Pre-University Examination subject wise paper collection

Applied Chemistry

Provided By:

Aasha Thapa

Arpan Adhikari

Asim Pandey

Harry Xettri

Kamal Rokaya

Samir kc

Prince subedi

Safal Poudel

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Applied Chemistry

Semester : Spring

Year : 2023
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What are the differences between a galvanic cell and electrolytic cell? A galvanic cell consists of two electrode, zinc and lead, zinc electrode is immersed in 0.1 M zinc ion solution and lead electrode in 0.02 M lead ion solution. Calculate the emf of the cell at 298 K. Write the equations of electrode process and represent the cell schematically. Given that $E^{\circ}_{(Zn^{++}/Zn)}$ = - 0.76 volt and $E^{\circ}_{(Pb^{++}/Pb)}$ = - 0.13 volt 8

OR

Define electrochemical series. Write the applications of electrochemical series. From the following data, calculate the emf of cell at 25°C.

$E^0 Ni^{2+}/Ni$ = - 0.25V

$E^0 Cu^{2+}/Cu$ = + 0.34V

$[Ni^{++}]$ = 0.1M, $[Cu^{2+}]$ = 0.2M

R = 8.314 J mol^{-1} K^{-1}

F = 96500C

b) Explain primary and secondary Cells. Write the construction and working mechanism of lithium-ion battery. 7

2. a) What is air pollution? Write its cause effect and control measure? 7

b) What is hard water? How can you determine alkalinity of water experimentally? 8

OR

What is permanent hardness of water? How can you determine total hardness of water experimentally

3. a) Explain the properties of transition metals with regards to the magnetic properties and variable oxidation states. 7

b) Give reasons: 8

i. Transition metals are good in forming complexes.

ii. TiO_2 is colourless.

iii. Zn is not considered as true transition element.

iv. Transition metals exhibit catalytic properties.

4. a) Define Nucleophilic Substitution reaction. Show the reaction mechanism between (R)-2-Bromobutane with water 8

b) Differentiate E_1 and E_2 reactions with mechanism and kinetics. 7

5. a) Write functions of various constituents of paints. 5

b) Write Principle and applications of sensors. 5

c) Write Preparation, properties and uses of TNT. 5

6. a) Write short notes on addition polymer and condensation polymer. 8

b) How do biodegradable polymers differ from non-biodegradable polymer? Explain with suitable examples. 7

7. Write short notes on: **(Any two)** 2×5

a) Chemistry of cement

b) Acidic and Basic Buffer

c) Stereochemistry

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Applied Chemistry

Semester: Fall

Year : 2023
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Write the applications of electrochemical series. Calculate the emf of the cell: Zn (s) / Zn^{++}(0.001M) // Ag^{+} (0.1M)/ Ag(s) The standard electrode potential (E^{o}) of Ag/Ag^{+} is 0.80V and Zn/Zn^{++} is -0.76V 8

OR

Define oxidation and reduction potential. A galvanic cell consists of metallic zinc plate in 0.1M $Zn(NO_3)_2$ solution and metallic plate of lead in 0.02M $Pb(NO_3)_2$ solution. Calculate the emf of the cell. Write the chemical equations for the electrode reaction and represent the cell. Given that: $E^0\ Zn^{2+}/Zn = -0.76V$ and $E^0\ Pb^{2+}/Pb = -0.13V$

b) Define batteries. Explain primary and secondary batteries with examples. 7

2. a) Define soil pollution. Write causes, effects and control measures of soil pollution. 7

b) Define Hardness of water. How do you determine free chlorine in the water sample in laboratory? 8

OR

Define Alkalinity and chemical oxygen demand. How do you measure alkalinity and dissolved oxygen in laboratory? Explain.

3. a) Explain the properties of transition metals with regards to the formation of coloured compounds and magnetic properties. 7

b) Give reasons: 8

i. Transition metals exhibit catalytic properties.
ii. Zinc sulphate is colourless.
iii. Transition metals are good in forming complexes.
iv. Transition metals show variable oxidation states.

