

Exercise 6: Heat transfer

1. A covered Styrofoam cup contains 26.05 g of distilled water at 27.20°C. A 0.2000 carat diamond at 74.21°C is added to the water. What is the **final temperature** of the system? Constants and conversions: 1 carat = 10.25 g; the specific heat of water is 4.184 J/g°C. and the specific heat of diamond is 0.616 J/g°C.

2. a. For your party this weekend, you pull a block of party ice weighing 10 pounds out of a -20.°C commercial freezer. During the party, it sits in a tub in the living room and melts, eventually reaching 37.°C, the temperature of the air warmed by all the people in the room. **How much heat** (in joules) is released by this process? The specific heat of water = 4.184 J/gK, the specific heat of ice = 2.11 J/gK, the heat of fusion of ice = 334 J/g and 1 pound = 453.6 grams.

b. Some wag suggests that a great way to burn off all those chips you ate at the party is to consume the 10 pounds of party ice you bought. "After all, your body will burn enough calories (from the chips, presumably) to bring the water up to normal body temperature!" she says. Is she right (assume that a bag of chips has 60 **food** calories)? Is this a good weight loss method?