Subject :- Applied Chemistry

(22202)

SYLLABUS

Chapter No.	Name of chapter	Marks
4	METALS,ALLOYS,CEMENT AND REFRACTORY MATERIALS	12
5	WATER TREATMENT	11
6	FUELS AND COMBUSTION	12
	Total Marks :-	35

CLASS TEST - I

PAPER PATTERN

FOR MECHANICAL ENGINEERING

COURSE:- APPLIED CHEMISTRY (22202)

PROGRAMME: - MECHANICAL ENGINEERING

Syllabus:-

Unit No.	Name of the Unit	Course Outcome (CO)
1	**METALS,ALLOYS,CEMENT AND REFRACTORY MATERIALS**	**202.4**
2	**WATER TREATMENT**	**202.5**
3	**FUELS AND COMBUSTION**	**202.6**

Q.1	**Attempt all MCQ questions.** **First six questions** **6*1= 6 Marks** **(g) & (h) questions** **2*2= 4Marks**	Course Outcome (CO)
a)	Question on Third chapter with four options	202.4
b)	Question on Third chapter with four options	202.4
c)	Question on Third chapter with four options	202.4
d)	Question on Fourth chapter with four options	202.5
e)	Question on Fourth chapter with four options	202.5
f)	Question on Fourth chapter with four options	202.5
g)	Question on Third chapter with four options	202.4
h)	Question on Fourth chapter with four options	202.5

COURSE OUTCOME (CO)

COURSE:- APPLIED CHEMISTRY (22202)

PROGRAMME: - MECHANICAL ENGINEERING

CO.NO	Course Outcome
CO-202.4	METALS,ALLOYS,CEMENT AND REFRACTORY MATERIALS
CO-202.5	WATER TREATMENT
CO-202.6	FUELS AND COMBUSTION

Chapter No 04

METALS, ALLOYS, CEMENT AND REFRACTORY MATERIAL

Total Marks:12

MCQ Question-

(Total number of Question=Marks*3=12*3=36)

Metallurgy-

1.Metallurgy is defined as a process that is used for the extraction of metals in their pure form. The compounds of metals mixed with soil, limestone, sand, and rocks are known as minerals. ..
2. **Metallurgy** deals with the process of purification of metals and the formation of alloys.
3.Flux is the material or substance thats is added to molten metal's to bond with impurities that can be readily removed.
4.Slag is the waste material which is removed.

Q.1) The product from a blast furnace in metallurgy of iron is known as ……

(a)cast iron (c)Wrought iron

(b)pig iron (d)Steel

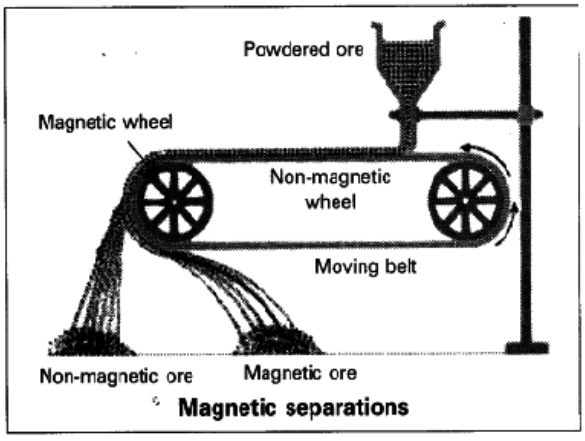
Q.2) Naturally occurring metallic compounds are called…….

(a)metalloids **(c)minerals**

(b)hard solids (d)matrix

ORE-a naturally occurring solid material from which a metal or valuable mineral can be extracted profitably

Magnetic Separation:
This involves the use of magnetic properties of either the ore or the gangue to separate them. The ore is first ground to fine pieces and then passed on a conveyor belt passing over a magnetic roller. The magnetic ore remains on the belt and the gangue falls off the belt.



Magnetic separations

Q.3) In magnetic separation, magnets are used to separate…….

(a) ore& gangue **(c) metal & gangue**

(b) metal & mineral (d) iron & steel

Q.4)A mineral from which metal can be extracted is called as.....

