# Answer on Question #62509, Chemistry / General Chemistry

**Condition:** When a 0.240-g sample of benzoic acid is combusted in a bomb calorimeter, the temperature rises 1.643 ∘C . When a 0.265-g sample of caffeine, C8H10O2N4, is burned, the temperature rises 1.494 ∘C . Using the value 26.38 kJ/g for the heat of combustion of benzoic acid, calculate the heat of combustion per mole of caffeine at constant volume.

**Solution:**

**M(g) = 0.240-g sample of benzoic acid**

**dT1= 1.643 ∘C**

**M(g) = 0.265-g sample of caffeine, C8H10O2N4**

**dT2= 1.494 ∘C**

**C1= 26.38 kJ/g**

**V=const**

C2-?

The difference between dT of benzene and caffeine = 1.494/1.643= 0,909times

$$C = \frac{\delta Q}{\delta T}.$$

$$c = \frac{Q}{m\Delta T},$$

Q from benzene = C*m*dT1= 26,38(kJ/g)*0.240(g)*1,643(°C)=10,4(kJ)

Here of C2= 10,4(kJ)/0.265(g)/1.494°C=26.26(kJ/g) and then *0,909 = 23,87kJ

**Answer: 23,87kJ**