

PHY 117 HS2023

Week 7, Lecture 1

Oct. 31st, 2023

Prof. Ben Kilminster

Note: $c = \frac{C}{m}$ ← heat capacity
specific heat $\left[\frac{\text{J}}{\text{kg} \cdot \text{K}} \right]$ $\left[\frac{\text{J}}{\text{mol} \cdot \text{K}} \right]$

• $m = \text{mass [kg] of 1 mol}$

Note: $1 \text{ cal} = 4.184 \text{ J}$
 $1 \text{ Cal} = 1 \text{ kcal} = 4.184 \text{ kJ}$

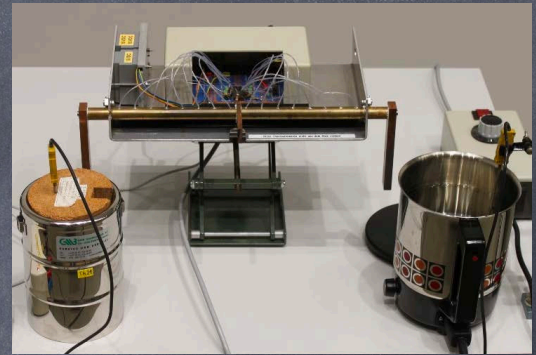
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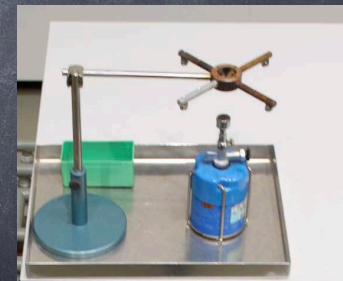
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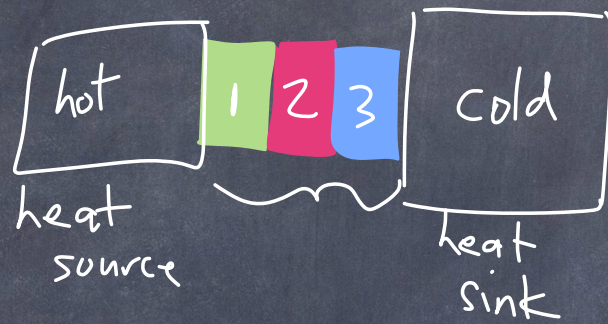


coefficient of thermal conductivity, κ

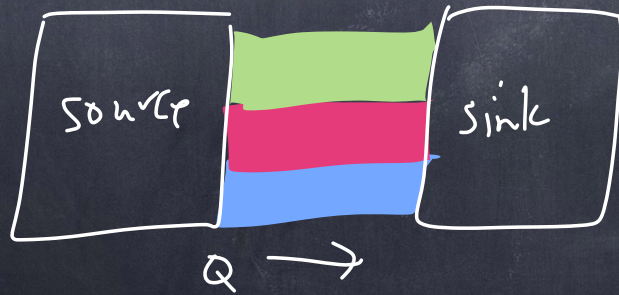
material $\kappa \left[\frac{W}{m \cdot K} \right]$

air	0.026
ice	0.592
Copper	401
wood	0.11 - 0.15
glass	~ 0.8
aluminum	237



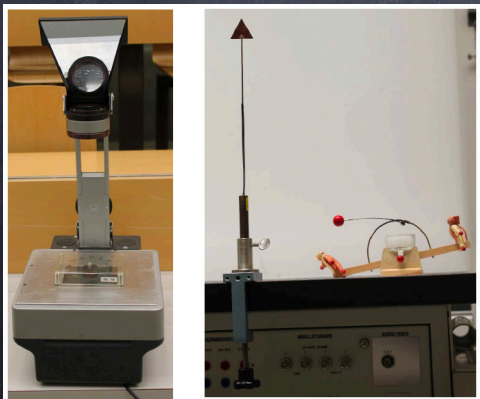
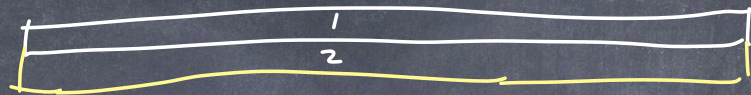