(a)minerals (c)gangue

(b)flux **(d)ore**

Q.5) A chemical formula $Al_2O_3 .H_2O$ represents ore.....

(a)Hematite (c)Chalcopyrite

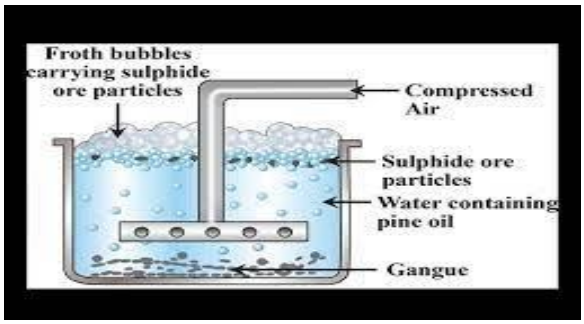
(b)Bauxite (d)ferrite

Q.6) The process of removal of gangue from ore is.....

(a) Oxidation (b) Reduction

(c)Smelting **(d) concentration**

For example, **froth flotation** is a **technique** commonly used in the mining industry. In this **technique**, particles of interest are physically separated from a liquid phase as a result of differences in the ability of air bubbles to selectively adhere to the surface of the particles, based on hydrophobicity.



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Q.7)The flux used in blast furnace.....

(a)CaO (c)FesiO3

(b)CaSiO (d)MgCO3

Q.8) Sulphide ore is concentrate by the process .....

(a)calcination (c)gravityseparation

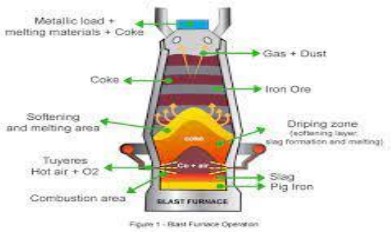
(b)Roasting **(d) froth floation**

Q.9) Froth floatation method uses…….

(a) pine oil (c) alcohol

(b) acid (d) alkali

A **blast furnace** is a type of metallurgical furnace used for smelting to produce industrial metals, generally pig iron, but also others such as lead or copper.



Q.10) Roasting is carried out in a furnace …….

(a)reverberatory furnace (c) muffle furnace

(b) blast furnace (d) electric oven

Q.11) Melting point of iron is ……

(a) 1083^0c **(c) 15300c**

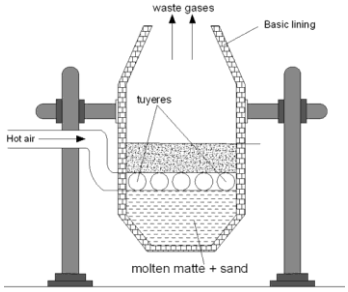
(b) 232^0c (d) 419^0c

Q.12) Oxidation is combination of an element and…….

(a) Hydrogen (c) ozone

(b) helium **(d) oxygen**

Mining. The ore is removed from the ground in either open pit or underground mines. ... The ore. An ore is a rock that contains enough metal to make it worthwhile extracting. **Grinding**. The ore is crushed, then ground into powder. Concentrating. ... **Roasting**. ... Smelting with fluxes. ... Conversion of matte. ... Anode **casting**.



Q.13) Copper is extracted from…….

(a)malachite **(c) Copper pyrite**

(b)hematite (d) dolomite

Q.14) In extraction of copper from pyrites iron is removed as…….