4. a) What product do you reaction from the reaction of R-2-chlorobutane with NaOH. Explain its mechanism and stereochemistry. 8

b) What is Saytzeff's rule? Write the Kinetics and mechanism of E_1 taking suitable example. 7

5. a) Write the preparation and uses of the TNT and TNG. 5

Comp. 2023

	b)	Explain the basic principle and application of sensors.	5
	c)	Write the preparation, properties and uses of silicone rubber.	5
6.	a)	Define bio-degradable polymers. Write examples of different types of bio-degradable polymers with applications.	7
	b)	Write preparation, properties and uses of Teflon, PVC and Neoprene.	8

7. Write short notes on: **(Any two)** 2×5
   a) Acidic and basic buffer
   b) Factors affection S_N2 reaction
   c) Rules of electronic configuration

POKHARA UNIVERSITY
FACULTY OF SCINCE AND TECHNOLOGY
SCHOOL OF ENGINEERING

Exam	Final Internal Examination 2024		
Level	B.E.	F M	100
Program	Computer	PM	45
Year/Part	II	Time	3 Hrs

Subject: Chemistry

Candidates are required to give answers in their own words as far as practicable.
The figure in the margin indicates full marks. Assume suitable data if necessary.
Attempt all the questions.

1.	a) What is electrode potential? Why it is not possible to measure the reduction potential of an isolated half-cell? Calculate the emf of a Daniel cell at 25 °C, when the concentration of $ZnSO_4$ and $CuSO_4$ are 0.001 M and 0.1M respectively. Given $E° Cu/ Cu^{2+} = -0.34$ V; $E° Zn^{2+}/ Zn = -0.76$ V. OR Write electrochemical series and its applications. Why electrochemical cells stop working after some time? Explain why we use NH_4NO_3 or KCl for preparing salt bridge. b) Write the importance of Batteries. Why does a dry cell become dead after a long time, even it is not used? Explain Ni-Cd battery with their applications.	8 7
2.	a) What is pollution? Discuss the general methods for the control of air pollutants emitted from different industries and its effect on environment. b) How DO and COD are determined experimentally?	8 7
3.	a) What are transition elements? Explain why transition elements i) forms color complex ii) shows variable oxidation states and iii) complex compounds. OR Predict the position of transition elements in the modern periodic table. Explain the general properties of transition elements. b) What are photovoltaic cells? Explain its basic principle and applications.	8 7
4.	a) What are electrophiles and nucleophiles? Explain the kinetics, mechanism and stereochemistry of SN1 reaction with suitable examples. b) Define Saytzeff's rule with suitable example. Explain the factor that governs the E1 and E2 reactions.	8 7
5.	a) Why detonator is required to explode TNT? What are the requirements of chemical explosives? Explain preparation and application of TNT. b) Write the characteristics good paints and describe the constituents of paints?	8 7
6.	a) Write the difference between biobased and biodegradable polymers with suitable examples. What is copolymer? Write the preparation and engineering	8

	applications of copolymer b) Write the preparation, properties and uses of PVC and Teflon.	7
7.	**Write short notes on:** *(Any two)* a) Corrosion and its control b) Sensors and its basic principle c) Setting and hardening mechanism of cement	2×5

*** *Best of Luck* ***

NEPAL COLLEGE OF INFORMATION TECHNOLOGY
Assessment

Level: Bachelor
Programme: Computer
Course: Applied Chemistry

Year : 2024
Full Marks: 100
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define electrochemical series. Write applications of electrochemical series. From the following data, calculate the emf of cell at 298K. 7

$E^0 Zn^{2+}/Zn = -0.76V$

$E^0 Pb^{2+}/Pb = -0.13V$

$[Zn^{2+}] = 0.1M$, $[Pb^{2+}] = 0.02M$

$R = 8.314\ J\ mol^{-1}\ K^{-1}$

$F = 96500C$

b) Define primary and secondary cells. Write construction and working of Nickel-Cadmium batteries.

OR

Define oxidation potential. How single electrode potential is originated? How do you measure the single electrode potential of Copper electrode experimentally? 8

2. a) Define particulates. Classify particulates and mention their effects on human. 8

b) Define alkalinity. How free chlorine is determined in the laboratory? 7

3. a) Define d-block elements. Explain the properties of transition metals with regards to the magnetic properties and variable oxidation states. 7

OR

Explain the striking features of transition metals with regards to the catalytic property and electronic configuration. 8

b) Give reasons:

Anjan Adhikari
26 July 2024

i) Transition metals are good in forming complexes.

ii) Zinc is not considered as true transition metal.

iii) TiO_2 is colourless.

iv) Transition metals are mostly paramagnetic.