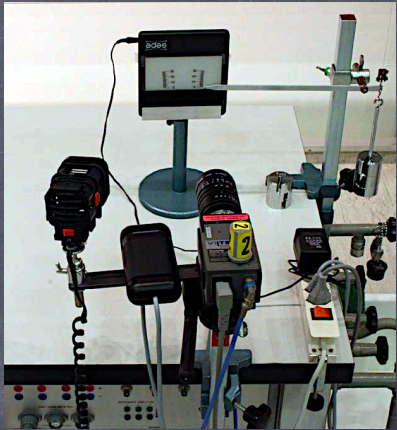
$Q \rightarrow$





<u>Material</u>	<u>$\alpha \left[\frac{1}{K} \right]$</u>	(Kelvin)
Aluminium	$24 \text{ E-}6$	
Steel	$11 \text{ E-}6$	
copper	$17 \text{ E-}6$	
brass	$19 \text{ E-}6$	
ice	$51 \text{ E-}6$	
water (20°C)	$0.207 \text{ E-}3$	
alcohol	$1.1 \text{ E-}3$	





material

γ $\left[\frac{GN}{m^2} \right]$

steel

200

lead

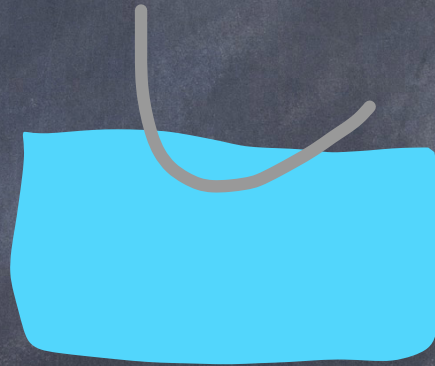
16

gold

8



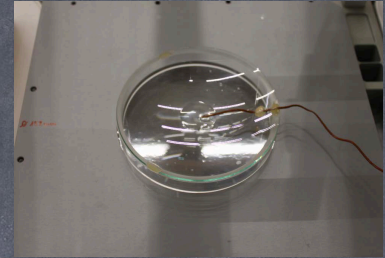
