Answer on Question #54042 – Chemistry – General chemistry

Question:

50 mL of .10M HCL and 50 mL of .10M NaOH are mixed. The temperature of the solution increases from 20.5 degrees celsius to 21.3 degrees celsius. The specific heat of the solution is the same as that for water. What is the delta H for the rxn per mole of HCl?

Solution:

The specific heat of water equals 4.186 J/g C°. Hence the heat produced upon the reaction is defined:

Q = C×m×Δt = 4.186 × 100 g × (20.5 − 21.3) J = -334.88 J

Note: m – the mass of water, which is of 50 g + 50 g,

C – the specific heat of water;

Δt – the change of temperature

The number of moles of reacted HCl equals (in 50 ml):

v = [HCl]×V, where [HCl] – the HCl concentration and V – the volume of solution.

Thus, v = 0.1 M × 0.05 L = 0.005 moles

Finally, ΔH = Q/v = - 334.88 J/0.005 moles = - 66.976 kJ/mol

Answer: the delta H for the rxn per mole of HCl is of - 66.976 kJ/mol. The negative value indicates that the reaction is exothermic.