Problem Solving Session 3

A sample of 0.782 g benzoic acid ($C_7H_6O_2$) was burnt in a bomb calorimeter along with 1.1 cm of wire. The temperature increased by 1.68 degrees. When benzoic acid burns, heat is released amounting to 3227 kJ/mol and when the wire burns the heat released is 8.5 J/cm. (The specific heat of water is 1 cal/g K, and there are 4.185 J per cal).

(a)What is the total heat capacity of the calorimeter?

(b) In a later experiment with the same calorimeter, the amount of water in the heat bath had dropped by 75ml. What value of the heat capacity should be used when the measured rise in temperature is used to determine the heat of combustion in that case?

(c) Write a balanced chemical equation for the combustion of benzoic acid.