Chemistry 236 -- Practice Quiz 5

October 8, 2003 — Thermal Expansivity

1. A hypothetical gas follows the equation of state, $PV = nRT\ (1 + aP)$, where a is a constant. What is α for this gas?

   a. $nR\ (^1/_P + a)$ b. $\frac{nR}{V}(1 + a)$ c. $\frac{nR}{PV}(1 + aP)$

   d. $1/T$ e. none of these
   f. There are multiple correct answers.

2. The volume of a certain fluid is observed to increase by 1.00% when it is heated from 35.0°C to 43.0°C. What is its average α over this temperature range?

   a. 0.00125 K b. 0.0100 K^{-1} c. 0.125 K^{-1} d. none of these
   f. This cannot be determined without additional information.

3. What would be the best temperature to record for the estimate of α in the previous problem?

   a. 35°C b. 39°C c. 40°C d. 43°C e. none of these

4. A 1.00-cm^3 cube of titanium (ρ = 4.51 g/cm^3) is suspended in water at 20.0°C from a sensitive spring scale. What does it "weigh"?

   a. 3.51 g b. 4.51 g c. 5.51g d. none of these

5. The weighing is repeated using an analytical balance equipped with brass weights (ρ = 8.4 g/cm^3), and the entire balance is immersed in a tub of water at 20.0°C. What does the Ti weigh now?

   a. 3.51 g b. 4.51 g c. 5.51g d. none of these

6. If $x << 1$, what is the approximate value of $(1 + x)^5 - 1$?

   a. x^5 b. $5\ x^5$ c. $3\ x$ d. none of these