

TED (10)—1016B

RegNo.

(REVISION -2010)

Signature

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING!
TECHNOLOGY—OCTOBER, 2014

APPLIED SCIENCE—II (CHEMISTRY)
(Common except DCP and CARM)

[Time 1 ½ hours

(Maximum marks 50)

PART-A

(Answer *all* questions in one or two sentences.
Each question carries 2 marks)

- | | Marks |
|--|-------|
| I (a) Describe a method to remove Carbon monoxide in a room. | 2 |
| (b) What is acid rain? What are its consequences? | 2 |

PART-B

(Answer any *two* full questions. Each question carries 8 marks)

- | | |
|---|---|
| II (a) Explain the working of a galvanic cell with the help of a diagram. | 4 |
| (b) Describe different methods to prevent rusting of iron. | 4 |
| 111 (a) Distinguish between thermoplastic and thermosetting plastics. | 4 |
| (b) (i) Define calorific value of a fuel. | |
| (ii) Explain catenation with example. | 4 |
| IV (a) Explain the effect of temperature on | |
| (i) Adsorption of ammonia on animal charcoal. | |
| (ii) Adsorption of Hydrogen on palladium. | 4 |
| (b) Write short notes on | |
| (i) Smog | |
| (ii) Ozone depletion | 4 |

PART-C

(Answer *one* full question from each unit, Each full question carries 15 marks)

UNIT — 1

- | | |
|---|---|
| V (a) Write any four applications of adsorption. | 4 |
| (b) Mention any four differences between electronic and electrolytic conduction. | 4 |
| (c) Explain the mechanism of corrosion that takes place when aluminium wire is in contact with Copper in air. | 4 |
| (d) Explain the mechanism of electrolysis of molten NaCl. | 3 |

OR

- VI (a) Distinguish between physisorption and chemisorptions. 4
- b) What is electrochemical series? Explain the reactions that take place when
- Ag is placed in dil H_2SO_4
 - Mg is placed in ZnSO_4
- (c) (i) What is galvanization 4
- (ii) Define corrosion, Write 2 examples. 4
- (d) Describe a method to coat Copper on Steel nail. 3

UNIT II

- VII (a) Mention two chemical methods to distinguish alkane and alkene. 4
- (b) Explain different types of polymers based on the kind of monomer unit present in it. 4
- (c) Describe a method to convert higher hydrocarbon into petrol. 4
- (d) What is green chemistry? What are the advantages of green chemistry over environmental chemistry? 4

OR

- VIII (a) Describe the different types of composites based on matrix. 4
- (b) Carbon atom is unique. Comment on the statement. 4
- (c) What are propellants? How will you classify it? Give examples. 4
- (d) Write the monomers of the following polymers
- Silicone rubber
 - Thiokol
 - Bakelite

ANSWERS

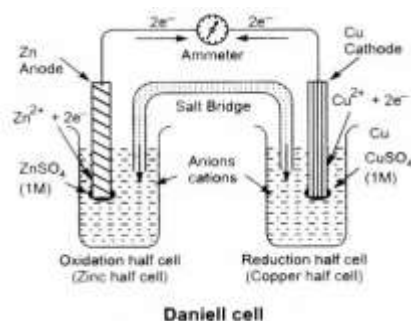
I)

a) By adsorption using Charcoal

b) When the pH of the rain water drops below 5.6, it is called acid rain. All the sources of SO_2 & NO_2 are also the sources of Acid Rain. Because they form H_2SO_4 ,
Adverse Effect: 1) Increase acidity of soil 2) Destroy Aquatic life, forests, Crops etc

II

a)



Here Anode=Zn & Cathode=Cu

Reactions:

At Anode: $Zn \rightarrow Zn^{2+} + 2e$ **At Cathode:** $Cu^{2+} + 2e \rightarrow Cu$

Net reaction/Redox reaction: $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

b) **Protection of corrosion:**

I) **Barrier protection:** ie not allow the metal to come direct contact with air.eg: Painting

These are

a) **Metallic coating(sacrificial protecton):** ie coating the Fe objects with more active metals like Al, Zn etc.Coating of Iron with Zn is called Galvanisation

b) **Non metallic coating:** It can be done using anti rust solutions like alkaline phosphate, chromate etc

c) **organic coating:** Coating with plastics, polymers etc

II) **Cathodic protection:** Protect the metal by making it as cathode.Ex: Zn, Mg pieces are attached along with Ships, under buried Iron pipes etc

III)

a)

| Thermo plastic | Thermosetting plastic |
|---|--|
| <ul style="list-style-type: none">• They formed by addition polymerization.• They are reusable• They have physical change• Eg: Polythene , PVC | <ul style="list-style-type: none">• Formed by condensation polymerization• They are not reusable• They have chemical change.• Eg; Polyester, Bakelite |

b)i) **Calorific Value (CV):** Quantity of heat liberated by complete combustion of a unit mass or volume of the fuel in air/O₂

ii)**Catenation:** Self linking property of an element is called Catenation. it can form ring compounds, chain compounds etc

IV) a) i)As the temperature increases, adsorption decreases, because adsorption is an exothermic process

ii) H₂ molecules dissociate into H atoms at high T and adsorbed on Palladium surface by chemisorptions

b) i) **Smog: It is** smoke + fog.= Smog

Photochemical smog:- unsaturated hydrocarbons + nitrogen oxides (in presence of Sun light) → Photochemical smog . occurs in warm, dry and sunny climate Ex: (PAN)] .

ii) Ozone layer depletion is due to the freons and oxides of nitrogen. They are decomposed by UV radiation to form free radical that breaks ozone layer.

