Dumkal College

Basantapur, Dumkal

Model questions

Topic: Born-Haber Cycle and its Application

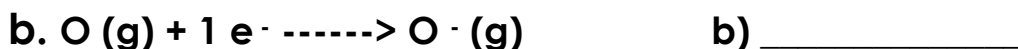**Course Code : CHEMHT-6**

Semester-III (Hons)

Name of the teacher: Saleha Khatun

1. What is the Born-Haber Cycle and Hess's law?
2. Construct the Born-Haber Cycle for NaCl and MgCl$_2$ explaing all the terms involved in it.
3. Draw Born-Haber cycle for the formation of cesium oxide and Use the following data to calculate the lattice energy of cesium oxide. You must write all thermochemical equations for the steps of the cycle. Enthalpy of formation of cesium oxide = - 233 kj/mole Enthalpy of sublimation of Cs = + 78 kj/mole First ionization energy of Cs = + 375 kj/mole Enthalpy of dissociation of O$_2$ (g) = + 494 kj/mole of O$_2$ molecules First electron affinity of O = - 141 kj/mole of O atoms Second electron affinity of O = + 845 kj/mole of O – ion.   (Ans= -2090 kj/mole)

4. Draw Born-Haber cycle for the formation of calcium oxide.

   Use the following data to calculate the lattice energy of calcium oxide. You must write all thermochemical equations for the steps of the cycle. The enthalpy of formation of calcium oxide (solid) = - 636 kj/mole The enthalpy of sublimation of calcium= + 192 kj/mole First ionization energy of Ca = + 590 kj/mole Second ionization energy of Ca= +1145 kj/mole The enthalpy of dissociation of O$_2$ (g) = + 494 kj/mole First electron affinity of O (g) = - 141 kj/mole Second electron affinity of O (g) = + 845 kj/mole.   (Ans= -3514Kj/mol)

5. Name the energy, Δ H, in each of the following processes

   a. 2 Cs $^+$ (g) + O $^{2-}$ (g) -------> Cs$_2$O(s)   a) _____

   b. O (g) + 1 e $^-$ ------> O $^-$ (g)   b) _____

   c. 2 Cs (s) + 1/2 O$_2$ (g) ------> Cs$_2$O(s)   c)_____

6. . Draw Born-Haber cycle for the formation of strontium chloride

Use the following data to calculate the enthalpy of formation of strontium chloride. You must write all thermochemical equations for the steps of the cycle. The enthalpy of sublimation of strontium = + 164 kj/mole First ionization energy for strontium = + 549 kj/mole Second ionization energy for strontium = + 1064 kj/mole The enthalpy of dissociation of chlorine, Cl$_2$ = + 243 kj/mole The electron affinity of chlorine, Cl = - 349 kj/mole Lattice energy of strontium chloride = - 2150 kj/mole

(Answer= - 828 kj)