PHYS 321 P 2.15 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
|   |

P 2.15: For a K+-Cl- ion pair, attractive and repulsive energies *EA* and *ER*, respectively, depend on the distance between the ions *r*, according to

|  |
| --- |
| http://edugen.wileyplus.com/edugen/courses/crs4676/common/art/pixel.gif |
| http://edugen.wileyplus.com/edugen/courses/crs4676/callister9977/callister9977c02/math/math025.gif |  |
| http://edugen.wileyplus.com/edugen/courses/crs4676/common/art/pixel.gif |

For these expressions, energies are expressed in electron volts per K+-Cl- pair, and *r* is the distance in nanometers. The net energy *EN* is just the sum of the preceding two expressions.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| http://edugen.wileyplus.com/edugen/courses/crs4676/common/art/pixel.gif |

|  |  |
| --- | --- |
| (a)   | Superimpose on a single plot *EN*, *ER*, and *EA* versus *r* up to 1.0 nm (Use Excel). |
| http://edugen.wileyplus.com/edugen/courses/crs4676/common/art/pixel.gif |
| (b)   | On the basis of this plot, determine (i) the equilibrium spacing *r*0 between the K+ and Cl- ions, and (ii) the magnitude of the bonding energy *E*0 between the two ions. |
| http://edugen.wileyplus.com/edugen/courses/crs4676/common/art/pixel.gif |
| (c)   | Mathematically determine the *r*0 and *E*0 values using the solutions to Problem [2.14](http://edugen.wileyplus.com/edugen/courses/crs4676/callister9977/callister9977c02/callister9977/callister9977c02/callister9977c02xlinks.xform?id=callister9977c02-prob-0017) and compare these with the graphical results from part (b). |

 |