※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Explain/define the following terms.
   (a) Electronegativity　(5%)
   (b) Ionization energy　(5%)
   (c) Homogenous　(5%)
   (d) Henry's Law　(5%)
   (e) Isothermal process　(5%)

2. The following is the phase diagram which shows the boiling point/composition curve for ethanol/water mixtures. A industrial wastewater contains 45% ethanol. Suppose you are going to recycle this high organic wastewater by distilling.

   (a) What is the highest purity ethanol you can obtain?　(5%)
   (b) Please describe the processes which are needed to obtain this high purity product you answered in (a).　(15%)
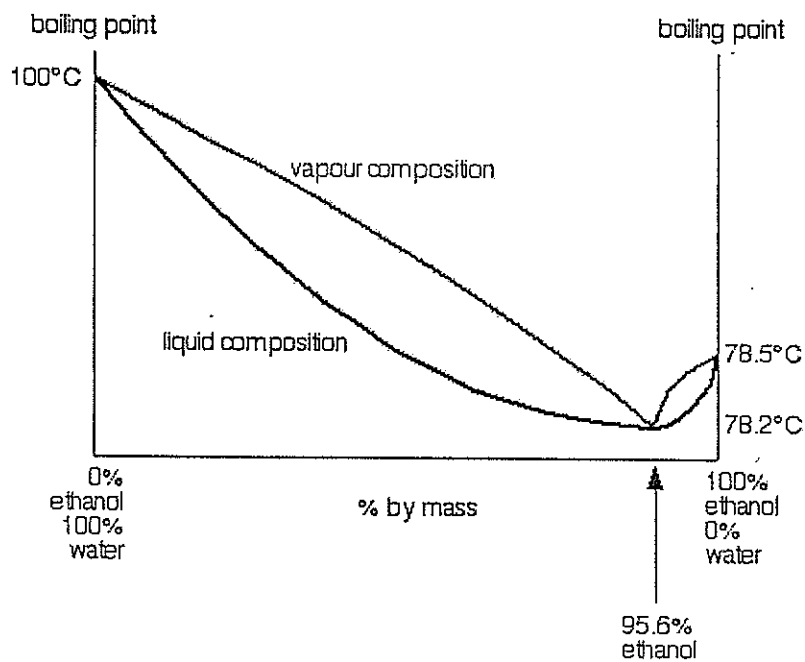
3. Complete combustion of 1.00 mol of acetone (C_3H_6O) under standard state liberates 1790 kJ of heat. Given that $\Delta H^{\circ}_f (CO_2) = -393.5$ kJ/mol and $\Delta H^{\circ}_f (H_2O) = -285.8$ kJ/mol, calculate the standard enthalpy of formation of acetone. (15%)

4. For laughing gas, N_2O
   (a) Draw a valid Lewis structure in your answer sheet. Assign formal charges to all atoms.　(7%)
   (b) Draw two additional resonance structures of the structure you drew in part (a). Assign formal charges to all atoms.　(7%)
   (c) Circle the single structure above (from the three structures in parts (a) and (b)) that most closely represents the true structure of N_2O **and explain your choice.**　(6%)

5. For each of the following items, provide an *example* (structural formula, where applicable) and a removal/treatment strategy.
   (a) hardness ions　(5%)
   (b) polyaromatic hydrocarbon　(5%)
   (c) colloidal suspended solid　(5%)
   (d) heavy metal ions　(5%)