

Question #80200

The specific heat capacity of silver is $0.24 \text{ J/}^\circ\text{C}\cdot\text{g}$.

(a) Calculate the energy required to raise the temperature of 160.0 g Ag from 273 K to 303 K.

_____ J

(b) Calculate the energy required to raise the temperature of 1.0 mol Ag by 1.0°C (called the molar heat capacity of silver).

_____ J/mol $^\circ\text{C}$

(c) It takes 1.15 kJ of energy to heat a sample of pure silver from 12.0°C to 15.1°C . Calculate the mass of the sample of silver.

_____ in grams

Answer:

According to the equation $Q=C* \Delta T*m$:

(a) $\Delta T=303\text{K}-273\text{K}=30^\circ\text{C}$

$$Q=0.24*30*160=1152 \text{ J}$$

So, the right answer is 1152 J.

(b) $\Delta T=1^\circ\text{C}$

1 mole of Ag = 108 g of Ag

$$Q=0.24*1*108=25.92 \text{ J}$$

$$C=25.92 \text{ J/mol}^\circ\text{C}$$

So, the right answer is 25.92 J/mol $^\circ\text{C}$.

(c) $\Delta T=15.1^\circ\text{C}-12.0^\circ\text{C}=3.1^\circ\text{C}$

$$m=Q/ (C* \Delta T)=1.15*1000/(0.24*3.1)=1545.7 \text{ g}$$

So, the right answer is 1545.7 g.