Chemistry 230 -- Quiz 6

October 17, 2001 — Tellinghuisen

Pledge and signature:

Note: If you want your paper returned folded (*i.e.*, score concealed), please print your name on the back.

1. (15) Consider the reaction, $N_2 + 3\ H_2 \rightleftarrows 2\ NH_3$ (where all components are gases).

   (a) Write the reaction equilibrium condition in a closed system. (Be specific for this reaction.)

   (b) Suppose that initially a reaction vessel contains just 5.80 mol N_2 and 6.20 mol NH_3. At a later time 6.50 mol of N_2 is present. How much of each of the other components is present, and what is the extent of reaction ξ ?

   (c) Suppose the reaction is rewritten, $NH_3 \rightleftarrows {}^1/_2\ N_2 + {}^3/_2\ H_2$. Repeat the calculations of (b) for the same initial and final amounts of N_2 and NH_3.

2. (7) For each of the following — $CCl_4(l)$, $H(g)$, $N_2(g)$ —

   (a) Write the reaction of formation from reference-form elements at room *T*.

   (b) Is $\Delta H_f^\circ = 0$ for any of these at 50˚C? If so, which ones?

3. (4) For each of the following closed systems, write the conditions for material equilibrium between phases:

   (a) ice in equilibrium with liquid water.

   (b) ice in equilibrium with an aqueous solution of sucrose.

   (c) a two-phase system of ether and water, with each phase saturated with the other component.