CW2HWST-9)

The specific heat capacity of aluminum is 890 Jeq/kg K and that for copper is 385 Jeq/kg K. We'll assume these values are constant over this temperature range.

A)

$$m_{Al}c_{mAl}(T_f - T_{iAl}) + m_{Cu}c_{mCu}(T_f - T_{iCu}) = 0$$

$$(m_{Al}c_{mAl} + m_{Cu}c_{mCu})T_f = m_{Al}c_{mAl}T_{fAl} + m_{Cu}c_{mCu}T_{fCu}$$

$$T_f = \frac{m_{Al}c_{mAl}T_{iAl} + m_{Cu}c_{mCu}T_{iCu}}{m_{Al}c_{mAl} + m_{Cu}c_{mCu}} = \frac{(1)(890)(0) + (1)(385)(20)}{(1)(890) + (1)(385)} = 6.74^{o}C$$

B) Since the temperatures are not constant, we must integrate. The temperatures must be converted to kelvins: 273, 279.7, and 293.

$$\Delta S = \int \frac{\delta Q_{Al}}{T} + \int \frac{\delta Q_{Cu}}{T} = \int_{273}^{279.7} \frac{m_{Al}c_{mAl}dT}{T} + \int_{293}^{279.7} \frac{m_{Cu}c_{mCu}dT}{T}$$
$$= m_{Al}c_{mAl}\ln\frac{279.7}{273} + m_{Cu}c_{mCu}\ln\frac{279.7}{293}$$
$$= (1)(890)\ln(1.0245) + (1)(385)\ln(0.9546) = 3.657\ \text{Jeq/K}$$