Alconium Phase Change Problems

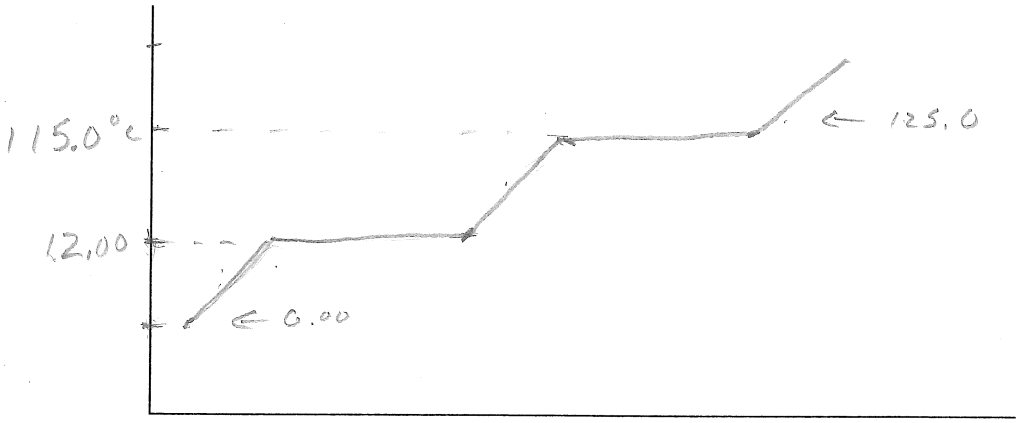
Name Key Period _____ Date _____

The fictitious substance alaconium has the following physical values:

Cp (solid) = 1.25 J/g°C	H_f = 94.5 J/g
Cp (liquid) = 0.850 J/g°C	H_v = 332 J/g
Cp (gas) = 1.10 J/g°C	
m.p. = 12.00°C	b.p. = 115.0°C

115.0
12.00
103.00 °C

1.) Draw a heating/cooling curve for alaconium and label the m.p. & b.p.



125.0
− 115.0
10.0

2.) How much heat would be required to heat a 50.0 g sample of alaconium from 0.00°C to 125.0°C?

			ΔT	
s	①	$Q = mC_p\Delta T$	12.00 °C	$\frac{50.0\,g}{} \left\| \frac{1.25\,J}{g\,^\circ C} \right\| \frac{12.00\,^\circ C}{} = 750.\,J$
s→l	②	$Q = mH_f$		$\frac{50.0\,g}{} \left\| \frac{94.5\,J}{g} \right. = 4730\,J$
l	③	$Q = mC_p\Delta T$	103.0 °C	$\frac{50.0\,g}{} \left\| \frac{.850\,J}{g\,^\circ C} \right\| \frac{103.0\,^\circ C}{} = 4380\,J$
l→g	④	$Q = mH_v$		$\frac{50.0\,g}{} \left\| \frac{332\,J}{g} \right. = 16600\,J$
g	⑤	$Q = mC_p\Delta T$	10.0°C	$\frac{50.0\,g}{} \left\| \frac{1.10\,J}{g\,^\circ C} \right\| \frac{10.0\,^\circ C}{} = 550.\,J$

27010 J

2.70×10^4 J

112.0
- 56.8
55.2

3.) How much heat would be released by 18.5 g of alaconium cooling from 112°C to 56.8°C?

ΔT
55.2°C

ℓ $Q = mC_p\Delta T$

$\frac{18.5\,g}{} \left| \frac{.850\,J}{g\,^\circ C} \right| \frac{55.2\,^\circ C}{}$

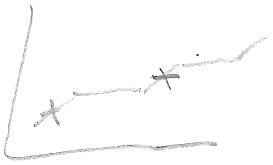
868.02

868 J

4.) How much heat is needed as 74.2 g of alaconium is warmed from 10.0°C to 68.4°C?

12.00
10.0
2.00°C

68.4
- 12.00
56.4°C



ΔT
2.0°C

(s) (1) $Q = mC_p\Delta T$ $\frac{74.2\,g}{} \left| \frac{1.25\,J}{g\,^\circ C} \right| \frac{2.0\,^\circ C}{}$ 190 J

s→ℓ (2) $Q = mH_f$ $\frac{74.2\,g}{} \left| \frac{94.5\,J}{g} \right| = 7010\,J$

ℓ (3) $Q = mC_p\Delta T$ ΔT 56.4°C

$\frac{74.2\,g}{} \left| \frac{.850\,J}{g\,^\circ C} \right| \frac{56.4\,^\circ C}{}$

10760 J | 13560 J

10800. J