V)

a) In gas mask: Here charcoal is used to adsorb poisonous gas like Carbon Monoxide etc from air & gives fresh air for breathing.

To produce high vacuum

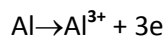
Softening of hard water

Decolourising sugar solution

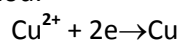
b)

| Metallic OR Electronic Conductors | Electrolytic OR Ionic Conductors |
|---|---|
| *Conduction is due to movement of free electrons *No chemical change occurs *Conductivity decreases with increase in temperature. because resistance increase with T *Eg: Metals | *Conduction is due to movement of ions *chemical change occur *Conductivity increases with increase in temperature. because movement of ions increase with T *Eg: CuSO ₄ , ZnSO ₄ |

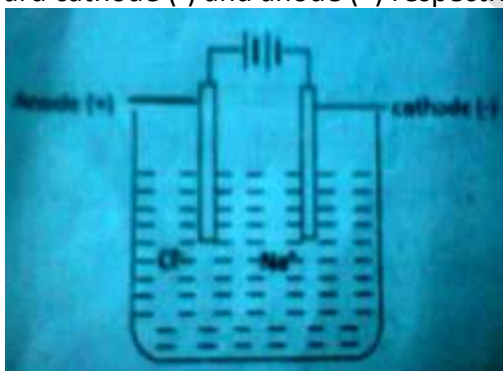
c) It is a galvanic corrosion. Here Firstly Aluminium undergo corrosion and form an oxide film of Al₂O₃. It protect further corrosion at anode:



At Cathod:



d) Electrolysis is the decomposition of an electrolyte by passage of electricity. When electricity passed through molten NaCl, It will dissociate to Na⁺ and Cl⁻ ions and move toward cathode (-) and anode (+) respectively.



VI)a)

| physisorption | Chemisorptions |
|-----------------------------------|----------------------------------|
| → Due to weak Vander waa'ls force | → Due to chemical bond formation |
| → Non specific: | → Specific |
| → Reversible | → Irreversible |

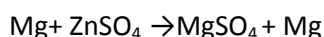
→ Eg: H₂ gas adsorbed on Ni surface at low temp

→ Eg: H₂ molecules dissociate into H atoms at high T and adsorbed on Ni surface by chemisorptions

b) Electro Chemical Series (ECS) OR Activity Series: It is the arrangements of various electrodes in the increasing order of their electrode potential

i) No reaction occurs. Because Ag lying below hydrogen in ECS

ii) Here Mg displaces Zn from ZnSO₄



c) i) Galvanization is the process of coating zinc on the surface of iron.

ii) It is the slow destruction of metal due to attack of atmospheric gases like CO₂, water vapour etc on the surface of metals. Ex: Rusting of Iron, Tarnishing of silver

d) Electroplating. It is the deposition of superior metal (Noble metals) on the surface of base metal using electricity.

Here **cathode** = steel nail

Anode = Cu i.e. $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$

Electrolyte = Soluble salt solution of Cu

VII)

Saturated organic compounds

a) Contain single covalent bonding

Are less reactive

Do not decolorise bromine water and Baeyer's reagent

Eg: Propane, Butane

Unsaturated organic compounds

Contain multiple covalent bonding

Are more reactive

Decolorise bromine water and Baeyer's reagent

b) Homo polymer consist of single type of monomer

Eg: polythene, PVC, Nylon - 6

Copolymer consist of different type monomer

Eg: Buna - S, Buna - N

c) Refer March 2012 VIII(3)

d) using liquid CO₂ along detergent for dry cleaning.

Prevention of production of waste instead of treating the waste.

Synthetic methods designed to maximize final product only

Using H₂O₂ for bleaching clothes, paper instead of chlorine.

Green chemistry is the development and implementation of chemical products and process, which are less hazardous to human health and environment.

VIII

a) Composites are reinforced plastics. It consists of a matrix phase and dispersed phase. 3 types of composites are

- Fibre reinforced composite → Fibre is embedded in suitable material
Eg: Glass Reinforced Plastic (GRP)
- Particulate composite → particles of different size dispersed in material
Eg: Concrete
- Dispersion hardened composite → Fibre particles dispersed in material
Eg: Alloys of copper

b) This is because of the following properties

Isomerism : Same molecular formula different properties

Catenation property : Self linking property of carbon

Tetra Covalency: Sharing of four valence electrons

Possibility to form multiple bonds : Double bond and triple bond

c) Rocket Propellant: Fuel used in rocket for their propulsion is called Propellant. It is the combination of fuel and an oxidizer. Depending upon the physical state, these are classified into:

1) Solid Propellant: Here both fuel & oxidizer are solid ex: Polybutadiene & Ammonium perchlorate.

2) Liquid Propellant: Here both fuel & oxidizer are liquid alcohol and liquid N_2O_4 .

3) Hybrid propellant: Here it is the combination of both solid fuel and liquid oxidizer. eg: mixture of acrylic rubber and liquid N_2O_4

Fuel used in SLV -3 (Satellite Launch Vehicle (India's first satellite vehicle), ASLV (Augmented Satellite Launch Vehicle) are solid propellant. In PSLV (Polar Satellite Launch Vehicle), use solid propellant in 1st and 3rd stages and liquid propellant in 2nd and 4th stage

d) i) Dimethyl silicon chloride

ii) Ethylene dichloride & sodium polysulphide

iii) Phenol & Formaldehyde