work done by heat



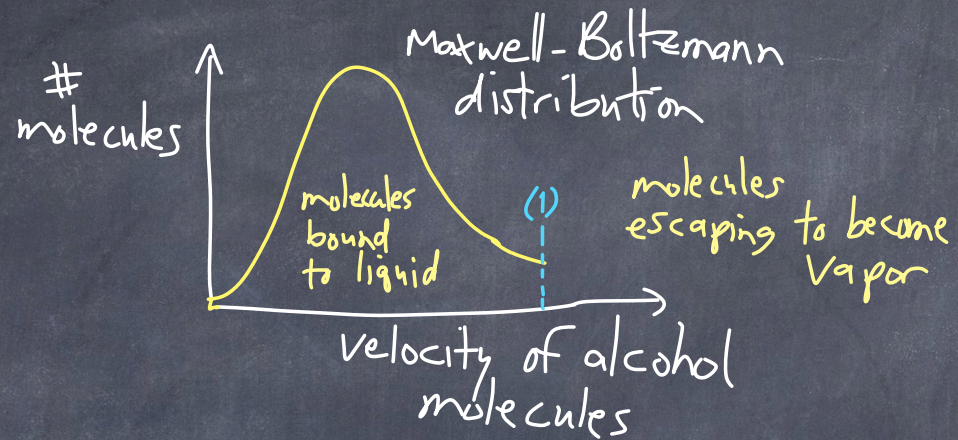


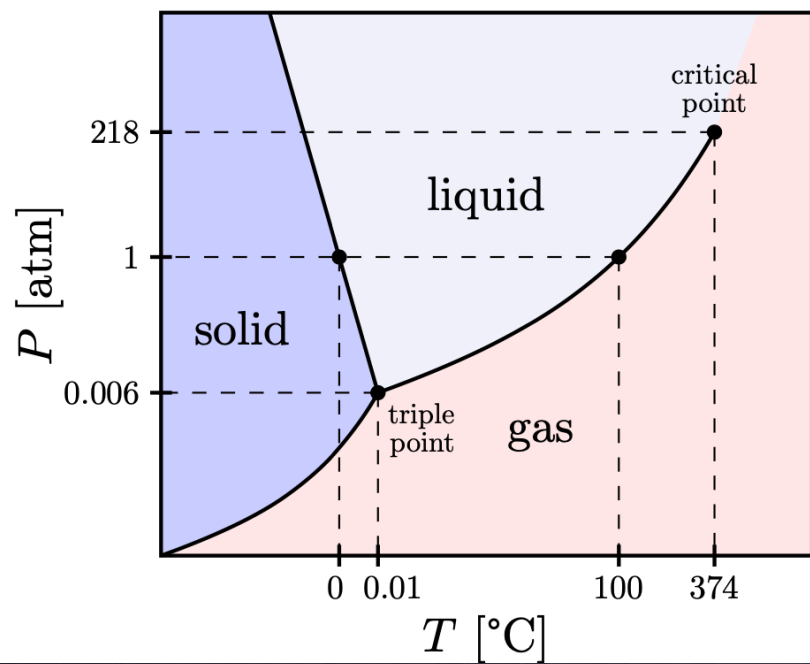
	Melting point [K]	latent heat of Fusion L_f [$\frac{kJ}{kg}$]	Boiling point [K]	latent heat of vaporization L_v [$\frac{kJ}{kg}$]	specific heat C [$\frac{kJ}{kg \cdot K}$]
Gold	1336	62.8	3081	1701	0.126
water	-	333.5	373.15	2257	4.18
lead	600	24.7	2023	858	0.128
alcohol	159	109	351	879	2.4
ice	273.15	333.5	-	-	2.05

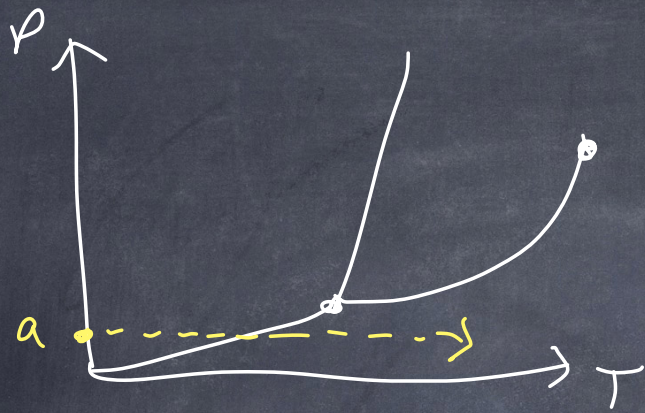
Experiment.

