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MJD chemistry

(Notes, Test &
Past papers
are Available).

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Youtube:-

MJD chemistry

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Chemistry
Annual Paper
Paper NO: 5
Objective Part

QNO1:-

Choice the
Correct Option

The units of equilibrium constant K_c for reaction in the balanced chemical equation $N_2 + 3H_2 \rightleftharpoons 2NH_3$ are:-

- (a) $Mol\ dm^{-3}$ (c) $Mol^{-2}\ dm^6$
(B) $Mol^{-1}\ dm^{-3}$ (D) No unit

2- Who proposed law of mass action:-

- (A) Newton (C) Lavoiser
(B) Charles Boyle (D) Gludberg and Waage

3- Used in the manufacturing soaps:-

- (a) $Pb(NO_3)_2$ (c) NaOH
(B) $ZnCl_2$ (D) $Fe(OH)_2$

4- Carbonization process is the conversion of:-

- (a) coal into coal gas (c) wood into coal
(B) coal into wood (D) wood into coal tar

5- Which one is not an Arrhenius acid?

- (a) HCl (c) CO_2
(B) H_2SO_4 (D) HNO_3

6- Oxidation of alkenes produces:-

- (a) glyoxal (c) oxalic acid
(B) glycol (D) formic acid

7- Number of amino acids in proteins is-

- (a) 1000 (c) less than 10000
(B) more than 1000 (D) more than 10000

8- Deficiency of which vitamins causes Rickets?

- (a) Vitamin A (c) vitamin K
(B) vitamin E (D) vitamin D

9- The Stratosphere layer is at height

above the earth's surface:-

- (a) 0-12 km (C) 50-85 km
(B) 12-50 km (D) 85-120 km

A disease that causes bone and tooth damage is:-

- (a) fluorosis (c) Cholera
(B) hepatitis (D) Jaundice

Temporary hardness of water is removed by adding:-

- (a) NaOH (c) $Ca(OH)_2(aq)$
(B) KOH (D) $CaSO_4$

The nitrogen present in urea is used by plants to synthesize:-

- (a) Sugars (c) fats
(B) proteins (D) DNA

Subjective

QNO2 :-

Short Question

1-

Q (i)
Write two possibilities of Chemical equilibrium state?

(Ans)

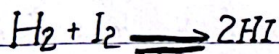
There are two possibilities at equilibrium state:-

(i) Static equilibrium state (ii) Dynamic equilibrium

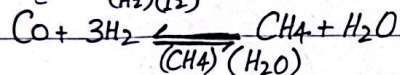
(ii)

Write the equilibrium constant expression for the following reaction? $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$.

(Ans)



$$K_c = \frac{(HI)^2}{(H_2)(I_2)}$$



$$K_c = (Co)(H_2)^3$$

(iii)

If the reaction quotient Q_c of a reaction is more than K_c . What will be the direction of the reaction?

(Ans)

If Q_c is greater than K_c then reaction proceed from right to left in backward direction:-

(iv)

Define complete reaction?

(Ans)

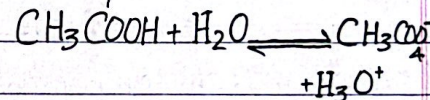
A complete reaction is one in which all reactants have been converted to products:-

(v)

Differentiate between conjugate acids and Lewis acids by an example?

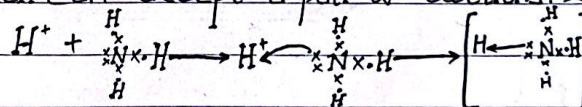
(Ans)

A conjugate acid is a species formed by accepting a proton by a base.



A Lewis acid is a substance (molecular ion)

which can accept a pair of electrons:-



In this examples H^+ acts as acid i.e. Lewis acid

(vi)

What are mixed salt?

(Ans)

Mixed salts contain more than one basic or acid radicals:-

(vii)
Write formula of calcium Hydroxide.

Also describe its one use?

(Ans)

Calcium hydroxide: - CaCO_3

Use of calcium hydroxide: - Calcium hydroxide is used for manufacturing of bleaching powder, softening of hard water and neutralizing acidic soil and lakes due to acid

rain: -

(viii)

Write any two uses of sodium silicate

(Ans)

(i) It is used in preparation of detergents.

(ii) It is used in preparation of adhesives.

QNO3:-

Short Question

(i)

What is ester group? Write down

the formula of ethyl acetate?

(Ans)

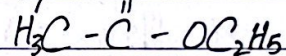
Organic compound consisting of RCOOR' functional group are called esters.

