**Physical Chemistry 6854 Exam 3:Take-home portion (45 pts total)**

**Due Monday May 12 by 4:00 PM**

**Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**You can attach any work to the answer sheet. Partial credit will be awarded for efforts that fall short of the right answer, but contain substantially valid analyses.**

**Problem 1: 6 pts**

**Final equilibrium T = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ K (1 pt)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **block** | **Heat (J)** | **W(J)** | **ΔU(J)** | **ΔS** |
| **A (1 pt)** |  |  |  |  |
| **B (1 pt)** |  |  |  |  |

**(3 pts) ΔSA + ΔS­B = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_J/K**

**Problem 2: 8 pts**

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Qrev (kJ) | Wrev(kJ) | ΔU (kJ) |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |

**Problem 3a: 4 pts**

Proof that compression suggested is irreversible

**Problem 3b: path (a + b) 5 pts**

|  |  |  |  |
| --- | --- | --- | --- |
| path | ΔSa (J/K) | ΔSb (J/K) | ΔSa+b (J/K) |
| a + b |  |  |  |

**Problem 3c: path (c + d + e + f) 8 pts**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Path | ΔSc (J/K) | ΔSd (J/K) | ΔSe (J/K) | ΔSf (J/K) | ΔSc+d+e+f (J/K) |
| c+d+e+f |  |  |  |  |  |

**Problem 3d:** Does it make sense that:

1)you should have gotten identical answers for these two wildly different pathways **? 2 pts**

**Problem 3d (continued)**

2) the entropy of the system is positive despite being an adiabatic one ? **2 pts**

**Problem 4:** % of required daily caloric intake supplied by 2 sugar cans of 12 oz soda: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ %

**5 pts**

**Problem 5: 6 pts**

1. **Your decision on patent application Approve Not Approve**
2. **Your (quantitative) arguments for the decision:**