CHEMISTRY
Section II
(Total time—95 minutes)

Part A
Time—55 minutes
YOU MAY USE YOUR CALCULATOR FOR PART A.

CLEARLY SHOW THE METHOD USED AND THE STEPS INVOLVED IN ARRIVING AT YOUR ANSWERS. It is to your advantage to do this, since you may obtain partial credit if you do and you will receive little or no credit if you do not. Attention should be paid to significant figures.

Be sure to write all your answers to the questions on the lined pages following each question in the goldenrod booklet. Do NOT write your answers on the lavender insert.

Answer Questions 1, 2, and 3. The Section II score weighting for each question is 20 percent.

1. Answer the following questions regarding the decomposition of arsenic pentafluoride, $AsF_5(g)$.

   (a) A 55.8 g sample of $AsF_5(g)$ is introduced into an evacuated 10.5 L container at 105°C.

      (i) What is the initial molar concentration of $AsF_5(g)$ in the container?

      (ii) What is the initial pressure, in atmospheres, of the $AsF_5(g)$ in the container?

   At 105°C, $AsF_5(g)$ decomposes into $AsF_3(g)$ and $F_2(g)$ according to the following chemical equation.

$$AsF_5(g) \;\rightleftarrows\; AsF_3(g) + F_2(g)$$
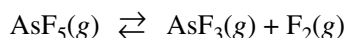
   (b) In terms of molar concentrations, write the equilibrium-constant expression for the decomposition of $AsF_5(g)$.

   (c) When equilibrium is established, 27.7 percent of the original number of moles of $AsF_5(g)$ has decomposed.

      (i) Calculate the molar concentration of $AsF_5(g)$ at equilibrium.

      (ii) Using molar concentrations, calculate the value of the equilibrium constant, K_{eq}, at 105°C.

   (d) Calculate the mole fraction of $F_2(g)$ in the container at equilibrium.

GO ON TO THE NEXT PAGE.