SCH4U

Energy Changes & Rates of Reaction

Specific Heat Capacity Worksheet

1. The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorb? c for water = 4.18 J/g°C(ans. 2.66 kJ)

2. How much heat in kilojoules has to be removed from 225g of water to lower its temperature from 25.0°C to 10.0°C? (ans. -14.1 kJ)

3. To bring 1.0kg of water from 25°C to 99°C takes how much heat input? (ans. 309 kJ)

4. An insulated cup contains 75.0g of water at 24.00°C. A 26.00g sample of metal at 82.25°C is added. The final temperature of the water and metal is 28.34°C. What is the specific heat of the metal? (ans 0.971 J/g°C)

5. A calorimeter has a heat capacity of 1265 J/°C. A reaction causes the temperature of the calorimeter to change from 22.34°C to 25.12°C. How many joules of heat were released in this process? (ans. 3.52 kJ released)

6. What is the specific heat of silicon if it takes 192J to raise the temperature of 45.0g of Si by 6.0°C? (ans. 0.71 J/g°C)

7. Aqueous silver ion reacts with aqueous chloride ion to yield a white precipitate of solid silver chloride. When 10.0 mL of 1.00M $AgNO_3$ solution is added to 10.0mL of 1.00 M NaCl solution at 25°C in a calorimeter a white precipitate of AgCl forms and the temperature of the aqueous mixture increases to 32.6°C. Assuming that the specific heat of the aqueous mixture is 4.18 J/g°C, that the density of the mixture is 1.00 g/mL, and that the calorimeter itself absorbs a negligible amount of heat, calculate the amount of heat absorbed in kJ/mol of Ag^+. (ans. -64 kJ/mol)

8. Assuming that Coca Cola has the same specific heat as water (4.18 J/g°C), calculate the amount of heat in kJ transferred when one can (about 350g) is cooled from 25°C to 3°C . (ans. 32.2 kJ of heat was transferred)

9. What is the specific heat of lead if it takes 96J to raise the temperature of a 75g block by 10C? (ans. 0.128 J/g°C)

10. When 25 mL of 1.0M H_2SO_4 is added to 50 mL of 1.0 M NaOH at 25°C in a calorimeter, the temperature of the aqueous solution increases to 33.9 °C. Assuming that the specific heat of the solution is 4.18 J/g°C, that its density is 1.00 /mL, and that the calorimeter itself absorbs a negligible amount of heat, calculate the amount of heat absorbed for the reaction. (ans. 2.79 kJ heat absorbed)

11. Titanium metal is used as a structural material in many high-tech applications such as jet engines. What is the specific heat of titanium in J/g°C if it takes 89.7 J to raise the temperature of a 33.0g block by 5.20°C? What is the molar heat capacity of titanium in J/mol °C? (ans. 25.0 J/mol°C)

12. Sodium metal is sometimes used as a cooling agent in heat exchange units because of its relatively high molar heat capacity of 28.2 J/mol°C. What is the specific heat of sodium in J/g °C? (ans. 1.23 J/g°C)