## 生物化學研究所 國立成功大學 76 學年度化學研究所考試(有機 化學試題) 第 1 (1) Give structural formulas for each of the following compounds. (4%) (c) TMS (b) 2.4-D (d) 2,3,7,8-tetrachlorodibenzodioxin (2) Give common or IUPAC names for each of the following compounds. (6%) $(d) \quad Br = c / C$ (C) C1- C+2- C≡C-H (f) 40-01 CHCY-OH (3) Show how you might carry out each of the following conversions. (10%) (a) O-C13-E-OH - O-OH-E-OH (d) CH3 CH-Br - CH3 CH - E-CH2-CH3 O>-OH → O-G-CH; (4) Give structures for the products of each of the following reactions. (30%) (b) $CH_2 = C - OI = CH_2$ $HB_r$ (4) (0)-c-cH3 HI (d) (H3 - C) - C1 - ON - 340°C CHCI, (f) CH3-CH2-C=C-CH2CH2CH3 Li (h) \$\frac{\phi\_{c-00H}}{} \frac{\phi\_{30}^{\phi}}{}\$ $\bigcirc -CH_3 \xrightarrow{B_2H_6} \xrightarrow{H_2O_3}$ (l) O-N-CH3 CH3CH2-CI $(j) \qquad \bigotimes_{c \equiv cH} \xrightarrow{Hg^{\dagger \dagger}, H^{\dagger}}$ CH3-CN-CH2 HIO4 (1) Eto-c-(CH2)4-c-OEt NaOEL (0) (0)-01-0-E-NHR H1/Pd

(5) Of the following solvents, which will be the <u>least desirable</u> (最不遵复 ) to be used in the

(d) ග<sub>3</sub>ද්යා<sub>3</sub>

(d) R-000H3

(b) C = C,

(7) Arrange the stretching vibration frequency of the following functional groups in proper order,

Arrange the proton nuclear magnetic resonance of the following compounds in the order of their <u>increasing</u> shielding, starting from the farthest downfield shift to TMS at the very right. (6%)

(e) CS<sub>2</sub>

(e) R-000H

(f) R-OCH<sub>3</sub>

nmr spectroscopy? (2%)

(b) D<sub>2</sub>O

(b) Ar-H

(a) C = C, C = C, C - C

starting from the highest to the lowest: (4%)

(c) CH<sub>3</sub>CH<sub>2</sub>OH

(c) R-CHO

(a) CC14

(a) R-CH3

| 任物學研究         | 1 |
|---------------|---|
| 1 2700 3 41/6 | i |

## 國立成功大學 76 學年度化學研究所考試(有機化學 試題) 第2月

- (8) Arrange in ascending order the electronic transition of the following types according to their energy requirements, starting from the lowest to the highest: (2%)
  - (a)  $\pi \longrightarrow \pi'$ (b)  $n \longrightarrow \kappa^*$ (c)  $\sigma \longrightarrow \sigma^s$
- (9) Draw structures of all the stereoisomers possible of each of the following compounds. Classify each pair of isomers as (i) cis, trans isomer (ii) enantiomerph (iii) diastereoisomer. (3%)
  - 03-01=5-CH=CH2
- (b) CH3 CH CO2H
- (c) CH3 CH CH CO2H
- (10) Identify the configurations of each of the following as R or S. (3%)
  - Br CI
- C h... H
- H ChanHa
- (11) Suggest plausible mechanisms for the following reactions: (6%)

  - (a)  $CH_3 E (CH_3)_4 E CH$   $\longrightarrow$   $CH_3 E CH_3$  (b)  $CH_4 EH (CH_3)_4 E CH_3$   $\longrightarrow$   $CH_3 CH_3 CH_3 CH_3$   $\longrightarrow$   $CH_3 CH_3 CH_3 CH_3$   $\longrightarrow$   $CH_3 CH_3 CH_3 CH_3$   $\longrightarrow$   $CH_3 CH_3 CH_3$   $\longrightarrow$   $CH_3 -$
  - $(c) \qquad \stackrel{\circ}{\longleftrightarrow} \qquad \stackrel{\phi_{3} \stackrel{\circ}{\to} c_{M_{3}} \stackrel{\circ}{\to} r^{-}}{(c_{M_{3}})_{c_{0}} \stackrel{\circ}{\to} Na^{+}} \qquad \stackrel{Ol}{\longleftrightarrow} \qquad \stackrel{$

(12) The correct products for the reaction, 
$$R = \overset{\circ}{C} = \circ H + \overset{\circ}{R} = \overset{H^{+}}{\longrightarrow} is$$
: (3%)

- (4) R-E-OR' + H20'\$
- (b) R-E-der + H20 (c) R-E-OR + H2018

- (d) R'-E-O"R+H20
- (e)  $R = \frac{0}{10} 0R' + H_2O$
- (13) A student tried to prepare methyl t-butyl ether by the following Williamson synthesis:

$$CH_3OH \xrightarrow{Na} CH_3O^*Na^+ \xrightarrow{(CH_3)_3C-Br} (CH_3)_3C-O-CH_3$$

Did he get the desired product? Why? What did he get? (4%)

- (14) For each pair of compounds below, indicate by simple chemical test(s) how you could distinguish the two: (3%)
  - (a) cyclopentanone, cyclohexene;
- (b) 1-octanol, 2-methylphenol;
- (c) ethyl phenyl ketone, ethyl benzoate;
- (15) Construct a flow diagram for the separation of p-cresol (pK $_a$  = 10.2) and 2,4-dinitrophenol (pK $_a$  = 3.96), both of which have slight solubility in water at 25°, but are very soluble in ether. (8%)
- (16) Complete the following reaction scheme by giving the correct structural formulas for the materials designated A-F. (6%)
  - Α IR (partral):

NOTR: 1.6 & (a), 7.18 (b), both singlets

NOTE: 
$$1.6 \delta$$
 (a),  $7.1 \delta$  (b), both singlets

area ratio:  $\frac{a}{b} = \frac{3}{2}$ 

$$Pd/H_2 \qquad F \leftarrow \frac{H_2 S O_4}{IR(partial)}$$

$$IR(partial)$$

$$IR(partial)$$

M+ =150