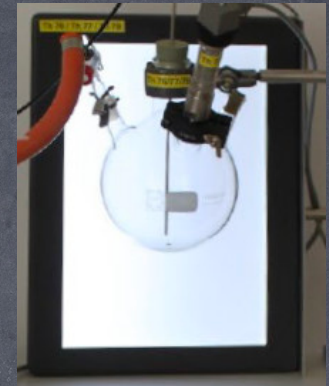
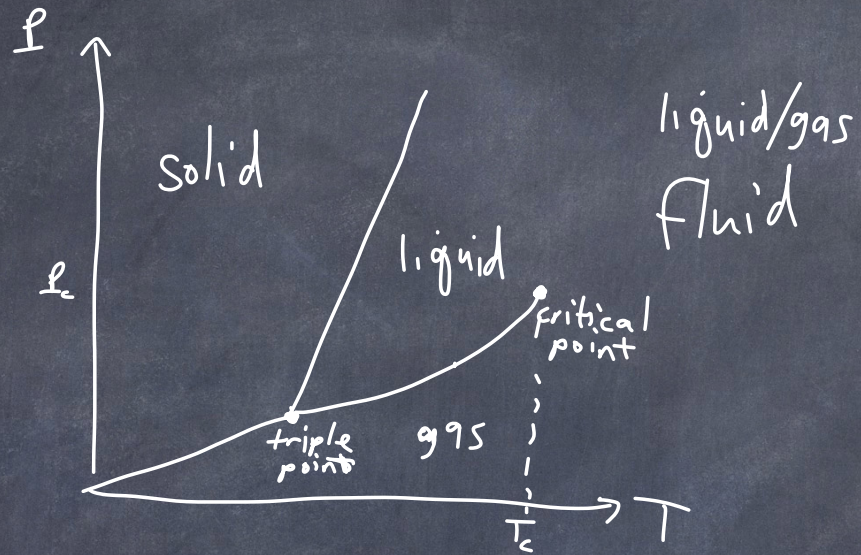


Microscopic scale:





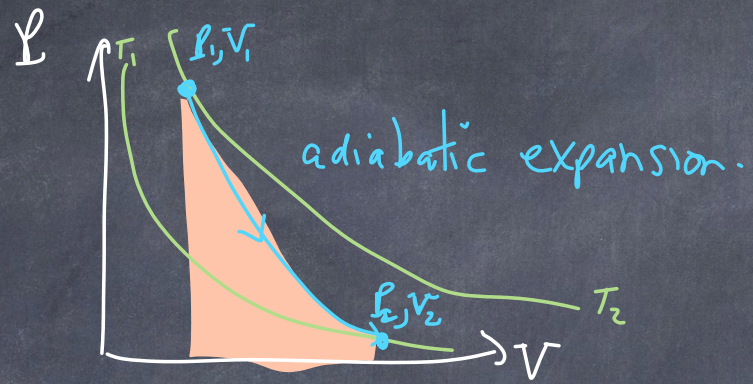




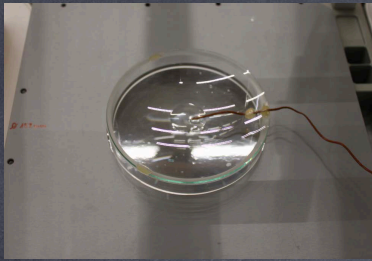












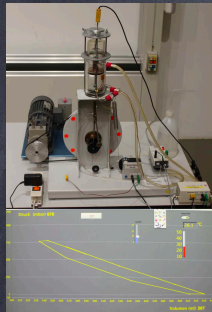
Th81



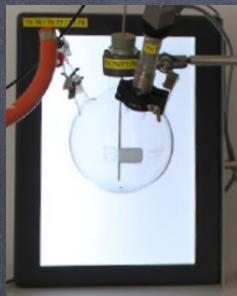
Th34



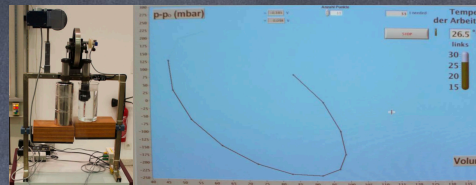
Th55



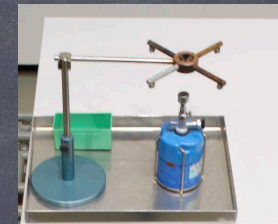
Th70



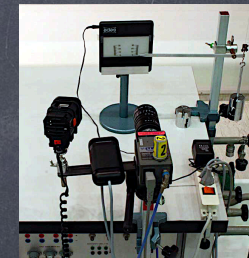
Th77



Th68



Th20



E12



Th19



Th14



Th2



Th22