General formula: -

Their general formula is $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OR}'$,

Where R and R' are alkyl groups. They may be same or different: -

Formula of ethyl: -



Ethyl acetate

(ii)

What is ether linkage?

(Ans)

The functional group of ether is C-O-C.

Their general formula is $\text{R}-\text{O}-\text{R}'$. Here R and R' are alkyl groups: -

(iii)

What are Alkyl radicals? Also write the general formula?

(Ans)

Alkyl radical are derivations derivatives of alkenes. They are formed by the removal of one of the hydrogen: -

General formula:—

General formula is C_nH_{2n+1} —

(iv)

Depending upon the nature of bonds
name the classes of hydrocarbons?

(Ans)

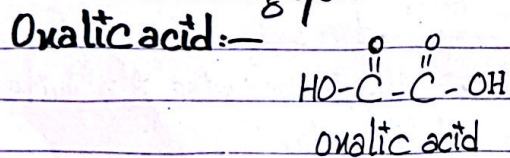
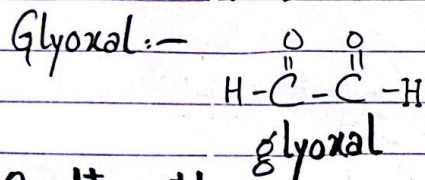
On the basis of type of bond,
hydrocarbons are divided into following
classes:—

(i) Alkane (ii) Alkenes (iii) Alkynes

(v)

Write the formula of glyoxal and
oxalic acid?

(Ans)



(vi)

Why are the ten amino acid essential
for us?

(Ans)

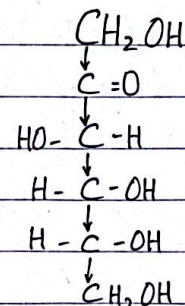
The ten amino acids are essential for us
because our body can not synthesize these
amino acids. Essential amino acids are
required by our bodies and must be supplied
through diet:—

(vii)

Write Structural formula of fructose?

(Ans)

Fructose formula:—



Fructose:—

(viii)

How margarine is prepared?

(Ans)

The produce margarine, first oil and
fats are extracted e.g by passing from
seeds and then refined.

QNO4 :-

Short Question*

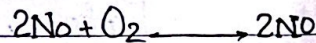
=====(i)=====

How Nitric Oxide (NO) is produced?

=====(Ans)=====

Nitric oxide (NO) is formed due to thundering of light. In Internal combustion engines, thermal power Stations of factories burn fossil fuels and nitrogen oxygen combine directly to form nitrogen monoxide gas.

Equation:-



=====(ii)=====

What is difference between pollutants and contaminants?

=====(Ans)=====

A pollutant is a waste material that pollutes air, water or soil.	While contaminants are those substances that make sometime impure.
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=====(iii)=====

How aquatic life is affected by acid rain?

=====(Ans)=====

Acid rain on soil and rocks leaches heavy metal (Al, Hg, Pb, Cr etc) with it and discharged these metal into rivers and lakes. This water is used by human beings for drinking purpose. These metals accumulate in human body, to a toxic level. On the other hand, aquatic life present in lakes also suffers because of high concentration of these metals. Especially high concentration of aluminum metals clogs the fish gills. It causes suffocation and ultimately death of fish:-

=====(iv)=====

How water is important for mankind?

=====(Ans)=====

- Human body consists of about 70% water.
- It provides an environment for animals and plants that live in water.
- All living organism owe their life to water.

- We use water for drinking, cooking and washing purpose

Q (v)

Write down the names of four fractions obtained by the fractional distillation of residual oil?

Ans

The residual oil which does not vaporize under specific condition is collected and heated above 400°C for further fractional distillation:-

Four fractions of residual oil are:-

- Lubricants
- Asphalt
- Paraffin wax
- petroleum coke

Q (vi)

What do you mean by scum?

Ans

A film or layer of foul or extraneous matter that forms on the surface of a liquid:-

Q (vii)

What is the percentage of nitrogen in urea? Also write down the formula of urea?

Ans

Urea is nitrogenous fertilizer. It consists of 46.6% nitrogen:-

Formula of urea:-



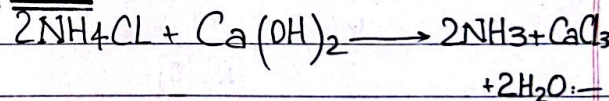
Q (viii)

How ammonia is produced by Solvay's process?

