

國立成功大學

111學年度碩士班招生考試試題

編 號：285

系 所：環境醫學研究所

科 目：普通化學

日 期：0220

節 次：第 2 節

備 註：不可使用計算機

※ 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. Draw the following chemical structures (15%)
 - (A) PCBs, dioxins, phthalates
 - (B) Benzene, toluene, xylene
 - (C) Epoxide, 1,3-butadiene, acetonitrile
 - (D) Acetone, isopropyl alcohol, ethyl acetate
 - (E) Cyclohexyl bromide, trifluoroacetic acid, trimethylsilane
2. Describe the factors that can influence (15%)
 - (A) the chemical reaction rate.
 - (B) the boiling point of a solution.
 - (C) how fast you cook well a pot of rice.
3. Describe or explain the following terms: (40%)
 - (A) pH and pKa
 - (B) Enthalpy and entropy
 - (C) Beer's Law and Henry's Law
 - (D) Isomer, epimer, and enantiomer
 - (E) Material safety data sheet (MSDS)
 - (F) Ionization energy and solvation energy
 - (G) Avogadro's number and octane number
 - (H) Electronic, vibrational, rotational transitions
4. Calculate the following. Show your work. Be mindful of significant digits. (30%)
 - (A) The pH in a 0.001 M solution of KOH.
 - (B) Number of carbon atoms in 48.24 grams of diamond.
 - (C) The molality of a solution formed by dissolving 1.14 mol of NaCl in 16.0 mol of water
 - (D) The molarity of the resulting solution when 25.0 mL of a 0.125 M NaCl solution is diluted to 125.0 mL.
 - (E) The mass of NaN_3 required for yielding 11.2 L of N_2 measured at 20.0 °C and 3.00 atm.
Note: $\text{NaN}_3(\text{s}) \rightarrow \text{Na}(\text{s}) + \text{N}_2(\text{g})$
 - (F) Number of oxygen molecules in the 100-liter vacuum chamber of a mass spectrometer that was pumped down from ambient air and then operated in 1×10^{-5} torr.