(a) $FeSO_4$ (c) FesiO

(b) $Fe3SO_3$ **(d) Fe_2O_3**

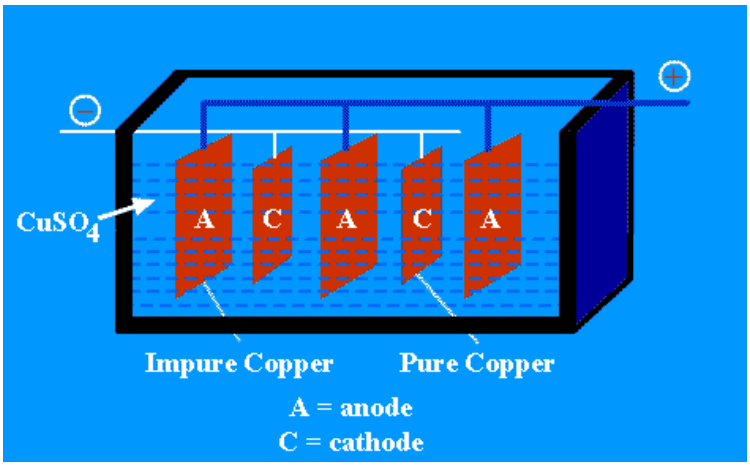
Q.15) Copper matte is the mixture of …….

(a) $FeS + Cu_2O$ **(c) Cu2S + FeS**

(b) $Cu_2O + Cu_2S$ (d) FeS + FeO

Electro refining-of Copper-

Electro refining entails electrochemically dissolving **copper** from impure **copper** anodes into an electrolyte containing $CuSO_4$ and H_2SO_4 and then electrochemically depositing pure **copper** from the electrolyte onto stainless steel or **copper** cathodes. The **process** is continuous.



Q.16) Chemical formula of copper pyrite or is…….

(a) Cu_2S **(c) $CuFeS_2$**

(b)Cu_2O (d) $CuSO_4$

Q.17) Blister copper is…….

(a) pure copper (c) impure copper

(b)alloy copper (d) ore of copper

Q.18) Molten matte is mixture of…….

(a)Cu2S+FeS (c)FeS+CuS

(b) Cu2O+FeS (d) FeO+Cu2O

Q.19) High purity copper metal is obtained by…….

(a)carbon reduction (c)hydrogen reduction

(b) electrolytic reduction (d) thermite reduction

Q.20)The electrolyte used in Electrorefining of copper…….

(a)15 % $CuSO_4$ +10 % H_2SO_4 (c) 15% H_2SO_4

(b) 10% KOH (d) 10%NaOH

Q.21) Blister copper contains copper in it ……

(a)96-98% (c) 40 – 45 %

(b) 60 – 65 % (d) 70 – 80 %

Steel is an alloy of iron with typically a few tenths of a percent of carbon to improve its strength and fracture resistance compared to iron.

Q.22) Percentage of Carbon in medium steel is…….

(a)1.5 to 2.5% (c)upto 0.3%

(b)0.3 to 0.6% (d) more than0.6%

Q.23) Percentage of Carbon in low steel is…….

(a)0.05% to 0.3% (c)1.5 to 2.5%

(b)0.3 to 0.6% (d) more than0.6%

Q.24) Percentage of Carbon in high steel is……

(a)0.05% to 0.3% **(c)0.6% to 1.5%**

(b)0.3 to 0.6% (d) more than0.6%

Q.25) Stainless steel is also called because of it's…….

(a)high strength **(c)high corrosion resistant**

(b)brittleness (d) high ductility

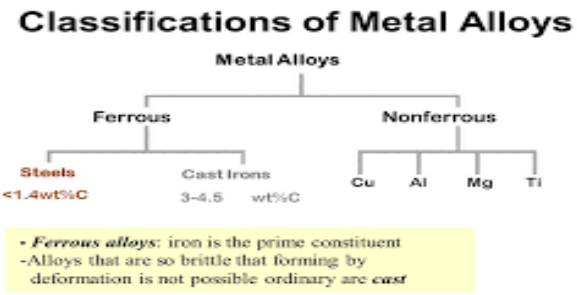
Q.26) ……steel is used in railway engineering .

