

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc Degree Programme
Department of Chemistry
CMU1220 Basic Principles of Chemistry Assignment
CAT III - 2015/2016
Duration – 01 hour



Date : 08 – 10-2016

Time :

10.30 a.m - 11.30 a.m

- This question paper consists of **18 multiple choice** questions in **Part A** and **four short answer** questions in **Part B**. මෙම ප්‍රශ්න පත්‍රයේ **Part A** ධනුවරණ ප්‍රශ්න 18 ක් ඇති අතර **Part B** කෙටි පිළිතුරු ප්‍රශ්න 4 කින් සමන්විත වේ.
- Choose the best correct answer and mark it on the answer sheet with a **PEN**. නිවැරදි උත්තරය තෝරා ඊට අදාළ කොටුවේ පැහැක් භාවිතයෙන් ලකුණු කරන්න.
- Write the more relevant/correct answer for short answer questions. කෙටි පිළිතුරු සඳහා හොඳින්ම අදාළ නිවැරදි පිළිතුර ලියන්න.
- The use of a **non-programmable** electronic calculator is permitted. ප්‍රක්‍රමණය කළ නොහැකි ගණක යන්ත්‍ර භාවිත කළ හැක.
- You are **NOT allowed** to keep Mobile phones with you during the examination. Please **switch off** and leave them in a safe place. විභාග වේලාවේදී ජංගම දුරකථන ලග තබා ගැනීමට ඉඩ දෙනු නොලැබේ. ඒවා ක්‍රියාවිරහිත කොට වෙනම ස්ථානයකින් තබන්න.

WRITE YOUR **REGISTRATION NUMBER, NAME AND ADDRESS** CLEARLY IN THE SPACE PROVIDED ON THE BACK OF THE ANSWER SHEET.

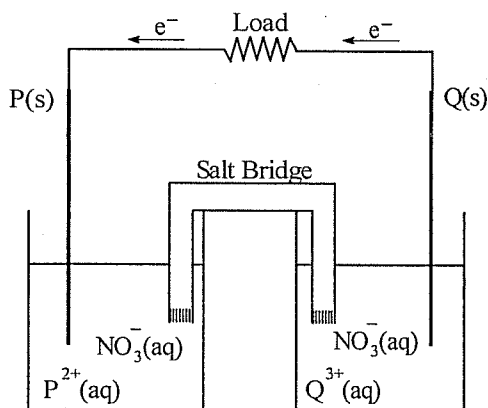
Gas constant	= $8.314 \text{ J K}^{-1} \text{ mol}^{-1}$	Avogadro constant	= $6.023 \times 10^{23} \text{ mol}^{-1}$
Faraday constant (F)	= $96,500 \text{ C mol}^{-1}$	Planck's constant (h)	= $6.63 \times 10^{-34} \text{ J s}$
Velocity of light (c)	= $3.0 \times 10^8 \text{ m s}^{-1}$	Standard Atmospheric pressure	= $10^5 \text{ Pa (N m}^{-2})$
Mass of an electron	= $9.1 \times 10^{-31} \text{ kg}$	Rydberg constant, R	= $1.097 \times 10^7 \text{ m}^{-1}$

Part A : 18 multiple choice questions (72 Marks)

Use the following data in answering questions 1 – 7.

ප්‍රශ්න අංක 1 - 7 දක්වා පහත දී ඇති දත්ත භාවිතයට ගෙන පිළිතුරු සපයන්න.

A student prepared a Galvanic cell by inserting a rod of metal P in an aqueous solution of $\text{P}(\text{NO}_3)_2$ in a beaker, inserting a rod of metal Q in an aqueous solution of $\text{Q}(\text{NO}_3)_3$ in a beaker and bringing the electrical contact between the two solution using a salt bridge; see the figure. She observed that the electrons flow from Q to P when they are connected to a load. The emf of the cell was found to be 1.24 V at 25°C . It is known that $[\text{P}(\text{NO}_3)_2] = 0.50 \text{ mol dm}^{-3}$ and $[\text{Q}(\text{NO}_3)_3] = 0.25 \text{ mol dm}^{-3}$. The student found out that the electrode potential of the $\text{Q(s)}|\text{Q}^{3+}(\text{aq})$ electrode is 0.74 V.



$P(NO_3)_2$ ජලය ප්‍රාවණයක් අඩංගු බිකරයකට P ලෝහ කුරක් සහ $Q(NO_3)_3$ ජලය ප්‍රාවණය සහිත බිකරයකට Q ලෝහ කුරක් ගිල්වා, එම බිකරවල අඩංගු ප්‍රාවණවල විද්‍යුත් සම්බන්ධතාවය ලවණ සේතුවක් මගින් ලබා දී සිසුවෙක් විසින් ගැල්වානික් කෝෂයක් සාදන ලදී. (රූපය බලන්න.)

Q සිට P දක්වා ඉලෙක්ට්‍රෝන ගමන් කරන බව ප්‍රතිරෝධයක් (Load) සම්බන්ධ කළ විට එම සිසුවා නිරීක්ෂණය කරන ලදී. $25^\circ C$ දී එම කෝෂයේ වි.ගා.බ. 1.24 V බව සොයා ගන්නා ලදී.

$[P(NO_3)_2] = 0.50 \text{ mol dm}^{-3}$ සහ $[Q(NO_3)_3] = 0.25 \text{ mol dm}^{-3}$ තව ද $Q(s)|Q^{3+}(aq)$ ඉලෙක්ට්‍රෝඩයේ විභවය 0.74 V බව සිසුවා සොයා ගන්නා ලදී.

1. Consider the following statements. පහත දී ඇති ප්‍රකාශන සලකන්න.

- The spontaneous cathode of the cell is Q(s). මෙම කෝෂයේ ස්වයං-සිද්ධ කැතෝඩය Q(s) වේ.
- The positive terminal of the cell is P(s). මෙම කෝෂයේ ධන අග්‍රය P(s) වේ.
- The electric potential of is 1.24 V higher than that of Q(s).

P(s) හි විද්‍යුත් විභවය Q(s) හි විද්‍යුත් විභවයට වඩා 1.24 V වැඩිවේ.

The correct statements, out of (i), (ii) and (iii) above, are

- (i), (ii) සහ (iii) අතරින් නිවැරදි ප්‍රකාශය වන්නේ
- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
- (d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

2. Consider the following cell diagrams drawn by the student for the above mentioned cell. ඉහත දී ඇති කෝෂය සඳහා සිසුවා අඳින ලද කෝෂ සටහන් සලකන්න.

- $P(s)|P^{2+}(aq)||Q^{3+}(aq)|Q(s)$
- $P(s)|P^{2+}(aq), NO_3^-(aq), H_2O(l)||Q^{3+}(aq)|Q(s)$
- $Q(s)|Q^{3+}(aq), NO_3^-(aq), H_2O(l)||P^{2+}(aq)|P(s)$

Acceptable cell diagrams, out of (i), (ii) and (iii) above, are

- (i), (ii) සහ (iii) අතරින් පිළිගත හැකි කෝෂ සටහන් වන්නේ
- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
- (d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

3. Three students wrote the following as the spontaneous cell reaction for the above cell.

මෙම කෝෂය සඳහා සිසුන් තිදෙනෙකු ලියන ලද ස්වයං-සිද්ධ කෝෂ ප්‍රතික්‍රියා පහත දක්වා ඇත.

- $2Q(s) + 3P^{2+}(aq) \rightarrow 2Q^{3+}(aq) + 3P(s)$
- $\frac{2}{3}Q^{3+}(aq) + P(s) \rightarrow \frac{2}{3}Q(s) + P^{2+}(aq)$
- $\frac{1}{3}Q(s) + \frac{1}{2}P^{2+}(aq) \rightarrow \frac{1}{3}Q^{3+}(aq) + \frac{1}{2}P(s)$

Correct spontaneous cell reactions, out of (i), (ii) and (iii) above, are

- (i), (ii) සහ (iii) අතරින් නිවැරදි ස්වයං-සිද්ධ කෝෂ ප්‍රතික්‍රියා වනුයේ,
- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
- (d) All (i), (ii) and (iii). (e) Only (ii).

4. Three students made the following statements about the above mentioned cell.

ඉහත කෝෂය සඳහා සිසුන් තිදෙනකු විසින් පහත ප්‍රකාශන කරන ලදී.

(i) The potential difference between P and Q rods will be different from 1.24 V when the load is connected (as shown in the figure). රූපයේ පෙන්වා ඇති පරිදි ප්‍රතිරෝධකය සම්බන්ධ කළ විට P සහ Q ලෝහකුරු අතරේ විභව අන්තරය 1.24 V වඩා වෙනස් ය.

(ii) The emf of the cell may be different from 1.24 V if the temperature of the $Q(s)|Q^{3+}(aq)$ electrode is increased without changing the concentration of $Q(NO_3)_3$ solution and temperature of the other parts of the cell.

$Q(s)|Q^{3+}(aq)$ ඉලෙක්ට්‍රෝඩයේ උෂ්ණත්වය වැඩි කර $Q(NO_3)_3$ ද්‍රාවණයේ සාන්ද්‍රණය සහ අනෙක් කොටස්වල උෂ්ණත්වය වෙනස් නොකර, කෝෂයේ වි.ගා.බ 1.24 V වඩා වෙනස් විය හැක.

(iii) The emf of the cell remains at 1.24 V when water is added to the beaker containing $P(NO_3)_2$ if the temperature of the cell is maintained at $25^\circ C$.

කෝෂයේ උෂ්ණත්වය $25^\circ C$ පවත්වා ගනිමින්, $P(NO_3)_2$ ද්‍රාවණය අඩංගු බීකරයට ජලය එකතු කළ විට, කෝෂයේ වි.ගා.බ. 1.24 V ලෙසට පවතියි.

Correct statements, out of (i), (ii) and (iii) above, are / (i), (ii) සහ (iii) අතරින් නිවැරදි වනුයේ

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
(d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

5. What best represents the ionic strength of the $Q(NO_3)_3$ solution?

$Q(NO_3)_3$ ද්‍රාවණයේ අයනික ප්‍රබලතාවය වඩා හොඳින් දක්වනුයේ

- (a) 0.75 mol dm^{-3} (b) 3.0 mol dm^{-3} (c) 2.5 mol dm^{-3}
(d) 0.5 mol dm^{-3} (e) 1.5 mol dm^{-3}

6. What best represents the electrode potential of the $P(s)|P^{2+}(aq)$ electrode?

$P(s)|P^{2+}(aq)$ ඉලෙක්ට්‍රෝඩයේ ඉලෙක්ට්‍රෝඩ විභවය වඩා හොඳින් දක්වනුයේ

- (a) 0.50 V (b) -0.50 V (c) 0.96 V (d) 1.98 V (e) -1.98 V

7. A student wrote down a cell diagram for the above cell. The cell reaction assigned to this cell diagram was $2Q^{3+}(aq) + 3P(s) \rightarrow 2Q(s) + 3P^{2+}(aq)$. What best represents the Gibbs free energy change for this cell reaction (under the above mentioned experimental conditions)? $[F = 96500 \text{ C mol}^{-1}]$.

සිසුවෙක් ඉහත කෝෂය සඳහා කෝෂ සටහන ලියන ලදී. මෙම කෝෂ සටහන සඳහා අදාළ කෝෂ ප්‍රතික්‍රියාව වනුයේ, $2Q^{3+}(aq) + 3P(s) \rightarrow 2Q(s) + 3P^{2+}(aq)$

මෙම කෝෂ ප්‍රතික්‍රියාව සඳහා ගිබ්ස් ශෝෂ්‍ය ශක්ති වෙනස ඉතාමත් හොඳින් දක්වනුයේ මින් කුමක් ද?

(ඉහත දී ඇති පරීක්ෂණ දත්ත සමඟ) $[F = 96500 \text{ C mol}^{-1}]$

- (a) $358.980 \text{ kJ mol}^{-1}$ (b) $239.320 \text{ kJ mol}^{-1}$ (c) $717.960 \text{ kJ mol}^{-1}$
(d) $179.480 \text{ kJ mol}^{-1}$ (e) $119.660 \text{ kJ mol}^{-1}$

8. Consider the following electrodes. පහත සඳහන් ඉලෙක්ට්‍රෝඩ සලකන්න.

- (i) $\text{Pb(s)}|\text{Pb}^{2+}(\text{aq})$ (ii) $\text{Zn(s)}|\text{H}^+(\text{aq}), \text{Zn}^{2+}(\text{aq})$
 (iii) $\text{Pb(s)}|\text{PbSO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})$

Chemically reversible electrodes out of (i), (ii) and (iii) above, are

ඉහත (i), (ii) සහ (iii) අතරින් රසායනිකව ප්‍රත්‍යාවර්ත ඉලෙක්ට්‍රෝඩ වනුයේ

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
 (d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

9. Half reactions of the redox electrodes, $\text{Pt(s)}|\text{MnO}_4^-(\text{aq}), \text{Mn}^{2+}(\text{aq}), \text{H}^+(\text{aq})$,
 $\text{Pt(s)}|\text{Cr}_2\text{O}_7^{2-}(\text{aq}), \text{Cr}^{3+}(\text{aq}), \text{H}^+(\text{aq})$ and $\text{Pt(s)}|\text{ClO}_4^-(\text{aq}), \text{ClO}_3^-(\text{aq}), \text{H}^+(\text{aq})$,
 respectively, are

රෙඩොක්ස් ඉලෙක්ට්‍රෝඩ සඳහා පිළිවෙලින් අර්ධ ප්‍රතික්‍රියා පහත ආකරය වේ.

$\text{Pt(s)}|\text{MnO}_4^-(\text{aq}), \text{Mn}^{2+}(\text{aq}), \text{H}^+(\text{aq})$, $\text{Pt(s)}|\text{Cr}_2\text{O}_7^{2-}(\text{aq}), \text{Cr}^{3+}(\text{aq}), \text{H}^+(\text{aq})$ and
 $\text{Pt(s)}|\text{ClO}_4^-(\text{aq}), \text{ClO}_3^-(\text{aq}), \text{H}^+(\text{aq})$

- (i) $\text{MnO}_4^-(\text{aq}) + 8\text{H}^+(\text{aq}) + 5\text{e}^- \rightarrow \text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}$
 (ii) $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6\text{e}^- \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}$
 (iii) $\text{ClO}_4^-(\text{aq}) + 2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{ClO}_3^-(\text{aq}) + \text{H}_2\text{O}$

The correct half reactions, out of (i), (ii) and (iii) above, are

ඉහත (i) (ii) සහ (iii) අතරින් නිවැරදි අර්ධ ප්‍රතික්‍රියා පෙන්වනුයේ

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
 (d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

10. In $a_X = \gamma_X \left(\frac{c_X}{c^0} \right)$, which gives the activity a_X of an ionic species X in a solution,

$a_X = \gamma_X \left(\frac{c_X}{c^0} \right)$ නි a_X යනු X නම් අයනික විශේෂයක සක්‍රියතාවයයි.

- (i) c^0 is always unity irrespective of the units.
 ඒකක නොසලකා හැරිය විට c^0 සැමවිටම ඒකීය වේ.
 (ii) c_X is the molar concentration of the species X.
 c_X යනු X නම් විශේෂයේ මවුලික සාන්ද්‍රණය වේ.
 (iii) in general, the value γ_X depends on the particular ionic species.
 සාමාන්‍යයෙන් γ_X නි අගය අයනික විශේෂය මත රඳා පවතී.

The correct statements, out of (i), (ii) and (iii) above, are

ඉහත (i), (ii) සහ (iii) අතරින් නිවැරදි ප්‍රකාශන වන්නේ,

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
 (d) All (i), (ii) and (iii). (e) Only (ii).

11. The thermodynamic equilibrium constant of the reaction

$\text{Hg}_2\text{SO}_4(\text{s}) + \text{Cu(s)} \rightarrow 2\text{Hg(l)} + \text{Cu}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$, at 298 K and 1 bar is 2.5×10^8 . At

298 K and 1 bar, what is the emf of the cell $\text{Hg(l)}|\text{Hg}_2\text{SO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})||\text{Cu}^{2+}(\text{aq})|\text{Cu(s)}$

when the activities of copper and sulphate ions are 0.60 and 0.70 respectively.

$[F = 96500 \text{ C mol}^{-1}]$

$\text{Hg}_2\text{SO}_4(\text{s}) + \text{Cu}(\text{s}) \rightarrow 2\text{Hg}(\text{l}) + \text{Cu}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$ වන ප්‍රතික්‍රියාව සඳහා තාපගතික සමතුලිත නියතය 298 K සහ 1 bar පීඩනයක දී 2.5×10^8 ක් නම්

$\text{Hg}(\text{l}) | \text{Hg}_2\text{SO}_4(\text{s}) | \text{SO}_4^{2-}(\text{aq}) || \text{Cu}^{2+}(\text{aq}) | \text{Cu}(\text{s})$ කෝෂයේ කොපර් සහ සල්ෆේට් අයනවල සක්‍රියතාවය (activities) පිළිවෙලින් 0.60 සහ 0.70 නම් එම කෝෂයේ වි.ගා.බ. 298 K සහ 1 bar හිදී වනුයේ

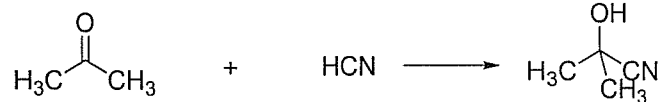
- (a) -0.569 V (b) -0.259 (c) 0.285 V (d) -0.285 V (e) 0.259 V

12. Electrode potential of $\text{Pb}(\text{s}) | \text{PbSO}_4(\text{s}) | \text{SO}_4^{2-}(\text{aq})$ is the emf assigned to the reaction.

ඉලෙක්ට්‍රෝනයේ විභවය පහත කිනම් ප්‍රතික්‍රියාවට අදාළ වේ.වි.ගා.බ.ද?

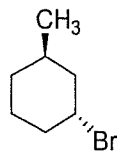
- (a) $\text{PbSO}_4(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Pb}(\text{s}) + 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
 (b) $\text{Pb}(\text{s}) + 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + \text{H}_2(\text{g})$
 (c) $\text{PbSO}_4(\text{s}) + 2\text{e}^- \rightarrow \text{Pb}(\text{s}) + \text{SO}_4^{2-}(\text{aq})$
 (d) $\text{Pb}(\text{s}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{e}^-$
 (e) $\text{Pb}(\text{s}) + \text{H}_2(\text{g}) + 2\text{SO}_2(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$

13. Consider the following reaction. පහත දී ඇති ප්‍රතික්‍රියාව සලකා බලන්න.



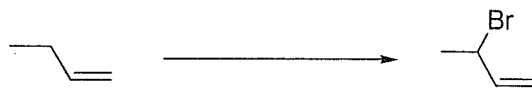
Above reaction is an example for a/an ඉහත ප්‍රතික්‍රියාවට උදාහරණයක් වන්නේ

- (a) Elimination reaction. ඉවත්වීමේ ප්‍රතික්‍රියාවකටය.
 (b) Electrophilic addition reaction. ඉලෙක්ට්‍රෝෆිලික ආකලන ප්‍රතික්‍රියාවකට ය.
 (c) Electrophilic substitution reaction. ඉලෙක්ට්‍රෝෆිලික ආදේශ ප්‍රතික්‍රියාවකට ය.
 (d) Nucleophilic substitution reaction. නියුක්ලියෝෆිලික ආදේශ ප්‍රතික්‍රියාවකට ය.
 (e) Nucleophilic addition reaction. නියුක්ලියෝෆිලික ආකලන ප්‍රතික්‍රියාවකට ය.
14. Select the correct chair conformation of the di-substituted cyclohexane given below.
 පහත දී ඇති ද්වි ආදේශිත සයික්ලො හෙක්සේනය සඳහා නිවැරදි පුටු සහනාසය තෝරන්න.



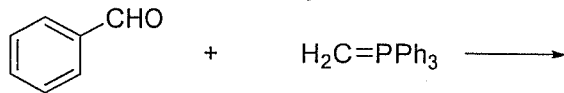
- (a) (b) (c) (d) (e)

15. What is the most suitable reagent to effect the following reaction?
පහත සඳහන් ප්‍රතික්‍රියාව සිදු කිරීම සඳහා සුදුසුම ප්‍රතිකාරකය කුමක් ද?



- (a) NBS (b) HBr/ether (c) HOBr (d) Br₂/water (e) Br₂/CCl₄

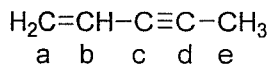
16. What is the major product of the reaction given below?
පහත සඳහන් ප්‍රතික්‍රියාවෙහි ප්‍රධාන ඵලය කුමක් ද?



- (a) (b) (c) (d) (e)

17. Hybridizations of the carbon atoms of the following compound labeled as a, b, c, d and e respectively are,

පහත දෙන ලද සංයෝගයෙහි a, b, c, d හා e වශයෙන් නම් කරන ලද කාබන් පරමාණුවල මුහුම්කරණ පිළිවෙලින්



- (a) sp², sp², sp³, sp², sp³ (b) sp, sp, sp³, sp³, sp²
(c) sp², sp², sp³, sp³, sp (d) sp², sp², sp, sp, sp³
(e) sp³, sp³, sp², sp², sp

18. Wrong statement regarding dehydration of alcohols is,

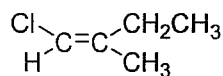
ඇල්කොහොල විචලනය සම්බන්ධයෙන් වැරදි ප්‍රකාශනය වනුයේ

- (a) It can be carried out by heating with alumina .
එය ඇලුමිනා සමඟ රත්කිරීමෙන් සිදු කල හැකිය.
(b) A carbocation is formed as an intermediate during the reaction.
විචලන ප්‍රතික්‍රියාවේ අතරමැදියන් වශයෙන් කාබොකැටායනයක් සෑදේ.
(c) It takes E1 mechanistic pathway. එය E1 ප්‍රතික්‍රියා මාර්ගය අනුගමනය කරයි.
(d) Primary alcohols undergo dehydration faster than secondary alcohols.
ප්‍රාථමික ඇල්කොහොල, ද්විතියික ඇල්කොහොලවලට වඩා වේගයෙන් විචලනය වේ.
(e) It results in formation of the corresponding alkene.
විචලනයේ ප්‍රතිඵල වශයෙන් අනුරූප ඇල්කීනය සෑදේ.

Part B : 04 short answer questions (28 Marks)

1. Give the IUPAC name of the following compound assigning configuration of the double bond by E-Z system.

ද්විත්ව බන්ධනයෙහි E-Z වින්‍යාසය දක්වමින්, පහත දෙන ලද සංයෝගයෙහි IUPAC නාමකරණය දෙන්න.

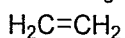


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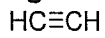
2. Draw the structure of the reactive intermediate formed in the following reaction.
පහත සඳහන් ප්‍රතික්‍රියාවේ දී සෑදෙන ප්‍රතික්‍රියා අතරමැදියේ ව්‍යුහය ලියා දක්වන්න.



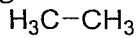
3. Arrange the following hydrocarbons according to the increasing order of their acidity.
පහත සඳහන් හයිඩ්‍රොකාබන්, ආම්ලිකතාව වැඩිවන අනුපිළිවෙලට සකසන්න.



(a)



(b)

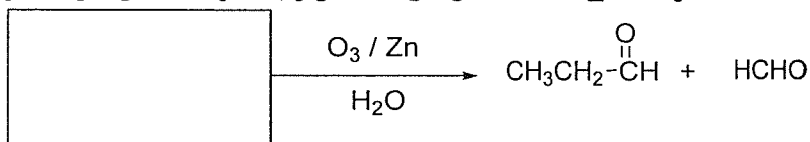


(c)

..... < <

4. Give the structure of the starting compound of this reaction.

පහත සඳහන් ප්‍රතික්‍රියාව සඳහා අදාළ වන ප්‍රතික්‍රියකයෙහි ව්‍යුහය දක්වන්න.



Reg. No -----

Name -----

Address -----

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc Degree Programme

Department of Chemistry

CMU1220 Basic Principles of Chemistry Assignment

CAT III - 2015/2016



08 – 10 - 2016

10.30 a.m - 11.30 a.m

- This question paper consists of **18 multiple choice** questions in **Part A** and **four short answer** questions in **Part B**.
- Choose the best correct answer and mark it on the answer sheet with a **PEN**.
- Write the more relevant/correct answer for short answer questions.
- The use of a **non-programmable** electronic calculator is permitted.
- You are **NOT allowed** to keep Mobile phones with you during the examination. Please **switch off** and leave them in a safe place.

WRITE YOUR **REGISTRATION NUMBER, NAME AND ADDRESS** CLEARLY IN THE SPACE PROVIDED ON THE BACK OF THE ANSWER SHEET.

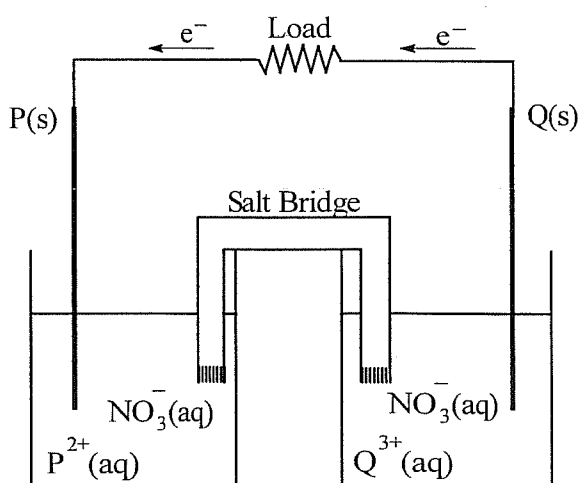
Gas constant	= 8.314 J K ⁻¹ mol ⁻¹	Avogadro constant	= 6.023 × 10 ²³ mol ⁻¹
Faraday constant (F)	= 96,500 C mol ⁻¹	Planck's constant (h)	= 6.63 × 10 ⁻³⁴ J s
Velocity of light (c)	= 3.0 × 10 ⁸ m s ⁻¹	Standard Atmospheric pressure	= 10 ⁵ Pa (N m ⁻²)
Mass of an electron	= 9.1 × 10 ⁻³¹ kg	Rydberg constant, R	= 1.097 × 10 ⁷ m ⁻¹

Part A : 18 multiple choice questions (72 Marks)

Use the following data in answering questions 1 – 7.

1 - 7 வரையான வினாக்களுக்கு விடையளிக்க கீழே தரப்பட்ட தரவுகளைப் பயன்படுத்துக.

A student prepared a Galvanic cell by inserting a rod of metal P in an aqueous solution of P(NO₃)₂ in a beaker, inserting a rod of metal Q in an aqueous solution of Q(NO₃)₃ in a beaker and bringing the electrical contact between the two solution using a salt bridge; see the figure. She observed that the electrons flow from Q to P when they are connected to a load. The emf of the cell was found to be 1.24 V at 25°C. It is known that [P(NO₃)₂] = 0.50 mol dm⁻³ and [Q(NO₃)₃] = 0.25 mol dm⁻³. The student found out that the electrode potential of the Q(s)|Q³⁺(aq) electrode is 0.74 V.



ஒரு மாணவி, ஒரு முகவையிலுள்ள $P(NO_3)_2$ நீர்க் கரைசலினுள் உலோகம் P யினை செலுத்தி, இன்னோர் முகவையிலுள்ள $Q(NO_3)_3$ இனுள் உலோகம் Q இனை உட்செலுத்தி, ஒரு உப்புப் பாலத்தினைப் பயன்படுத்தி இரு கரைசல்களிற்கும் இடையில் ஒரு மின் தொடர்பை ஏற்படுத்துவதன் ஊடே ஒரு கல்வனிக் கலத்தினை உருவாக்கினார், தரப்பட்ட படத்தினைப் பார்க்க. Q உம் P யும் ஒரு சுமையினால் இணைக்கப்படும்போது இலத்திரன்கள் Q இலிருந்து P யினை நோக்கிப் பாய்வதை அவள் அவதானித்தாள். $25^\circ C$ யில் கலத்தின் emf 1.24V ஆக இருப்பது அறியப்பட்டது. $[P(NO_3)_2] = 0.50 \text{ moldm}^{-1}$, $[Q(NO_3)_3] = 0.25 \text{ moldm}^{-1}$ என்பதும் அறியப்பட்டுள்ளது. அம் மாணவி $Q(s)|Q^{3+}(aq)$ இன் மின்வாய் அழுத்தம் 0.74 V எனக் கண்டறிந்தாள்.

1. Consider the following statements: கீழே தரப்பட்டுள்ள கூற்றுக்களைக் கருதுக.

(i) The spontaneous cathode of the cell is Q(s).

கலத்தின் தன்னிச்சையான கதோட்டு Q(s) ஆகும்.

(ii) The positive terminal of the cell is P(s).

கலத்தின் நேர்முனை P(s) ஆகும்.

(iii) The electric potential of P(s) is 1.24 V higher than that of Q(s).

P(s) இன் மின் அழுத்தம் 1.24 V ஆனது Q(s) இனது மின் அழுத்தத்திலும் பார்க்கக் கூடியது.

The correct statements, out of (i), (ii) and (iii) above, are

மேலே தரப்பட்டுள்ள கூற்றுக்கள்; (i), (ii) மற்றும் (iii) ஆகியவற்றுள் சரியான கூற்றுக்கள் ஆவன.

(a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.

(d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

2. Consider the following cell diagrams drawn by the student for the above mentioned cell.

மேற்குறிப்பிட்ட கலத்திற்காக அம் மாணவியால் வரையப்பட்ட கீழே தரப்பட்ட கல வரைபடத்தைக் கருதுக.

(i) $P(s) | P^{2+}(aq) || Q^{3+}(aq) | Q(s)$

(ii) $P(s) | P^{2+}(aq), NO_3^-(aq), H_2O(l) || Q^{3+}(aq) | Q(s)$

(iii) $Q(s) | Q^{3+}(aq), NO_3^-(aq), H_2O(l) || P^{2+}(aq) | P(s)$

Acceptable cell diagrams, out of (i), (ii) and (iii) above, are

மேலே தரப்பட்ட கல வரைபடங்கள் (i), (ii) மற்றும் (iii) ஆகியவற்றுள் ஏற்றுக்கொள்ளப்படக்கூடியவை;

(a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.

(d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

3. Three students wrote the following as the spontaneous cell reaction for the above cell.

மேலே தரப்பட்ட கலத்திற்கு மூன்று மாணவர்களால் எழுதப்பட்ட கலத்தாக்கங்கள் கீழே தரப்பட்டுள்ளது

(i) $2Q(s) + 3P^{2+}(aq) \rightarrow 2Q^{3+}(aq) + 3P(s)$

(ii) $\frac{2}{3}Q^{3+}(aq) + P(s) \rightarrow \frac{2}{3}Q(s) + P^{2+}(aq)$

(iii) $\frac{1}{3}Q(s) + \frac{1}{2}P^{2+}(aq) \rightarrow \frac{1}{3}Q^{3+}(aq) + \frac{1}{2}P(s)$

Correct spontaneous cell reactions, out of (i), (ii) and (iii) above, are

கீழே தரப்பட்ட (i), (ii) மற்றும் (iii) ஆகிய கலத்தாக்கங்களுள் சரியான தன்னிச்சையான தாக்கங்களாவன,

(a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.

(d) All (i), (ii) and (iii). (e) Only (ii).

4. Three students made the following statements about the above mentioned cell.

மேற்குறித்த கலம் தொடர்பாக மூன்று மாணவர்கள் கீழே தரப்பட்டுள்ள கூற்றுக்களைத் தந்தனர்.

- (i) The potential difference between P and Q rods will be different from 1.24 V when the load is connected (as shown in the figure).

P, Q ஆகியவற்றுக்கிடையிலான அழுத்த வேறுபாடானது, சுமை இணைக்கப்பட்டுள்ளபோது 1.24 V இலிருந்து வேறுபடும்.

- (ii) The emf of the cell may be different from 1.24 V if the temperature of the $Q(s)|Q^{3+}(aq)$ electrode is increased without changing the concentration of $Q(NO_3)_3$ solution and temperature of the other parts of the cell.

$Q(s)|Q^{3+}(aq)$ மின்வாயினது வெப்பநிலை அதிகரிக்கப்பட்டு $Q(NO_3)_3$ கரைசலின் செறிவு மற்றும் கலத்தின் ஏனைய பகுதிகளின் வெப்பநிலை மாறாது பேணப்படும்போது கலத்தின் emf ஆனது 1.24 V இலிருந்து வேறுபடலாம்.

- (iii) The emf of the cell remains at 1.24 V when water is added to the beaker containing $P(NO_3)_2$ if the temperature of the cell is maintained at $25^\circ C$.

கலத்தின் வெப்பநிலை $25^\circ C$ யில் பேணப்படுமாயின், $P(NO_3)_2$ கொண்ட முகவையினுள் நீர் சேர்க்கப்படும்போது கலத்தின் emf 1.24 V ஆக தொடர்ந்தும் இருக்கும்.

Correct statements, out of (i), (ii) and (iii) above, are

மேற் தரப்பட்டுள்ள கூற்றுக்கள் (i), (ii) மற்றும் (iii) ஆகியவற்றுள் சரியானவை?

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
(d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

5. What best represents the ionic strength of the $Q(NO_3)_3$ solution?

$Q(NO_3)_3$ கரைசலின் அயன் உறுதிப்பாட்டை மிகச் சிறப்பாக பிரதிநிதித்துவப்படுத்துவது எது?

- (a) 0.75 mol dm^{-3} (b) 3.0 mol dm^{-3} (c) 2.5 mol dm^{-3} (d) 0.5 mol dm^{-3}
(e) 1.5 mol dm^{-3}

6. What best represents the electrode potential of the $P(s)|P^{2+}(aq)$ electrode?

$P(s)|P^{2+}(aq)$ மின்வாயின் மின்வாய் அழுத்தத்தை மிகச் சிறப்பாக பிரதிநிதித்துவப்படுத்துவது எது?

- (a) 0.50 V (b) -0.50 V (c) 0.96 V (d) 1.98 V (e) -1.98 V

7. A student wrote down a cell diagram for the above cell. The cell reaction assigned to this cell diagram was $2Q^{3+}(aq) + 3P(s) \rightarrow 2Q(s) + 3P^{2+}(aq)$. What best represents the Gibbs free energy change for this cell reaction (under the above mentioned experimental conditions)?

$$[F = 96500 \text{ C mol}^{-1}]$$

ஒரு மாணவன் மேற்கூறப்பட்ட கலத்திற்கான கல வரைபடம் ஒன்றை எழுதினான். இவ் வரைபடத்தில் இக் கலத்திற்கு வழங்கப்பட்ட கலத் தாக்கமானது

$2Q^{3+}(aq) + 3P(s) \rightarrow 2Q(s) + 3P^{2+}(aq)$. இக் கலத்திற்கான Gibbs இன் சுயாதீன சக்தி மாற்றத்தை மிகச் சிறப்பாக பிரதிநிதித்துவப்படுத்துவது எது? (மேற்குறித்த பரிசோதனை நிபந்தனைகளின் கீழ்) $[F = 96500 \text{ C mol}^{-1}]$.

- (a) $358.980 \text{ kJ mol}^{-1}$ (b) $239.320 \text{ kJ mol}^{-1}$ (c) $717.960 \text{ kJ mol}^{-1}$
(d) $179.480 \text{ kJ mol}^{-1}$ (e) $119.660 \text{ kJ mol}^{-1}$

8. Consider the following electrodes: பின்வரும் மின்வாய்களைக் கருதுக.

- (i) $\text{Pb(s)}|\text{Pb}^{2+}(\text{aq})$
- (ii) $\text{Zn(s)}|\text{H}^+(\text{aq}), \text{Zn}^{2+}(\text{aq})$
- (iii) $\text{Pb(s)}|\text{PbSO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})$

Chemically reversible electrodes out of (i), (ii) and (iii) above, are

மேற் தரப்பட்ட (i), (ii) மற்றும் (iii) ஆகியவற்றுள் இரசாயனவியல் மீள்தாக்கத்திற்குரிய மின்வாய்களாவன.

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
- (d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

9. Half reactions of the redox electrodes, $\text{Pt(s)}|\text{MnO}_4^-(\text{aq}), \text{Mn}^{2+}(\text{aq}), \text{H}^+(\text{aq}), \text{Pt(s)}|\text{Cr}_2\text{O}_7^{2-}(\text{aq}), \text{Cr}^{3+}(\text{aq}), \text{H}^+(\text{aq})$ and $\text{Pt(s)}|\text{ClO}_4^-(\text{aq}), \text{ClO}_3^-(\text{aq}), \text{H}^+(\text{aq})$, respectively, are

தாழ்த்தேற்ற மின்வாய்கள், $\text{Pt(s)}|\text{MnO}_4^-(\text{aq}), \text{Mn}^{2+}(\text{aq}), \text{H}^+(\text{aq}), \text{Pt(s)}|\text{Cr}_2\text{O}_7^{2-}(\text{aq}), \text{Cr}^{3+}(\text{aq}), \text{H}^+(\text{aq})$ மற்றும்; $\text{Pt(s)}|\text{ClO}_4^-(\text{aq}), \text{ClO}_3^-(\text{aq}), \text{H}^+(\text{aq})$ இன் அரைத் தாக்கங்கள் முறையே,

- (i) $\text{MnO}_4^-(\text{aq}) + 8\text{H}^+(\text{aq}) + 5\text{e}^- \rightarrow \text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}$
- (ii) $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6\text{e}^- \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}$
- (iii) $\text{ClO}_4^-(\text{aq}) + 2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{ClO}_3^-(\text{aq}) + \text{H}_2\text{O}$

The correct half reactions, out of (i), (ii) and (iii) above, are

மேற் தரப்பட்டுள்ள அரைத் தாக்கங்கள் (i), (ii) மற்றும் (iii) ஆகியவற்றுள் சரியானவை?

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
- (d) All (i), (ii) and (iii). (e) None of the answers (a), (b), (c) or (d), is correct.

10. In $a_x = \gamma_x \left(\frac{c_x}{c^0} \right)$, which gives the activity a_x of an ionic species X in a solution,

$a_x = \gamma_x \left(\frac{c_x}{c^0} \right)$ இல், கரைசலிலுள்ள ஒரு அயன் இனம் X இன் செயற்பாடு a_x இனைத் தருவது,

- (i) c^0 is always unity irrespective of the units.
அலகுகள் எதுவாக இருந்தாலும் c^0 எப்போதும் ஒத்த தன்மையுடையதாய் இருக்கும்.
- (ii) c_x is the molar concentration of the species X.
 c_x , X இனத்தின் மூலர் செறிவு ஆகும்.
- (iii) in general, the value of γ_x depends on the particular ionic species.
பொதுவாக, γ_x இன் பெறுமானம் குறித்த அயனிக் இனங்களில் தங்கியிருக்கும்.

The correct statements, out of (i), (ii) and (iii) above, are

மேற்கூறப்பட்டுள்ள கூற்றுக்கள் (i), (ii) மற்றும் (iii) ஆகியவற்றுள் சரியானவை?

- (a) (i) and (ii) only. (b) (i) and (iii) only. (c) (ii) and (iii) only.
- (d) All (i), (ii) and (iii). (e) Only (ii).

11. The thermodynamic equilibrium constant of the reaction $\text{Hg}_2\text{SO}_4(\text{s}) + \text{Cu(s)} \rightarrow 2\text{Hg(l)} + \text{Cu}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$, at 298 K and 1 bar is 2.5×10^8 . At

298 K and 1 bar, what is the emf of the cell $\text{Hg(l)}|\text{Hg}_2\text{SO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})||\text{Cu}^{2+}(\text{aq})|\text{Cu(s)}$ when the activities of copper and sulphate ions are 0.60 and 0.70 respectively. $[F = 96500 \text{ C mol}^{-1}]$

298 K, 1 பார் அழுக்கத்தில் $\text{Hg}_2\text{SO}_4(\text{s}) + \text{Cu(s)} \rightarrow 2\text{Hg(l)} + \text{Cu}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$ எனும் தாக்கத்தின் வெப்பவியக்கச் சமநிலை மாறிலி 2.5×10^8 ஆகும். 298 K, 1 பார் அழுக்கத்தில் செப்பு மற்றும் சல்பேட் அயன்களின் தொழிற்பாடுகள் முறையே 0.60 மற்றும் 0.70 ஆக உள்ளபோது $\text{Hg(l)}|\text{Hg}_2\text{SO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})||\text{Cu}^{2+}(\text{aq})|\text{Cu(s)}$ கலத்தின் emf யாது? $[F = 96500 \text{ C mol}^{-1}]$

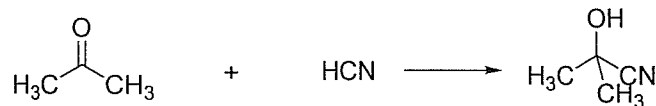
(a) -0.569 V (b) -0.259 V (c) 0.285 V
(d) -0.285 V (e) 0.259 V

12. Electrode potential of $\text{Pb(s)}|\text{PbSO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})$ is the emf assigned to the reaction

$\text{Pb(s)}|\text{PbSO}_4(\text{s})|\text{SO}_4^{2-}(\text{aq})$ மின்வாய் அழுத்தமே இத் தாக்கத்திற்கு ஒதுக்கப்பட்ட emf ஆகும்.

- (a) $\text{PbSO}_4(\text{s}) + \text{H}_2(\text{g}) \rightarrow \text{Pb(s)} + 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
 (b) $\text{Pb(s)} + 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + \text{H}_2(\text{g})$
 (c) $\text{PbSO}_4(\text{s}) + 2\text{e}^- \rightarrow \text{Pb(s)} + \text{SO}_4^{2-}(\text{aq})$
 (d) $\text{Pb(s)} + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{e}^-$
 (e) $\text{Pb(s)} + \text{H}_2(\text{g}) + 2\text{SO}_2(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{PbSO}_4(\text{s}) + 2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$

13. Consider the following reaction: கீழே தரப்பட்ட தாக்கங்களைக் கருதுக.

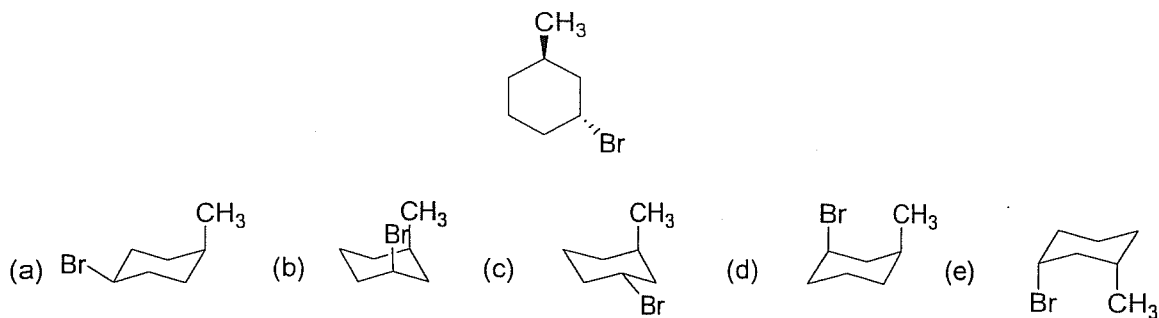


Above reaction is an example for a/an; மேற்குறிப்பிட்ட தாக்கம் பின்வருவனவற்றுள் எதற்கான உதாரணமாகும்?

- (a) Elimination reaction
நீக்கல் தாக்கம்
(b) Electrophilic addition reaction
இலத்திரன்நாட்ட கூட்டற் தாக்கம்
(c) Electrophilic substitution reaction
இலத்திரன்நாட்ட பிரதியீட்டுத் தாக்கம்
(d) Nucleophilic substitution reaction
கருநாட்ட பிரதியீட்டுத் தாக்கம்
(e) Nucleophilic addition reaction
கருநாட்ட கூட்டற் தாக்கம்

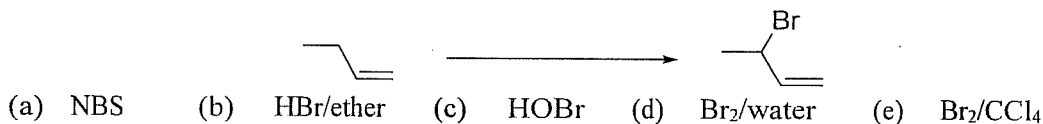
14. Select the correct chair conformation of the di-substituted cyclohexane given below.

கீழே தரப்பட்டுள்ள இருபிரதியீட்டு சக்கரளட்சேன் (cyclohexane) இன் நான்காலி வடிவ சரியான கட்டமைப்பைத் தெரிக.



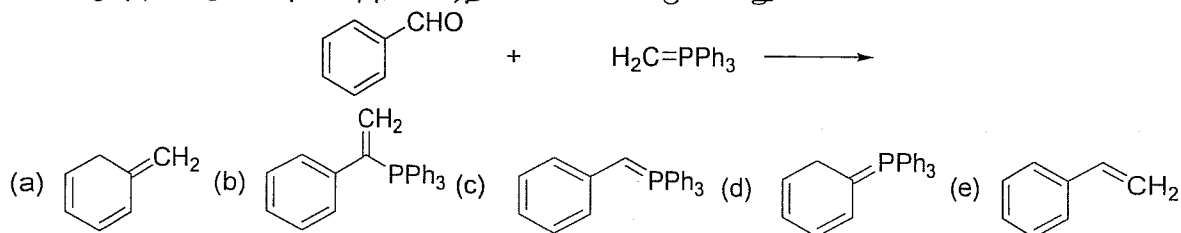
15. What is the most suitable reagent to effect the following reaction?

பின்வரும் தாக்கத்தினை தோற்றுவிக்கத் தேவையான மிகப் பொருத்தமான தாக்குபொருள் எது?



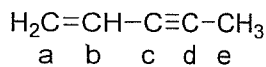
16. What is the major product of the reaction given below?

கீழே தரப்பட்டுள்ள தாக்கத்தின் பிரதான விளைபொருள் யாது?



17. Hybridizations of the carbon atoms of the following compound labeled as a, b, c, d and e respectively are,

பின்வரும் சேர்வையின் முையையே a, b, c, d மற்றும் e காபன் அணுக்களின் கலப்புகளாவன,



- (a) $sp^2, sp^2, sp^3, sp^2, sp^3$ (b) sp, sp, sp^3, sp^3, sp^2
(c) $sp^2, sp^2, sp^3, sp^3, sp$ (d) sp^2, sp^2, sp, sp, sp^3
(e) $sp^3, sp^3, sp^2, sp^2, sp$

18. Wrong statement regarding dehydration of alcohols is,

அற்ககோல்களின் நீரகற்றல் தொடர்பான தவறான கூற்று ஆவது,

- (a) It can be carried out by heating with alumina
அலுமினாவுடன் சூடாக்குவதன் மூலம் இதனை மேற்கொள்ள முடியும்
(b) A carbocation is formed as an intermediate during the reaction
இத் தாக்கத்தின்போது ஒரு இடைநிலையாக ஒரு காபோகற்றயன் உருவாகும்
(c) It takes E1 mechanistic pathway
இது E₁ பொறிமுறைப் பாதையை எடுக்கும்
(d) Primary alcohols undergo dehydration faster than secondary alcohols
முதல் அற்ககோல்கள் வழி அற்ககோல்களை விடவும் வேகமாக நீரகற்றலுக்கு உள்ளாகும்
(e) It results in formation of the corresponding alkene
இது உரிய அற்கனின் உருவாக்கத்தை விளைவிக்கும்

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc Degree Programme — Level 3

Assignment III (Test) — 2015/2016

CMU1220 - Basic Principles of Chemistry



MCQ Answer Sheet: Mark a cross (×) over the box that corresponds to the most suitable answer.

Reg. No.

FOR EXAMINER'S USE ONLY

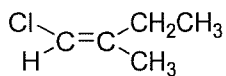
Answers	No.	Marks
Correct		
Wrong		—
Unmarked		0.0
Total		

1	a	b	c	d	e	2	a	b	c	d	e	3	a	b	c	d	e	4	a	b	c	d	e
5	a	b	c	d	e	6	a	b	c	d	e	7	a	b	c	d	e	8	a	b	c	d	e
9	a	b	c	d	e	10	a	b	c	d	e	11	a	b	c	d	e	12	a	b	c	d	e
13	a	b	c	d	e	14	a	b	c	d	e	15	a	b	c	d	e	16	a	b	c	d	e
17	a	b	c	d	e	18	a	b	c	d	e												

Part B : 04 Short Answer Questions (28 Marks)

1. Give the IUPAC name of the following compound assigning configuration of the double bond by E-Z system.

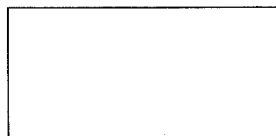
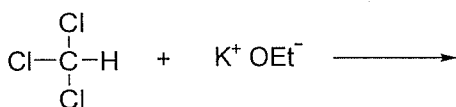
தரப்பட்ட சேர்வைக்கான IUPAC பெயரினை தந்து, E-Z அமைப்பினூடாக அதன் இரட்டைப் பிணைப்பு அமைப்பினை வழங்குக.



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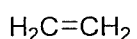
2. Draw the structure of the reactive intermediate formed in the following reaction.

பின்வரும் தாக்கத்தில் உருவாகும் தாக்க இடைநிலைக்கான கட்டமைப்பை வரைக.

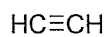


3. Arrange the following hydrocarbons according to the increasing order of their acidity.

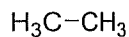
பின்வரும் ஐதரோகாபன்களை அவற்றின் அமிலத் தன்மை ஏறுவரிசையில் ஒழுங்கமைக்குக.



(a)



(b)

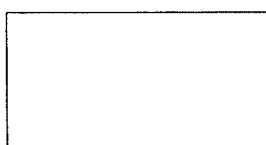


(c)

..... < <

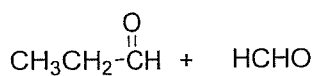
4. Give the structure of the starting compound of this reaction.

இத் தாக்கத்திற்கான ஆரம்ப சேர்வைக்கான கட்டமைப்பினைத் தருக.



O_3 / Zn

H_2O



Reg. No

Name

Address

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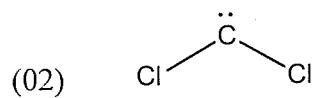
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B.Sc. Degree Programme – Level 3
CAT III Answer Guide-2015/2016
CMU1220 – Basic Principles of Chemistry

Part I - MCQ

- | | | | |
|-------|-------|-------|-------|
| 1) c | 2) d | 3) b | 4) a |
| 5) e | 6) d | 7) c | 8) b |
| 9) d | 10) c | 11) b | 12) a |
| 13) e | 14) c | 15) a | 16) e |
| 17) d | 18) d | | |

Part II – Structured

(01) 1-chloro-2-methylbut-1(z)-ene



(03) $c < a < b$

(04) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$