4. a) Write the kinetics, mechanism and stereochemistry of SN_2 8

b) Define elimination reaction. Write the kinetics and mechanism of E_1. 7

5. a) What are paints? Write constituents of paints with their functions. 7

b) Define explosives. What are the requisites of good explosives? Write preparation and properties of TNG. 8

6. a) Write preparation, properties and uses of PVC and Neoprene. 8

b) Define bio-degradable polymers. Write examples of bio-degradable polymers and mention their important applications. 7

7. Write short notes on (any two) 2×5

a) Photovoltaic cell

b) Dissolved oxygen

c) Applications of transition metals

Arpan Adhikari
26 July 2024

Pokhara Engineering College
Phirke,Pokhara

Level:Bachelor
Programme: BE(Computer)
Course: Applied Chemistry

Year:2024
Full Marks:100
Pass Marks:45
Time: 3 hrs

1. a) What is meant by single electrode potential? How is the single electrode potential of Zn-electro de measured experimentally? Explain. From the given information answer the following questions.

$Ni \longrightarrow Ni^{++} + 2e^-$ $E^0 = +0.25$ V

$Al \longrightarrow Al^{3+} + 2e^-$ $E^0 = +1.66$ V

$[Ni^{++}] = 0.01M$, $[Al^{3+}] = 0.02M$, $R = 8.314 Jk^{-1} mol^{-1}$, $F = 96500C$

i. Which of the above electrode acts as anode and why?

ii. Write the electrode and cell reactions.

ii. Represent the cell using proper cell notation when given electrodes are coupled together.

iv. Calculate the potential of the given cell at standard temperature. (2+ 2 +4)

b. What is corrosion? What are its consequences? Write the mechanism of corrosion in iron. (1+2+4)

2. a) What are transition elements? Are all d-block elements called transition elements? Justify your answer with reason. Why do transition elements show variable valency? Explain (1+2 +4)

b) Give reasons: (2x4=8)

i. Ionization potentials of transition elements are almost constant.

ii. Transition elements and their compounds shw catalytic property.

iii. The compounds of V^{3+} are coloured but those of Ti^{4+} are colourless.

iv. Transition elements are capable of forming complexes.

3.a) What are elimination reactions? Write the mechanism and stereochemistry of E^1 reaction. (2+3+3)

b)Write the mechanism of nucleophilic substitution reaction in tertiary alkyl halide taking suitable example. Why do SN^1 reaction gives retention and inversion but SN^2 reaction gives inversion isomer only? (4+3)

4.a) What is meant by silicon rubber? Write its application.Give a brief account on biodegradable polymer. (2+2+4)

b) What are addition and condensation polymer? Write the mechanism of addition polymerization taking suitable example. (3+4)

5.a) What are sensors? How do they function? Write the applications of sensor in the field of engineering (2+3+3)

b) What are paints? What are the characteristics of good paints.?

Write the important constituents of paints. (2+2+3)

6.a) What are the causes of water pollution? Write its impact on human health.

Also mention its controlling measures. (3+2+3)

b) What is meant by hardness of water. How is it estimated in the laboratory? (3+4)

7. a) Write short notes on (any two) (2x5=10)

I. Photovoltaic cells

ii. Electrochemical series and its application.

iii. Preparation and uses of TNT.

The End

LUMBINI ENGINEERING COLLEGE (LEC)

Final Internal Exam

Level: Bachelors Degree | **Year: 2023**
Program: Computer 2nd sem. | **Full Mark:100**
Course: Applied Chemistry | **Pass Mark: 45**
Time:- 3 hrs

1.a) What is Galvanic cell? Construct a galvanic. Calculate the e.m.f of the cell at 30^0C. (7)

$Sn/sn^{++}(0.2M)$ // $Ag^{+}(0.1M)$ Ag

where k^0 $Sn/sn^{++}=+0.14V$

E^0 $Ag/Ag^{+}=-0.80V$

$R= 83.14\ Jmol^{-1}k^{-1}$ $F= 96500C$

b) What is electrochemical series? Give its significances. Explain about the electrochemical mechanism of corrosion. (8)

2.a) What is air pollution? Explain about the causes, effects and suitable remedies of air pollution. (7).

b) How can you determine the hardness of water present in water in your lab by complexometric titration method. (8)

3.a) Give reasons for the followings (i) $TiCl_3$ is coloured but $TiCl_4$ is colourless.
ii) Transition elements show variable oxidation state.
iii) Transition elements are generally paramagnetic in nature.
iv) Cadmium is not considered as transition elements. (8)

b) Differentiate between E_1 and E_2 reaction. (7)

4.a) Explain the manufacture method of Portland cement. (8)

b) What are the characteristics of good paint. Explain the constituents of paint. (7)

5.a) How can you determine free chlorine present in water in your lab. 7)

b) What is lead storage battery? Give its principle and applications? (8)
Differentiate between Li-ion battery and sodium in battery,

6.a) Differentiate between addition and condensation polymerization. What are conducting polymers. Explain its types. (8)

b) Give the preparation metho, properties and uses of Telfon and Neoprene. (7)

7. Write short notes on (any two) **(2*5=10)**

a) Dissolved oxygen
b) Sensors
c) Photovoltaic cell
d) Biodegradable polymers.

