

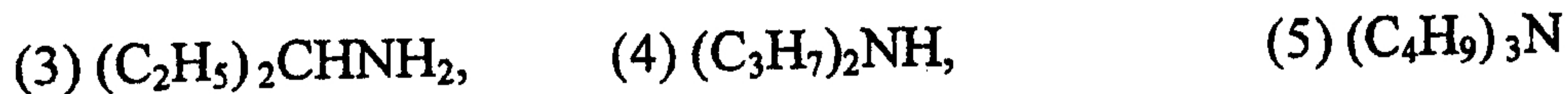
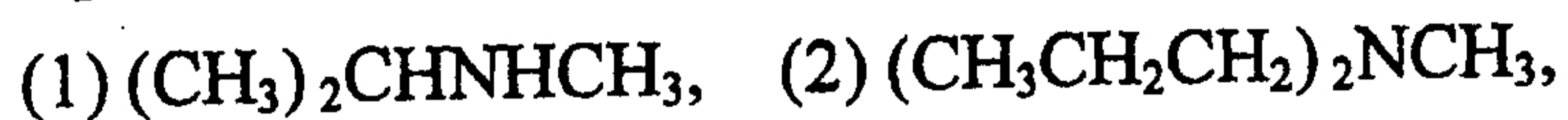
本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

考試日期：0301，節次：1

- (10%)** Name the following compounds with **English and Chinese**.
(1) CaF_2 , (2) TiCl_3 , (3) $\text{Mg}(\text{HCO}_3)_2$, (4) $\text{K}_2\text{Cr}_2\text{O}_7$, (5) $(\text{NH}_4)_3\text{PO}_4$
- (10%)** Consider the (1) sulfate ion, SO_4^{2-} , and (2) sulfur dioxide, SO_2 . Draw and name its shape, and estimate the bond angles.
- (10%)** Consider the unbalanced reaction: $\text{C}_6\text{H}_6 + \text{H}_2 \rightarrow \text{C}_6\text{H}_{12}$
 - Balance the reaction by inspection.
 - Write this reaction in English, using the word mole(s) wherever appropriate.
 - To produce 1 mole of C_6H_{12} from this reaction, how many grams of C_6H_6 and H_2 must you combine?
 - What is the theoretical yield of C_6H_{12} for this reaction?
 - Suppose only 24.0 g of C_6H_{12} was recovered. What would be the percent yield of this reaction?
- (10%)** A 2.136 g sample of a solid burns in oxygen to produce 5.933 g of CO_2 and 1.227 g of H_2O .
 - What are the mass percents of the elements present in this sample?
 - What is the empirical formula for this compound?
 - The molar mass of this compound is determined to be about 94 g/mole. What is the molecular formula for this compound?
- (10%)** Would you expect (1) CCl_4 or CBr_4 , (2) CH_3Cl or CH_4 to have a higher boiling point? Explain your answer and give their reasons.
- (10%)** Consider the reaction: $\text{CH}_4(\text{g}) + 2\text{H}_2\text{S}(\text{g}) \rightleftharpoons \text{CS}_2(\text{g}) + 4\text{H}_2(\text{g})$
The equilibrium concentrations of the reactions and products are: $\text{CS}_2 = 6.10 \times 10^{-3} \text{ M}$; $\text{H}_2 = 1.17 \times 10^{-3} \text{ M}$; $\text{CH}_4 = 2.35 \times 10^{-3} \text{ M}$; $\text{H}_2\text{S} = 2.93 \times 10^{-3} \text{ M}$. Please calculate the value of equilibrium constant (K_{eq}) for this reaction.
- (10%)** Describe the alternative definitions of acids and bases on the basis of Arrhenius, Bronsted-Lowry and Lewis concepts, respectively.

(背面仍有題目,請繼續作答)

8. (10%) Which amines shown as follows are (a) primary, (b) secondary, (c) tertiary amines? Please also give an IUPAC name for these amines, respectively.



9. (10%) Draw a dot diagram for the molecule; (1) O_3 , ozone, and (2) CO , carbon monoxide.

10. (5%) A tank of acetylene gas (C_2H_2) contains 48.5 lb of the gas and is at a pressure of 600.2 lb/in.^2 ($760 \text{ mmHg} = 14.696 \text{ lb/in.}^2$, $453.6 \text{ g} = 1 \text{ lb}$). Express the pressure of the gas in atmospheres and the amount of gas in moles.

11. (5%) How many milliliters of a 0.250 M solution of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) are required to obtain 100.0 g of glucose?