

CSE – MAY 2008

YEAR 12 CHEMISTRY

Written test 1

ANSWERS & SOLUTIONS BOOK

SECTION A – Multiple choice questions (20 marks)

1	B	5	C	9	C	13	A	17	D
2	C	6	A	10	D	14	C	18	B
3	D	7	B	11	C	15	A	19	B
4	D	8	D	12	B	16	D	20	A

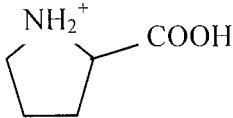
SECTION B – Short answer questions (50 marks)**Question 1 (6 marks)**

- a. $2\text{Al(s)} + 6\text{HCl(aq)} \rightarrow 2\text{AlCl}_3\text{(aq)} + 3\text{H}_2\text{(g)}$ 1 mark
- b. $n(\text{HCl}) = c \times V$
 $= 1.15 \times 20.00 \times 10^{-3}$
 $= 0.0230 \text{ mol}$ 1 mark
- c. $n(\text{NaOH}) = c \times V$
 $= 0.0993 \times 15.55 \times 10^{-3}$
 $= 0.00154 \text{ mol}$ 1 mark
- d. $n(\text{HCl}) \text{ reacted with } n(\text{Al}) = 0.02300 - 0.00154 = 0.0215 \text{ mol}$ 1 mark
- e. $n(\text{Al}) = 2/6 \times n(\text{HCl})$
 $n(\text{Al}) = 2/6 \times 0.0215 = 0.00715$
 $m(\text{Al}) = 0.00715 \times 27.0 = 0.193 \text{ g}$ 2 marks

Question 2 (5 marks)

- a. Strong base and weak acid has an equivalence point greater than 7. This requires an indicator with a pH range above 7. On the list provided only phenol red is suitable. 2 marks
- b. Weak acid and strong base with equivalence point above 7 so phenol red is suitable. 1 mark
- c. Sodium hydroxide is hygroscopic and reacts with carbon dioxide. This disqualifies it as a primary standard. 2 marks

Question 3 (6 marks)

- a.  1 mark
- b. The three dimensional shape of protein arises from intramolecular bonding such as H-bonding, electrostatic attraction etc between side chains. This causes folding and pleating. 2 marks

- c.
$$\begin{array}{c} \text{CH}_3\text{SCH}_2\text{CH}_2 \\ | \\ \text{H}_2\text{NCHCONHCH}_2\text{COOH} \end{array} \qquad \begin{array}{c} \text{CH}_3\text{SCH}_2\text{CH}_2 \\ | \\ \text{HOOCCHNHCOCH}_2\text{NH}_2 \end{array}$$
 2 marks
- d. Cysteine has a $-\text{SH}$ functional group and this can form strong disulfide covalent cross-links whereas glycine only exhibits weak forces of attraction. 1 mark

Question 4 (8 marks)

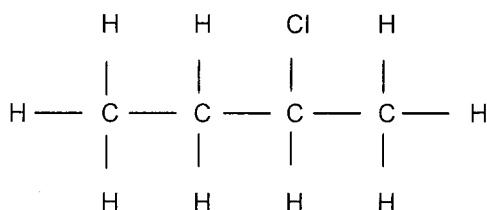
- a. $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl} \longrightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
 $\searrow$
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ 3 marks

b.

Reagent	Type of chemical reaction
HCl/AlCl_3	Addition
$\text{MnO}_4^-(\text{aq}) / \text{H}^+(\text{aq})$	Oxidation
$\text{H}_2\text{SO}_4(\text{l})$	Condensation or esterification or dehydration

3 marks

c.



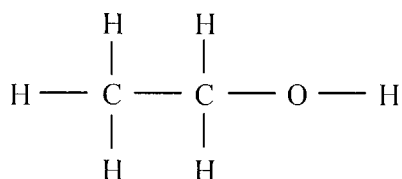
1 mark

- d. Fractional distillation. 1 mark

Question 5 (9 marks)

- a. $1670\text{--}1750\text{ cm}^{-1}$ 1 mark
- b. $-\text{CH}_3$ 1 mark
- c. $-\text{CH}_2-$ 1 mark
- d. 2 1 mark

e.



1 mark

- e. $-\text{OH}$ (acids) 1 mark
- f. CH_3COOH 1 mark
- g. $60\text{ CH}_3\text{COOH}^+ \quad 45\text{ COOH}^+ \quad 15\text{ CH}_3^+ \quad 43\text{ CH}_3\text{CO}^+$ 1 mark
- h. One of aroma or liquid or solvent or a sensible answer 1 mark

Question 6 (5 marks)

- a. propan-1-amine or 1-aminopropane
- b. propyl propanoate
- c. 2-chlorobut-1-ene
- d. 3-chloro-3-methylpentan-1-ol
- e. 2-methylhexane

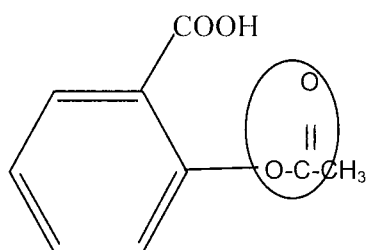
Question 7 (6 marks)

		Type of reaction
a.	HCl	substitution
b.		addition polymerisation
c.	HCl	substitution
d.		hydrolysis

Question 8 (5 marks)

- a. $C_7H_6O_3$ 1 mark

b.



1 mark

c.

$$n(\text{aspirin}) = 10.00/180.0 = 0.0555 \text{ mol}$$

$$n(\text{salicylic acid}) = n(\text{aspirin})$$

$$m(\text{salicylic acid}) = 0.0555 \times 138.0 = 7.67 \text{ g}$$

$$\text{Mass required due to 90\% yield} = 7.67 \times 100/90 = 8.52 \text{ g}$$

3 marks