※答案須寫在答案卷內，否則不予計分。

1. Gaseous carbon dioxide is initially at $15^\circ C$, 55bar in a rigid tank $1000 cm^3$ in volume. It is then heated to $150^\circ C$. Carbon dioxide is reasonable to assume to be ideal in the process.
   (a) How much carbon dioxide is in the tank? (10%)
   (b) What is the final pressure? (10%)

2. At $25^\circ C$, under a pressure of 1 atm of pure oxygen, 35 ml oxygen gas dissolves in 1 mole of certain oil. At 1 atm, oxygen can be assumed to be ideal. What is the Henry's constant K_H (atm)?
   (20%)

3. Calculate z and v for sulfur hexafluoride at $75^\circ C$ and 10 bar by the second virial equation with the experimental values of virial coefficient $B = -194 \text{ cm}^3 \text{ mol}^{-1}$.
   (20%)

4. The reaction that produces NH_3 is
   $$N_2 + 3H_2 \xleftrightarrow{K} 2NH_3$$
   and H_2 is produced by steam reforming of CH_4 while the N_2 is produced by separation from air.
   (a) For a stoichiometric feed of N_2 and H_2 at a total pressure P, write the mole fractions of all species, y_{H2}, y_{N2} and y_{NH3}, in the reaction process versus conversion X. (10%)
   (b) show that the equilibrium constant K can be expressed as
   $$K = \frac{16}{27} \frac{X^2 (2-X)^2}{(1-X)^4 P^2}$$
   (10%)

5. The dissociation of ammonia at $27^\circ C$ has a equilibrium constant K value of 2.63×10^{-9}
   $$Heat + 2NH_{3(g)} \xleftrightarrow{K} N_{2(g)} + 3H_{2(g)}$$
   (a) If 1 M ammonia is placed in a reaction vessel, calculate the equilibrium concentrations of N_2 and H_2. (10%)
   (b) What is the percent yield of $N_{2(g)}$? (10%)