Ans

When ammonia ammonium chloride is reacted with slaked lime, ammonia is produced:-

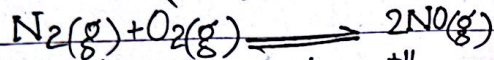
Equation:-



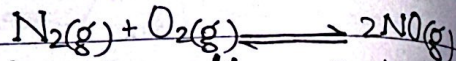
LONG QUESTION

QNO5 :-

Q(a)
Derive the equilibrium constant expression for the following reaction:



When nitrogen reacts with oxygen to form nitrogen monoxide, the reversible reaction:-



Rate of forward reaction:- $R_f = k_f [\text{N}_2][\text{O}_2]$

Rate of reverse reaction:- $R_r = k_r [\text{NO}]^2$

The equilibrium constant expression for the reaction:-

$$K_c = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]}$$

Q(B)

Differentiate between Acidic and Basic Salts?

Ans

These salts are formed by partial replacement of a replaceable H^+ ions of an acid by a	Basic salts are formed by the incomplete neutralization of a poly hydroxy base by
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positive metal ion:-	acid:-
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QNo6:-

Q(a)

Write three Chemical reactions of alkenes?

Ans

Chemical reaction:-

Alkenes are reactive compounds, because the electrons of the double bonds are easily available for reaction.

These compound have the tendency to reacts readily by adding other atoms, to because saturated compounds are

As a result, the double bond is converted into a single bond that is more stable. Thus addition reactions

are characteristic property of unsaturated compounds. These are the reactions which the products are formed by the

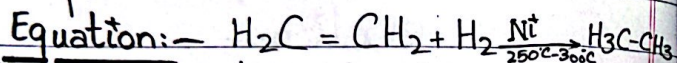
addition of some reagents. like H_2, Cl_2 etc, to an unsaturated organic compounds.

In the process, one of the bonds of a

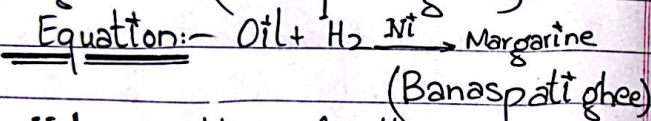
double bond gets broken and two new single bonds are formed.

• Hydrogenation of alkenes:-

Hydrogenation means addition of molecular hydrogen to an unsaturated hydrocarbon in the presence of a catalyst. (Ni) (Pt) to form saturated compound.



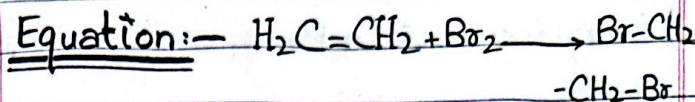
On industrial scale, this reaction is used to convert vegetable oil into margarine (Banaspatti ghee):-



• Halogenation of alkenes:-

Halogenation means addition of halogen like Chlorine or bromine.

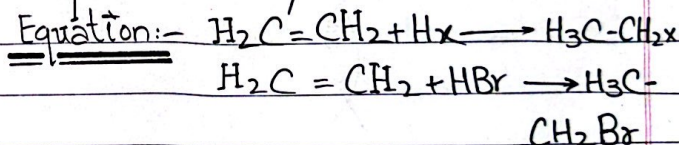
Bromination of alkenes is very important reaction. When bromine water (a solution of bromine in water having red-brown colour) is added to ethane ethene in an inert solvent like carbon tetrachloride its colour is discharged at once:-



• In the reaction double bond of ethene is converted into a single bond by the addition of a molecule of bromine. This reaction is used to identify the unsaturation of an organic compound:-

• Hydrohalogenation of alkenes:-

Dry gaseous hydrogen halides (HI, HBr and HCl) react with alkenes to produce alkyl halides:-



The order of reactivity of hydrogen halides is $\text{HI} > \text{HBr} > \text{HCl}$:-

(B)

Write a notes on Deoxyribonucleic acid (DNA):-

(Ans)

DNA

Full form of DNA is

Deoxyribonucleic acid:-

Component of DNA:-

- Nitrogenous base
- Pentose sugar
- Phosphate group

Diagram:-



DNA of Structure:-

- The Structure of DNA is Studied by waston "waston and crick"
- DNA is double helicate Structure which consist of two Strand:-
- Back bone of DNA is made up of pentose, group:-
- Two Strands are connected two each other

by nitrogenous base:-

Function of DNA:-

- DNA is the permanent Storage for all genetic information in the nucleus of a cell:-
- It carries and Stores all genetic information of a cell:-
- It passes these information as instructions from generation to generation how to synthesise particular proteins from amino acid. The instructions are "genetic code" of life:-

Qno 7:-

Q (a)

Explain the reasons, Why water is considered a universal solvent?

