Basic Problems:

1. $Q = mc\Delta T$

   =500 g(4.19 J/(g ^{o}C)) (4-18) ^{o}C

   = -29330.00 J

   With sig figs: -3 X 10^4 J

2. $Q = mc\Delta T$

   14 700 J = 250(4.19 J/(g ^{o}C)) (x-24) ^{o}C

   x = 38 ^{o}C (2 SF)

3. $Q = mc\Delta T$

   = 200 000 g(4.19 J/(g ^{o}C)) (60-15) ^{o}C

   = 3.8 X 10^7 J

   = 4 X 10^7 J (1 SF)

Mixing Problems

4. What mass of copper, originally at 50.0 ^{o}C, must be added to 1.0 kg of 10.0 C water to raise its temperature to 20.0 ^{o}C? [sp heat for Cu = 0.39 J/(g ^{o}C)]

   -1*m*0.39*(20-50) = 1000*4.19*(20-10)

   3581.196581g

   With sig figs: 3.6 X10^3 g

5. A 450 mL sample of water is originally at 25.0 C. How cold will it get if we add 300 mL of 0.5 ^{o}C water to that sample?

   -450*4.19*(x-25)=300*4.19*(x-0.5)

   15.2 ^{o}C = 20 ^{o}C (1 SF)

6. $c = 25/M = 25/65.3 = 0.38$ J/(g °C)
$c = 25/M = 25/195 = 0.13$ J/(g °C)
$c = 25/M = 25/48 = 0.52$ J/(g °C)

7. The one with the LOWEST molar mass because if Mc = 25, then c = 25/M. A smaller value of M will make c bigger.

8.

$$m_1 c_1 \Delta T_1 = -m_2 c_2 \Delta T_2$$

But $m_1 = m_2$ and it's the same c!

So mc cancels and $\Delta T_{cold} = -\Delta T_{hot}$

$$(T_f - T_{1cold}) = -(T_f - T_{1hot})$$

$$2\,T_f = T_i \text{ cold} + T_i \text{ hot}$$

$T_f = (T_i \text{ cold} + T_i \text{ hot})/2$ or the average.