Problem #1: (Ideal gas)

For an ideal gas the slope for a graph PV vs. V would be

(a) -1   (b) 0   (c) 1   (d) nRT

The slope for P vs. V^{-1} would be

(a) -1   (b) 0   (c) 1   (d) nRT

The slope for log P vs. log V would be

(a) -1   (b) 0   (c) 1   (d) nRT

Problem #2: (Gas mixture)

A mixture of helium and argon contains 3 mol of He for every 2 mol of Ar. The partial pressure of Ar is

(a) 2/3   (b) 2/5   (c) 3/5   (d) 1/2

of the total pressure

Problem #3: (First Law)

Citric acid is mixed with an aqueous baking soda solution in a flask closed by a balloon over the neck. The flask feels cool and the balloon expands.
Under the convention $\Delta U = q + w$, we can infer that

(a) $q < 0$, $w < 0$
(b) $q < 0$, $w > 0$
(c) $q > 0$, $w < 0$
(d) $q > 0$, $w > 0$

Problem #4: (Heat Capacity)

If you drink 200ml of an ice-cold (0°C) beverage, then how many kcal are used to warm the liquid to body temperature (37°C)? You can assume that the heat capacity and density of the beverage is essentially the same as that of water.

(a) 200   (b) 0.200   (c) 7400   (d) 7.400