Ans)

Water as Solvent:-

Water is the universal solvent because it can dissolve almost all the minerals. Its ability to dissolve substance is

because of two unique properties of water:-

- polarity of water molecule :-
- exp. exceptional hydrogen bonding ability
- Polar nature of water :-

Structure of water molecule:- Water molecule has a polar structure i.e., one end of the molecule is partially positive while the other end is partially negative because of electronegativity difference between oxygen and hydrogen atoms:-

Solubility of polar substance in water:-

All other polar substances are soluble in water, because the positive $H^{\delta+}$ end of the substance is attracted by the negative end ($O^{\delta-}$) of the water and negative end of the substance is attracted by the positive end ($H^{\delta+}$) of the water:-

Electrostatics forces:- The electrostatic attractions among the ions are overcome by the ion-dipole forces of attraction between ion and water molecules. In this way, positive and negative ions of the compounds are pulled apart. Ultimately, these oppositely

Charged ions are surrounded by water molecules, thus separated and kept in solution-

For example:- Most of the salts like $NaCl$, KCl , Na_2SO_4 etc, are soluble in water.

Solubility of non-polar compound:- On the other hand, many covalent substance like Benzene, ether, octane etc, which does not have polar ends bonds are not attracted by water molecules. Therefore non-polar compounds do not dissolve in water:-

- Extensive hydrogen bonding ability:-

Angular Structure of water molecule:-

Water molecule is composed of oxygen and hydrogen atoms:-

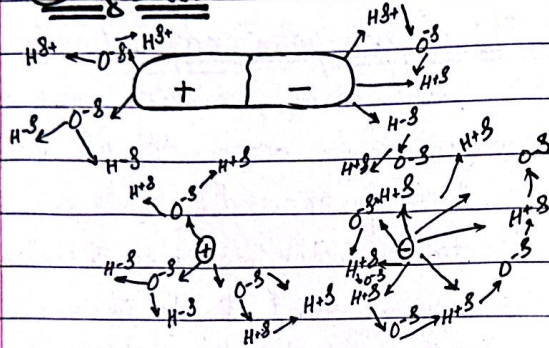
Hydrogen bonding:- Because of two O-H bonds and two lone pair, one H_2O molecule can form hydrogen bonding with four other H_2O molecules, which are arranged tetrahedral like around the H_2O molecules:-

Unique behaviour of water:-

Due to hydrogen bonding, water enable it to dissolve many polar non-ionic compound having hydroxy group ($-OH$) like alcohols,

organic acids, glucose, sugar etc, by forming hydrogen bond with them:-

Diagram:-



(B)

Q How crude oil is refined? Explain two important fractions of petroleum along with their usage?

(Ans)

Petroleum:- Petroleum is a natural product found under Earth's crust trapped in rocks. Petroleum means rocks oil:-

Definition:- Petroleum is a complex mixture of several ge. gaseous, liquid and solid hydrocarbons having water, salts and earth particles with it:-

It is lighter than water and is insoluble in it:-

Origin of petroleum:-

Formation of petroleum:- Petroleum was formed by the decomposition of dead plants and animals buried under Earth's crust million of year ago. It is believed crust million of year ago. living plants and animals in the sea died:- Their bodies sank and buried under mud and sand. Then decomposition process took place in the absence of air because of high, pressure, temperature and bacterial effects. This process took million of years for completion:-

Crude oil:- Remains of dead plants and animals were converted into a dark & brownish viscous crude oil. It was trapped between two layers of impervious rocks:-

Property of crude oil:- Being lighter and insoluble in water, crude oil floats over the water and forms an oil trap:-

Natural gas:- These gaseous products accumulated over the petroleum are found as natural gas:-

Extraction of petroleum:- Petroleum

Day: _____

Date: _____

is extracted by drilling holes (oil wells) into earth's crust where there oil is found. When a well is drilled through the rocks, natural gas comes first with a great pressure. For some time crude oil also comes out by itself due to gas pressure. When gas pressure subsides, the crude oil is pumped out:—

Refining of crude oil :- The crude oil is refined in the refineries. —

Refining and fractional distillation :- Refining process is the separation of crude oil mixture into various useful products (fractions). It is carried out by a process called fractional distillation. —

Principle of fractional distillation :-

The principle of fractional distillation is based upon separation of substance depending upon their boiling points. The substance having low boiling point boils, out first, leaving behind other. Then the next fraction of slightly higher boiling point boil out. This process continues until a residue is left behind. The vapours of each fraction are collected and condensed separately. —

Tall fractionating tower :- The fractional distillation of petroleum is carried out in a tall fractionating tower. —

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