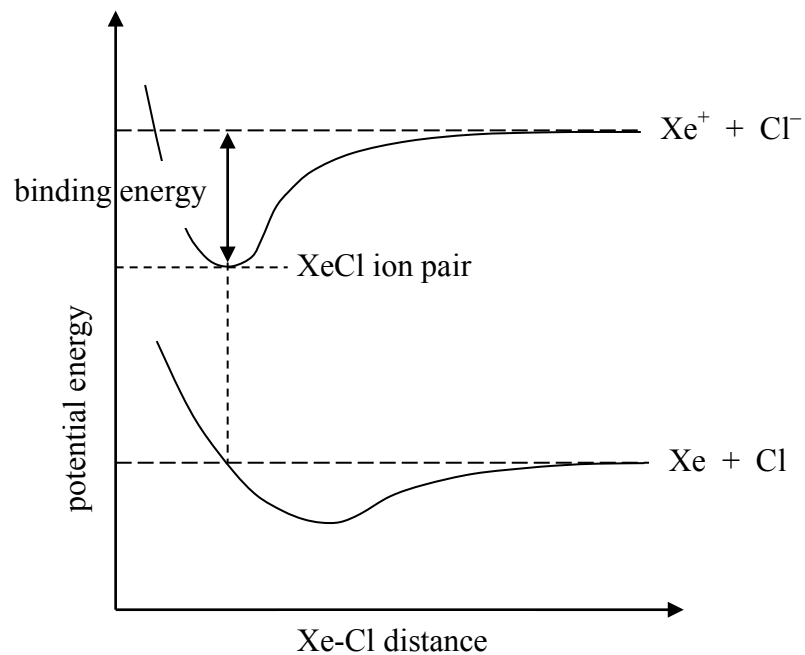
What energy, in eV, is required to convert a pair of Xe and Cl atoms into Xe^+ and Cl^- ions?

Answer:

What energy (in eV) is released when the XeCl molecules emit ultraviolet light?

Answer:

THIS QUESTION CONTINUES ON THE NEXT PAGE.



What is the binding energy (in J) of the XeCl ion pair?

Answer:

If the binding is electrostatic, what is the approximate equilibrium bond length of XeCl if the binding energy is given by the Coulomb formula: $E = \frac{q_1 q_2}{4\pi\epsilon_0 r}$?

Answer: