



THE OPEN UNIVERSITY OF SRI LANKA
B.Sc Degree Programme Department of Chemistry
CMU1220/CME3220 - Basic Principles of Chemistry

CAT II - 2015/2016

Duration -1 hour

Date :08 .05.2016

Time : 9.00 a.m - 10.00 a.m

- This question paper consists of 10 multiple choice questions in **Part A** and ten short answer questions in **Part B**.
- Choose the best correct answer for **MCQ** 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 : 10 –MCQ (20 – minutes)

(150 – Marks)

1. **A → P** is a first order reaction. Rate constant for the above reaction = $3.5 \times 10^{-2} \text{ min}^{-1}$ and the initial concentration of **A** = 0.50 mol dm^{-3} . The half – life of this reaction is about

A → P යනු පළමු පෙළ ප්‍රතික්‍රියාවකි. එහි වේග නියතය $3.5 \times 10^{-2} \text{ min}^{-1}$ වන්නේ නම් හෝ ආරම්භක සන්තූණය $A = 0.50 \text{ mol dm}^{-3}$ වේ නම් මෙම ප්‍රතික්‍රියාවේ අර්ධ ජීව කාලය

- (1) 35 min (2) 3 s (3) 20 min (4) 15 min (5) 40 min

2. Consider the following statements: පහත ප්‍රකාශ සලකන්න.

(a) Rates of reactions always depend on the concentration of reactant/s

ප්‍රතික්‍රියාවක සීඝ්‍රතාවය සැමවිටම එහි ප්‍රතික්‍රියක/ය කාන්දුණ මත රඳා පවතී.

(b) In accordance with Arrhenius equation, a plot of $\ln k$ (where k is the rate constant) against

T (temperature) is expected to be linear.

ආකිනියස් සමීකරණය අනුව උෂ්ණත්වය (T) ඉදිරියේ ලඝු k හි ප්‍රස්ථාරය සරල රේඛීය වේ. (මෙහි k ප්‍රතික්‍රියාවේ වේග නියතය වේ.)

(c) A catalyst increases the rate of a reaction by decreasing its activation energy.

උත්ප්‍රේරක මගින් ප්‍රතික්‍රියාවක සක්‍රියන ශක්තිය අඩු කරන අතර ප්‍රතික්‍රියාවේ වේගය වැඩි කරයි.

Of these statements, මෙම ප්‍රකාශවලින්

- | | |
|----------------------------------|----------------------------------|
| (1) only (a) and (c) are correct | (2) only (b) and (c) are correct |
| (3) only (a) is correct | (4) only (c) is correct |
| (5) only (b) is correct | |

3. The following value for the rate constant (k) of an elementary reaction is reported as

$k = 3.0 \times 10^{-4} \text{ mol}^{-1} \text{ dm}^3 \text{ min}^{-1}$. The value of the rate constant, k , in **SI units** is;

මූලික ප්‍රතික්‍රියාවක වේග නියතය (k) = $3.0 \times 10^{-4} \text{ mol}^{-1} \text{ dm}^3 \text{ min}^{-1}$ යයි දී ඇති විට එම ප්‍රතික්‍රියාවේ වේග නියතය (k) SI ඒකක වලින්

- (1) 3.0×10^{-1} (2) 3.0×10^{-7} (3) 5.0×10^{-5} (4) 5.0×10^{-6} (5) 5.0×10^{-9}

4. Consider the following expression giving the relationship between the two variables k and T .

පහත k සහ T අදාළ සම්බන්ධතාවය සමීකරණයෙන් පෙන්වයි.

$$\ln k = Q \left(\frac{1}{T} \right) + \ln A \quad (Q \text{ and } A \text{ are constants}) \quad (Q \text{ සහ } A \text{ නියත වේ.})$$

The corresponding exponential form of the equation is

මෙයට අදාළ සමීකරණයේ ඝාතීය (exponential) ආකාරය වනුයේ

- (1) $k = Qe^{\frac{A}{T}}$ (2) $k = Ae^{\frac{Q}{T}}$ (3) $k = Qe^{-\frac{A}{T}}$ (4) $k = Ae^{-\frac{Q}{T}}$ (5) $k = \frac{1}{A}e^{\frac{Q}{T}}$

5. Which of the following set of properties comprise entirely intensive thermodynamic

properties? පහත සඳහන් සංකේත අඩංගු කාණ්ඩයන් අතුරින් සියල්ලම ස්ථාන තාපගතික ගුණාංග වශයෙන් නිරූපනය වන්නේ කුමන කාණ්ඩයෙන් ද?

- (1) S, U, V_m (2) U, H, P (3) P, T, V_m (4) C_p, P, V (5) C_v, H, U

6. 10 moles of an ideal monatomic gas ($C_{v,m} = 3R/2$) at 300K is subjected to a reversible and adiabatic expansion until the final temperature was 100K. The change in internal energy is,
 300K දී ඒක පරමාණුක පරිපූර්ණ වායුවක මවුල 10 ක් ($C_{v,m} = 3R/2$) 100K අවසාන උෂ්ණත්වයකට ප්‍රතිවර්තය ස්ථිරතාපි ප්‍රසාරණයකට භාජනය වේ. මෙහි අභ්‍යන්තර ශක්තිය වෙනස් වීම

- (1) 5000R (2) -5000R (3) 3000R (4) -3000R (5) -30R

7. A Joule-Thompson expansion can be described as,

ජුල් තොම්සන් ප්‍රසාරණය හොඳින් නිරූපණය කරනු යේ

- (1) An iso-enthalpic process සම එන්තැල්පි ක්‍රියාවලියකි.
 (2) A univariant phase transformation මෙය ඒක විචල්‍ය කලාපීය වෙනස්වීමකි.
 (3) An adiabatic process ස්ථිරතාපි ක්‍රියාවලියකි.
 (4) An isochoric process මෙය සමපරිමා ක්‍රියාවලියකි.
 (5) A reversible process ප්‍රතිවර්තීය ක්‍රියාවලියකි.

8. For an isothermal expansion of an ideal gas, පරිපූර්ණ වායුවක සමෝෂ්ණ ප්‍රසාරණය සඳහා දී ඇති පහත සඳහන් සමීකරණ සලකන්න.

(i) $\left(\frac{\partial U}{\partial V}\right)_T = 0$ (ii) $\left(\frac{\partial H}{\partial P}\right)_T = 0$ (iii) $\left(\frac{\partial U}{\partial H}\right)_V = 0$

The correct expression/s is/are, නිවැරදි සමීකරණ/ය වනුයේ

- (1) (i) and (ii) only (2) (i) and (iii) only (3) (ii) and (iii) only
 (4) (i) only (5) (i) and (ii) and (iii) all are correct

9. The boiling of water to give water vapour at its boiling point is ජලය නැටීමේදී ජලයේ තාපාංකයට පැමිණි විට වාෂ්ප ලබාදෙයි. එම ක්‍රියාවලිය

- (i) Reversible ප්‍රතිවර්තනය (ii) Isothermal සමෝෂණ (iii) Isobaric සම්පීඩන

The correct process/es is/are, මේ සඳහා නිවැරදි ක්‍රියාවලි/ය වනුයේ

- (1) (i) and (ii) only (2) (ii) and (iii) only
 (3) (i) only (4) (ii) only (5) (i), (ii) and (iii)

10. Which of the following quantities is not a path function, පහත දී ඇති ක්‍රියාවලි වලින් කුමක් මාර්ග සහිත ක්‍රියාවලියක් නොවේ ද?

- (1) Both enthalpy and pressure පීඩනය සහ එන්තැල්පිය යන දෙකම
 (2) Enthalpy only එන්තැල්පිය පමණක් (3) Pressure only පීඩනය පමණක්
 (4) Work only ක්‍රියාව පමණක් (5) Both heat and work ක්‍රියාව හා තාපය යන දෙකම

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc Degree Programme Department of Chemistry
CMU1220 Basic Principles of Chemistry Assignment
CAT II - 2015/2016



(1 hour)

08 – 05-2016

9.00 a.m - 10.00 a.m

- This question paper consists of 10 multiple choice questions in **Part A** and ten short answer questions in **Part B**.
- Choose the best correct answer and mark it on the answer sheet with a **PEN**.
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- The use of a **non-programmable** electronic calculator is permitted.
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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 : 10 multiple choice questions (20 minutes)

1. A → P is a first order reaction. Rate constant for the above reaction = 3.5 × 10⁻² min⁻¹ and the initial concentration of A = 0.50 mol dm⁻³. The half – life of this reaction is about

A → P ஆனது ஒரு முதல் வரிசைத் தாக்கமாகும். இத் தாக்கத்தின் வீத மாறிலி = 3.5 × 10⁻² min⁻¹ மற்றும் A யின் ஆரம்பச் செறிவு = 0.50 mol dm⁻³. இத் தாக்கத்தின் அரைவாழ்வுக் காலமானது ஏறக்குறைய,

- (1) 35 min (2) 3 s (3) 20 min (4) 15 min (5) 40 min

2. Consider the following statements:

பின்வரும் கூற்றுக்களைக் கருதுக.

- (a) Rates of reactions always depend on the concentration of reactant/s

தாக்க வீதமானது எப்போதும் தாக்கி/தாக்கிகளின் செறிவில் தங்கியிருக்கும்.

(b) In accordance with Arrhenius equation, a plot of $\ln k$ (where k is the rate constant) against T (temperature) is expected to be linear

ஆர்கீனியஸ் சமன்பாட்டின்படி, $\ln k$ (k என்பது வீத மாறிலியாக இருக்கும்போது) எதிர் T (வெப்பநிலை) வரைபானது நேர்கோடாக இருக்குமென எதிர்பார்க்கப்படும்.

(c) A catalyst increases the rate of a reaction by decreasing its activation energy

ஒரு ஊக்கியானது, ஏவற் சக்தியைக் குறைப்பதன் மூலம் தாக்க வீதத்தை அதிகரிக்கச் செய்யும்.

Of these statements, மேல்வரும் கூற்றுக்களுள்

- (1) only (a) and (c) are correct (2) only (b) and (c) are correct (3) only (a) is correct
(4) only (c) is correct (5) only (b) is correct

3. The following value for the rate constant (k) of an elementary reaction is reported as

$k = 3.0 \times 10^{-4} \text{ mol}^{-1} \text{ dm}^3 \text{ min}^{-1}$. The value of the rate constant, k , in SI units is;

ஒரு அடிப்படைத் தாக்கத்தின் வீத மாறிலி (k) யின் பெறுமதி பின்வருமாறு அறிக்கையிடப்பட்டது; $k = 3.0 \times 10^{-4} \text{ mol}^{-1} \text{ dm}^3 \text{ min}^{-1}$. வீத மாறிலி k யின் பெறுமதியை SI அலகில் தருக.

- (1) 3.0×10^{-1} (2) 3.0×10^{-7} (3) 5.0×10^{-5} (4) 5.0×10^{-6} (5) 5.0×10^{-9}

4. Consider the following expression giving the relationship between the two variables k and T

இரு மாறிகள் k மற்றும் T இற்கு இடையிலான தொடர்பினைத் தரும் பின்வரும் வெளிப்பாட்டினைத் கருதுக.

$$\ln k = Q \left(\frac{1}{T} \right) + \ln A \quad (Q \text{ and } A \text{ are constants})$$

The corresponding exponential form of the equation is

இத் தாக்கம் தொடர்பான விரிவாக்கவடிவம் யாது?

- (1) $k = Qe^{\frac{A}{T}}$ (2) $k = Ae^{\frac{Q}{T}}$ (3) $k = Qe^{-\frac{A}{T}}$ (4) $k = Ae^{-\frac{Q}{T}}$ (5) $k = \frac{1}{A}e^{\frac{Q}{T}}$

5. Which of the following set of properties comprise entirely intensive thermodynamic properties?

பின்வருவருவனவற்றில் எத் தொகுதிப் பண்புகள் வெப்பவியக்கற் செறிவியல்புகளை முழுமையாகக் கொண்டுள்ளன?

- (a) S, U, V_m (b) U, H, P (c) P, T, V_m (d) C_p, P, V (d) C_v, H, U

6. 10 moles of an ideal monatomic gas ($C_{v,m} = 3R/2$) at 300K is subjected to a reversible and adiabatic expansion until the final temperature was 100K. The change in internal energy is,

300K இல் உள்ள ஒரு இலட்சிய ஓரணுக் கொண்ட வாயுவின் ($C_{v,m} = 3R/2$) 10 மூல் ஆனது 100K எனும் இறுதி வெப்பநிலையை அடையும்வரை ஒரு மீளும் மாறாவெப்ப விரிவாக்கத்திற்கு உட்படுத்தப்பட்டது. அதன் அகச் சக்தியில் ஏற்படும் மாற்றமானது,

- (a) 5000R (b) -5000R (c) 3000R (d) -3000R (e) -30R

7. A Joule-Thompson expansion can be described as,

ஒரு யூல் - தொம்சன் விரிவாக்கம் பின்வருவனவற்றில் எவ்விதமாக விவரிக்கப்படலாம்?

- (a) An iso-enthalpic process

ஒரு சமவெப்பவள்ளுறைச் செயற்பாடு

- (b) A univariant phase transformation

ஒரு ஏகவினமாறி அவத்தை மாற்றம்

- (c) An adiabatic process

ஒரு சேறலில்லாதசெயற்பாடு

- (d) An isochoric process

ஒரு மாறாக் கனவளவுச் செயற்பாடு

- (e) A reversible process

ஒரு மீள்செயற்பாடு

8. For an isothermal expansion of an ideal gas,

ஒரு இலட்சிய வாயுவின் சமவெப்ப விரிவாக்கத்திற்கு,

$$(i) \left(\frac{\partial U}{\partial V}\right)_T = 0 \quad (ii) \left(\frac{\partial H}{\partial P}\right)_T = 0 \quad (iii) \left(\frac{\partial U}{\partial H}\right)_V = 0$$

The correct expression/s is/are; சரியான வெளிப்பாடு/வெளிப்பாடுகள் ஆவது/ஆவன,

- (a) (i) and (ii) only (b) (i) and (iii) only (c) (ii) and (iii) only
(d) (i) only (e) (i) and (ii) and (iii) all are correct

9. The boiling of water to give water vapour at its boiling point is

கொதிக்கும் நீர் அதன் கொதிநிலையில் நீராவியைத் தருவதானது,

- (i) Reversible; மீளும் (ii) Isothermal; சமவெப்ப (iii) Isobaric; சமஅழுக்க

The correct process/es is/are, சரியான செயற்பாடு/ செயற்பாடுகள் ஆவது/ஆவன

- (a) (i) and (ii) only (b) (ii) and (iii) only
(c) (i) only (d) (ii) only (e) (i), (ii) and (iii) all

10) Which of the following quantities is not a path function?

பின்வரும் கணியங்களில் எவை வழிச் செயற்பாடுகளல்ல,

(a) Both enthalpy and pressure

வெப்பவள்ளுறையும் அழுக்கமும்

(b) Enthalpy only

வெப்பவள்ளுறை மட்டும்

(c) Pressure only

அழுக்கம் மட்டும்

(d) Work only

வேலை மட்டும்

(e) Both heat and work

வெப்பமும் வேலையும்

The Open University of Sri Lanka
CMU1220/CME3220 – Basic Principles of Chemistry
(CAT) Assignment Test II - 2015/ 2016

This question paper consists of 2 **PARTS A & B**.
PART A carries 10 multiple choice questions
PART B carries **TEN** short answer structured type questions.

ANSWER ALL QUESTIONS

Registration Number:

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INSTRUCTIONS:

Each item is a statement or question that may be answered by one of the five responses given.
There is only **one best** answer to every question. Mark a cross (X) over the most suitable answer.

1.

1	2	3	4	5
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 2.

1	2	3	4	5
---	---	---	---	---

 3.

1	2	3	4	5
---	---	---	---	---
4.

1	2	3	4	5
---	---	---	---	---

 5.

1	2	3	4	5
---	---	---	---	---

 6.

1	2	3	4	5
---	---	---	---	---
7.

1	2	3	4	5
---	---	---	---	---

 8.

1	2	3	4	5
---	---	---	---	---

 9.

1	2	3	4	5
---	---	---	---	---
10.

1	2	3	4	5
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Unattempted Questions

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 Correct Answers

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 Wrong Answers

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 Marks

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