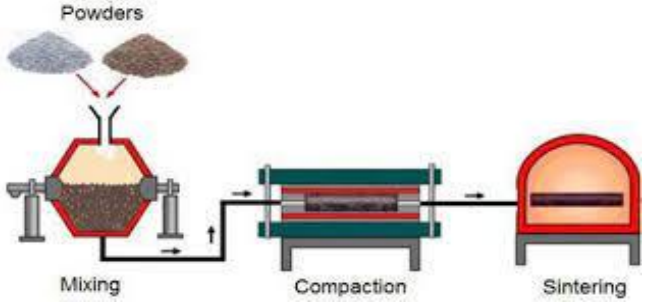
(a)low carbon steel (c) high carbon steel

(b)medium carbon steel (d) all of the above

ALLOY-

An **alloy** is an admixture of metals, or a metal combined with one or more other elements. For example, combining the metallic elements gold and copper produces red gold, gold and silver becomes white gold, and silver combined with copper produces sterling silver.





Q.27) The composition of woods metal is……

(a) Zn,Cd,Sn,Cd
(c) Bi,Zn,Sn,Cd
(b)Bi,Pb,Sn,Cd
(d) Cu,Zn,Pb,Cd

Q.28) Brass Consist of elements…….

(a) Cu+Pb
(c) Cu+Zn
(b)Zn+Pb
(d) Cu+Hg

Q.29) Melting point of iron is ……

(a) 1083^0c
(c) 1530^0c
(b) 232^0c
(d) 419^0c

Q.30) Alloy which do not contain iron as main component known……

(a) Nonferrous alloy
(c) ferrous alloy
(b)steel
(d) Magnetic steel

Q.31) Solder is an alloy of …….

(a)Lead &Tin
(c) Bismith&Lead
(b)Tin &Copper
(d) Lead &Copper

Cement-

- Ordinary Portland Cement (OPC) Ordinary Portland cement is the most widely used type of cement, which is suitable for all general concrete construction. ...
- Portland Pozzolana Cement (PPC) ...
- Rapid Hardening Cement. ...
- Quick setting cement. ...
- Low Heat Cement. ...
- Sulfates Resisting Cement. ...
- Blast Furnace Slag Cement. ...
- High Alumina Cement.

Q.32) Tricalcium silicate develop strength in cement in …….

(a)28days
(c)7days
(b)1day
(d)2days

Q.33) Tricalcium aluminate in cement …….

(a)causes initial setting of cement
(c)provides colour to cement
(b)hardens the cement slowly
(d)all of the above

Q.34) The commly used lime in white washing is…….

(a)White lime
(c)Fat lime
(b)hydrullic lime
(d)quick lime

Q.35) Good Quality cement contains higher percentage of

(a)tricalcium silicate
(c) dicalcium silicate
(b) Tricalcium aluminates
(d)all of these

Tricalcium silicate (Ca3SiO5 or C3S) is the main phase of Portland cement clinker. It is called 'alite' in clinker because it is not pure tricalcium silicate

Compound	Formula	Shorthand form	% by weight[1]
Tricalcium aluminate	$Ca_3Al_2O_6$	C_3A	10
Tetracalcium aluminoferrite	$Ca_4Al_2Fe_2O_{10}$	C_4AF	8
Belite or dicalcium silicate	Ca_2SiO_5	C_2S	20
Alite or tricalcium silicate	Ca_3SiO_4	C_3S	55
Sodium oxide	Na_2O	N	)
Potassium oxide	K_2O	K	)Up to 2
Gypsum	$CaSO_4 \cdot 2H_2O$	$C\bar{S}H_2$	5

Q.36) Hydration of cement is…….

(a)exothermic (c)endothermic

(b)none of these (d) both(a) &(b)

Q.37) The material used as an ingredient of concrete is usually…….

(a)cement (c)aggregate

(b) water (d) all of these

TYPES OF REFRACTORIES

- Fireclay refractories. ...
- Silica brick. ..
- High alumina refractories. ...
- Magnetite refractories. ...
- Chromite refractories. ...
- Zirconia refractories

Q.38) Refractory bricks are used for…….

(a)retaining walls (c)columns

(b)piers (d)combustion chambers

Q.39) Which is not basic refractory…….

(a)chrome magnetite (c) dolomite

(b)magnetite **(d) silicon carbide**

Q.40) Good refractory should have…….

(a)high porosity **(c)low porosity**

(b)medium porosity (d) porosity

Q.41) The type of refractory are…….

