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Reading Assignment b

3/17/2020

## 5.12 - Using the Fact that S is a State Function to Determine the Dependence of S on V and T

I. Entropy of a system increases with the internal energy at constant V

A. Entropy also increases with volume at constant U

1. Internal Energy not a variable under experimental control

$$dS = \left(\frac{\partial S}{\partial T}\right)_{V} dT + \left(\frac{\partial S}{\partial V}\right)_{T} dV$$

$$dS = \frac{1}{T} dT + \frac{1}{T} \left(\frac{\partial P}{\partial T}\right)_{V} dV$$

$$dS = \frac{1}{T} dT + \frac{\partial P}{\partial T} = \frac{P}{K}$$

$$dS = \frac{C_{V}}{T} dT + \frac{B}{V} dV$$

$$dS = \frac{C_{V}}{T} dT + \frac{B}{V} dV$$

f. For reversible paths,

$$\Delta S = \int_{T_i}^{T_f} \frac{C_v}{T} dT + \int_{V_i}^{V_f} \frac{\beta}{K} dV$$

	5.13 - The Dependence of S on T and P
I.	Experiments are normally carried out at constant pressure
	A. $dS = \left(\frac{\partial S}{\partial T}\right)_{P} dT + \left(\frac{\partial S}{\partial P}\right)_{T} dP$
	(OF) TO
	1. S is an increasing function of the temperature
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	( as = T at T ( pp fr ) I am a to me trought
	$\frac{1}{7} \cdot (-7) \left( \frac{\partial V}{\partial T} \right)_{p} = -\left( \frac{\partial V}{\partial T} \right)_{p} = -V \beta_{A}$
19-7	though Color to to the second
	AS= T dT - VB dP
	5. CTf CP IT CP 10
	$\Delta S = \int_{T_i}^{T_f} \frac{C_P}{T_i} dT - \int_{P_i}^{P_f} V \beta dP,$
	for reversible paths only
	6.1 - The Gibbs Energy and the Helmholtz Energy
工。	Clausius inequality
	A. TdS Zdq
	1. for only reversible processes
	Bdu+tw+TdS 20, since dq=du-tw
condition day in the deposits of the second	1. Can rewrite to identify type of work
	adu- Pext dV + two nonexpansion + TdS ≥ 0
on a mann a grad magni a li miner	expansion work
18 an ar formach a const	C. For isciated system, dS≥0
o a nor y sure and a sure a sure and a sure a sure and a sure a sure and a sure a sure and a sure a sure and a sure a sure and a sure a sure and a sure and a sure	D. For isothermal system TdS = d(TS)
	1du+TdS = -tweep - twomexp 7
	2. d(U-TS) = tweep + twoonexp 2

I.	Helmholtz energy
	A. State Function (U-TS)
	B. denoted as "A"
	C. dA - twexp - twoonexp & O
	1. can calculate max work system can do on surroundings for iso
	isothermal process (reversible)
	2. Jutotat = twexp + twonexp = dA
Ш.	Reactions under constant pressure more than constant volume
and and highest first the state of the control of t	A. Constant P and T
78.5	1. d(u + PV-TS) = d(H-TS) = twexp
	B. Gibbs energy
	1. State Function (H-TS)
	2. denoted as "G"
	3. dG-twnonexp = 0
	a. can calculate maximum nonexpansion work in reaction
II,	Value of G to determine spontaneous change + direction of reaction
*	B. DAR = DUR - TOSR, for macroscopic change at constant Vand T
	6.2 - The Differential Forms of U, H, A, and G
I	Differentials for U, H, A, and G (natural variables)
	A. $dU = TdS - PdV$ Calculate change in
and the state of t	B. dH=TdS-PdV + PdV + VdP = TdS + VdP ) energy for processes
***************************************	C. dA = TdS-PdV-TdS-SdT = -SdT-PdV ? calculate direction of
<u> </u>	D. dG = TdS + VdP - TdS - SdT = - SdT + VdP ) work produced

6.1 Cont'd ...

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	6.3
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Service (SERVICE)	
	Maxwell Relations
	A. $(\partial T)_s = -(\partial P)_V$ involve constant S for one partial derivative
	> 1. Mark Mark Mark Mark Mark Mark Mark Mark
	B. (at ) = (av)   S reversible, adiabatic process
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90000	the section of the se
en e	D. (35) Ab = (3V) anone by growth = total of 26 of (36) and The many type of the constant of t
	A. Constant P and T
	6.3 - The Dependence of the Gibbs and Helmholtz Energies on
	P, V, and T ppane edded . 8
- 0	Helmholtz energy of a pure substance decreases as either
	Temperature or Volume increases. De betones . I
I.	Gibbs energy decreases with increasing temperature, and Gibbs energy
9)	increases with increasing pressure status and a
I.	II. Value of G to determine spontaneous change + direction of r
t	The method to produce an importance of the produce
<u> </u>	B. DAR=DUR - TASR, for macroscopic change at co
	for reversible path and ideal gas behavior
. 9	Gibbs - Helmhoftz equation to emod lattrestation of - 2.0
	A. (O[G/T]) P T (OT) P G VOT - 26 T TZUB A
9	
	1. Can be rewritten as V69 + V69 - 26T = Hb . 8
tp 22	(a)
20	1.0000000000000000000000000000000000000
	$\int_{T_1}^{T_2} d\left(\frac{\Delta G}{T}\right) = \frac{\Delta G(T_1)}{T_1} + \Delta H(T_1) \left(\frac{1}{T_2} - \frac{1}{T_1}\right)$
	11 (12 11)