Lumbini Engineering, Management & Science College

Final Internal Assessment Exam

Year: 2024
Full Mark:100
Pass Mark: 45

Level: Bachelors
Program: Computer 2nd sem.
Course: Applied Chemistry

1.a) What is galvanic cell? Give the mechanism of rusting of iron. From the following data, calculate the e.m.f of cell at 25^0C.
E^0Ni^{+2}/Ni=-0.25V. $[Ni^{++}]$=0.1M
$E^0\ Cu^{+2}/Cu$=+0.3V $[Cu^{++}]$=0.2M
R= 8.314 $Jmol^{-1}K^{-1}$ F= 96500C (8)

b) Explain primary and secondary cells. Write the construction and working mechanism of lithium-ion battery. (7)

2.a) What is water pollution? Write its causes, effects and controlling measures. (7)

b) How can you determine free chlorine present in water in your lab? (8)

3.a) What is D.O.? How can you determine total hardness of water experimentally? (7)

b) Give reasons: (8)
i) Transition metals are good in forming complexes.
ii) Ti O_2 is colourless
iii)Zn is not considered as true transition element.
iv) Transition metals exhibit catalytic properties.

4.a) Define Nucleophilic substitution reaction. Differentiate between SN_1 and SN_2 reaction. (8)

b) Differentiate between E_1= E_2 reaction. (7)

5.a) Describe the manufacture method of cement. (8)

b) What are the characteristics of good paints? Give preparation methods of TNT and TNG (7)

6.a) Differentiate between addition polymerization and condensation polymerization. (8)

b) What are conducting polymers? Describe its type. (7)

7. Write short notes on: any two (2*5=10)
a) Sensors
b) Photovoltaic cell.
c) Silicone rubber
d) Electronic configuration

NEPAL ENGINEERING COLLEGE

Changunarayan, Bhaktapur

Assessment Examination-023

Level : Bachelor (BE) Full Marks: 100
Program: Comp & CRE Pass Marks: 45
Course: Applied Chemistry I/II Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1a. Explain and illustrate the Daniel cell. Calculate the emf of given cell at 25^0 C with necessary cell reactions. (5+3)
Fe / Fe^{2+} (a= 0.001) // Ag^+ (a=0.1) / Ag
given that $E^0_{Fe^{2+}/Fe}$ = -0.440 V and $E^0_{Ag^+/Ag}$ = +0.779 V

1b. How do you show that corrosion is electrochemical process? Explain it with necessary reaction. (7)

2a. What are the different ways by which drinking water can be polluted/ unsafe for drinking? Discuss the ways by which we can control water pollution. (7)

2b. Solid waste/liquid waste management is directly related to air pollution. explain it. Discuss the issues going on in Kathmandu valley and the efforts made by the municipality to manage the solid/liquid wastes. (8)

3a. Explain why i) zinc sulphate salt is colorless compound, ii) $Fe(NH_3)_6^{3+}$ and $Fe(CN)_6^{3-}$ have different colors as well as magnetic behavior. (2+3+3)

3b. What are transition metals? Discus why transition elements act as a good catalyst, form colorful compounds, and form complexes. (1+2+2+2)

4a. Write the mechanism of E2 reaction. Why strong base is required for this reaction? (7)

4b. SN1 reaction proceeds via first order kinetics, explain with suitable example. (8)

5a. What is paint? Explain its essential components. (2+5)
OR
How do you obtain (manufacture) Portland cement from its raw materials? Why gypsum salt is added to the cement? (5+2)

5b. What are explosives? How do you prepare TNT in laboratory? Write down its properties. (2+4+2)

6a. Explain laboratory preparation, general properties and some applications of: i) neoprene rubber ii) teflon. (7)

6b. Differentiate between i) addition and condensation polymer ii) biodegradable and non biodegradable polymers with suitable examples. (4+4)

7. Write short notes on any two. (2x5)
   a. Sensor
   b. Estimation of Dissolved oxygen in water sample
   c. Conducting polymer and its applications

National Academy of Science and Technology

(Affiliated to Pokhara University)

Dhangadhi, Kailali

Pre-University Examination

Level: Bachelor | Semester: II_Spring | Year : 2024

Program: B.E. Computer | F.M : 100

Course: Applied Chemistry | P.M : 45

Time : 3Hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

1.a) Define Standard electrode potential. Write the cell notation of Ag-Cu cell ? Calculate the emf of cell at 25^0C. Mg/ Mg^{++}(1.5M) //Ag^+(0.05 M)/Ag. Given E^0 Mg^{++}/ Mg= -2.37V and E^0 Ag^+/Ag= +0.80V. [8]

Or

What is salt bridge? Why is it used in the construction of the cell? Calculate the emf of following cell at 25^0C

Zn/ Zn^{++}(1.2M) //Ag^+(0.001 M)/Ag.

