

Quiz 9

Answer the questions in the spaces provided. If you run out of room for an answer, continue on the back of the page.

|           |    |    |   |   |       |
|-----------|----|----|---|---|-------|
| Question: | 1  | 2  | 3 | 4 | Total |
| Points:   | 10 | 10 | 5 | 0 | 25    |
| Score:    |    |    |   |   |       |

Name: \_\_\_\_\_

1. (10 points) State versus process

- (a) Circle all of the following that are **state variables**. If you don't know what a particular variable represents, please ask. For example,  $p$  is pressure.

$p$     $V$     $\mu$     $N$     $T$     $q$     $U$     $w$     $S$

- (b) Circle all of the following that are **process (or path-dependent) variables**.

$p$     $V$     $\mu$     $N$     $T$     $q$     $U$     $w$     $S$

2. (10 points) Intensive versus extensive

- (a) Circle all of the following that are **intensive variables**.

$p$     $V$     $\mu$     $N$     $T$     $q$     $U$     $w$     $S$

- (b) Circle all of the following that are **extensive variables**.

$p$     $V$     $\mu$     $N$     $T$     $q$     $U$     $w$     $S$

3. (5 points) Fill in the blanks in the following sentences with the correct words or variables.

\_\_\_\_\_ is the capacity to do work. \_\_\_\_\_ governs the tendency of matter or energy to flow. The flow of energy (with or without work being done) is \_\_\_\_\_.

\_\_\_\_\_ is a "force" for volume change. Chemical potential is a "force" for \_\_\_\_\_ change.

4. For fun if you finish early: We have a system that has an extensive property  $X$  that is conserved:  $dX = 0$ . For a system partitioned into parts  $A$  and  $B$  with a partition that allows only equilibration of  $X$  between  $A$  and  $B$ , what is the condition of equilibrium for this system if

$$\frac{\partial S}{\partial X} = -y \tag{1}$$

where  $y$  is some intensive property of the system.

If  $A$  and  $B$  are not initially in equilibrium with each other, is the process of  $A$  and  $B$  equilibrating reversible? quasistatic? adiabatic? Can it be described by some other term?