Given E^0 Zn^{++}/ Zn= -0.76V and E^0 Ag^+/Ag= +0.80V

b) What is corrosion? Write about electrochemical theory of rusting. [7]

2.a) Define transition element? What are the applications of transition elements in various engineering fields? [7]

b) Give reason [4× 2 = 8]

i). Cd is not regarded as typical transition element.

ii). Transition elements usually form colored ions.

iii). Transition elements are paramagnetic in nature

iv). Transition elements shows complex compounds.

3.a) Define SN^2 reaction with mechanism and stereochemistry. [8]

or

Define SN^1 reaction with mechanism and factor affecting SN^1 and SN^2 reaction. [8]

b) Describe the E^2 reaction with mechanism. [7]

4.a) Write the preparation, properties and uses of PVC and neoprene rubber. [7]

b) What are thermoplastic and thermosetting polymer. Also write their applications. [8]

5.a) Define cement. How cement is manufactured? [8]

b) Define explosive substance? How TNG is prepared? Write its application. [7]

6.a) What is air pollution? Explain sources and control measures of air pollution. [8]

b) Define alkalinity of water. How it is determined in laboratory [7]

7. Write short notes on any two: [2 × 5=10]

a) Difference OPC and PPC cement.

b) Lithium ion battery.

c) Biodegradable polymer

Best of Luck

COSMOS COLLEGE
OF MANAGEMENT AND TECHNOLOGY

Term Test I

Date: 2081/02/30			
Level	BE	Full Marks	50
Programme	BCE	Time	
Semester	II	1.5 hrs	

Subject: - Applied Chemistry

- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *Attempt All questions.*
- ✓ *The figures in the margin indicate Full Marks.*
- ✓ *Assume suitable data if necessary.*

1. a) Elimination reactions E1 and E2 depends on structure of substrate molecules. Explain it with relevant example. [7]
   b) Define alkalinity. How is it estimated in the laboratory, explain? [8]

2. a) Explain about the preparation, properties and uses of silicon rubber. [7]
   b) How do conducting polymers differ from non-conducting polymers? [8]

3. Explain about the [2*5=10]
   a) Chemistry of cement.
   b) Stereochemistry of SN1 and SN2 reaction

4. Write short notes on: (*any Two*) [2*5=10]
   a) Paints
   b) Photovoltaic cell
   c) Condensation polymers
   d) TNT and TNG

OF MANAGEMENT AND TECHNOLOGY

MOS COLLEGE

Term Test II

Date: 2081/04/0		1.5 hrs
Level	BE	
Programme	BCE	
Semester	II	

Subject: - Applied Chemistry

- Candidates are required to give their answers in their own words as far as practicable.
- Attempt All questions.
- The figures in the margin indicate Full Marks.
- Assume suitable data if necessary.

1. Define single electrode potential. Calculate EMF of a zinc- silver cell at 30°C when activity of Zn^{2+} ions is 0.5 and the activity of Ag^{+} ions is 0.01. Standard reduction potentials at 30°C are: [8]
   i) Ag^{+}, Ag electrode=+0.799 volt. Ii) Zn^{2+}, Zn electrode= - 0.760volt.
2. What is water pollution? Discuss its causes, effects to human health and ways to control it. [8]

[2+2+2+2]

3. Give reason:
   i. Transition elements are good as forming complexes.
   ii. Transition elements show variable oxidation state.
   iii. TiO_2 is colorless but Cr^{3+} is colored.
   iv. Cu(I)is diamagnetic where as Cu(II) is paramagnetic.
4. Point out the differences between SN1 and SN2 reactions with mechanism and stereochemistry. [8]
5. What is permanent hardness of water? How can you determine total hardness of water experimentally? [8]

[5+5]

6. Write short notes on: (*any two*)
   a. corrosion
   b. Silicon rubber
   c. conducting polymer
   d. Photovoltaic cell