(a)acidic, basic, chemical **(c) acidic,basic,neutral**

(b) chemical, neutral, basic (d) acidic, alkaline, chemical

Q.41) The main objective of refractory material is…….

(a)to resist heat loss (c)to increase heat loss

(b)to maintain heat loss (d)all of these

Q.42) Aload bearing strength of refractory should be…….

(a)high (c)low

(b)stable **(d)high and low depending on temperature**

Chapter No 05
Water Treatment and Analysis

Total Marks: 11

MCQ Question-

(Total number of Question=Marks*3=11*3=33)

Source of Water-

Source water refers to sources of water (such as rivers, streams, lakes, reservoirs, springs, and groundwater) that provide water to public drinking water supplies and private wells.

Types of Water-

Hard water... is water that contains an appreciable quantity of dissolved minerals (like calcium and magnesium). Soft water... is treated water in which the only ion is sodium. As rainwater falls, it is naturally soft

Q.1) The process of removing calcium and magnesium from hard water is known as …

(a) filtration (c)flocculation

(b)sedimentation **(d) water softening**

Q.2) The metallic constituents of hard water are…….

(a)magnesium,tin,iron **(c)calcium,magnesium,iron**

(b)iron,tin,calcium (d) magnesium,calcium,tin

Q.3) When soap is added to hard water,a white precipitate of ……is formed**.**

(a) Sludge (b) flux **(c)scum** (d)scale

Permanent hardness in water is hardness due to the presence of the chlorides, nitrates and sulphates of calcium and magnesium, which will not be precipitated by boiling. The lime scale can build up on the inside of the pipe restricting the flow of water or causing a blockage**.**

Q.4) Permanent harness is also known as……

(a)carbonate hardness (c) non-carbonate hardness

(b) both(a) & (b) (d)none of these

Q.5) Water which not produces lather with soap is……

(a)mineral water **(c)hard water**

(b) Soft water (d)distilled water

7 easy ways to manage hard water issues

- Boil "Temporary" Hard Water. ...
- Remove Soap Scum Using a Hard Water Cleaning Aid. ...
- Use Washing Soda When Doing the Laundry. ...
- Apply Some Distilled White Vinegar to Remove Hard Water Stains. ...
- Consider a Magnetic Water Conditioner. ...
- Install a Faucet Water Softener. ...
- Invest in a Whole House Water Softening System.

Q.6) Permant hardness of water may be removed by addition of……

(a) Lime **(c) soda ash**

(b) Potassium permanganate (d)sodium bicarbonate

Q.7) Select the unit which is used to express the hardness of the water.

(a)Degree Frence (c) gms

(b)Ohm (d)Degree

Hard Water Create Problem in Boiler-

- scale and sludge formation
- priming& foaming
- caustic embrittlement

Q.8) Boilers do not face the trouble of…….while using hard water to generate steam.

(a)scale and sludge formation (c) corrosion

(b)lubrication (d)priming & foaming

Q.9) Highly alkaline water in boiler causes……..

(a) scale and sludge formation (c) corrosion

(b)priming& foaming (d)caustic embrittlement

Q.10) Permanent hardness is also known as ……..

(a) carbonate hardness (c) non- carbonate hardness

(b)both(a)&(b) (d)none of the above

Q.11) The most commonly used unit to express hardness is……..

(a)degree Frence (c) PPM

(b)degree Clark (d)grains/gallon

Q.12) Acceptable pH range for drinking water is……..

(a)7-8.5 (c) 6-7

(b)8-10 (d)6.5-9

Q.13) The maximum permissible limit (BIS)of turbidity in drinking water is…….

(a)5 NTU (c) 10 NTU

(b)15 NTU (d)20 NTU

Q.14) 1 PPM……

(a)0.07 ^{0}Fr

(c) 0.7^{0}Fr

(b)0.1^{0}Fr

(d)0.01^{0}Fr

Q.15) Temporary hardness can be removed by adding ……..

(a)lime

(c)carbon

(b)oxygen

(d)slaked lime

Ion exchange process-

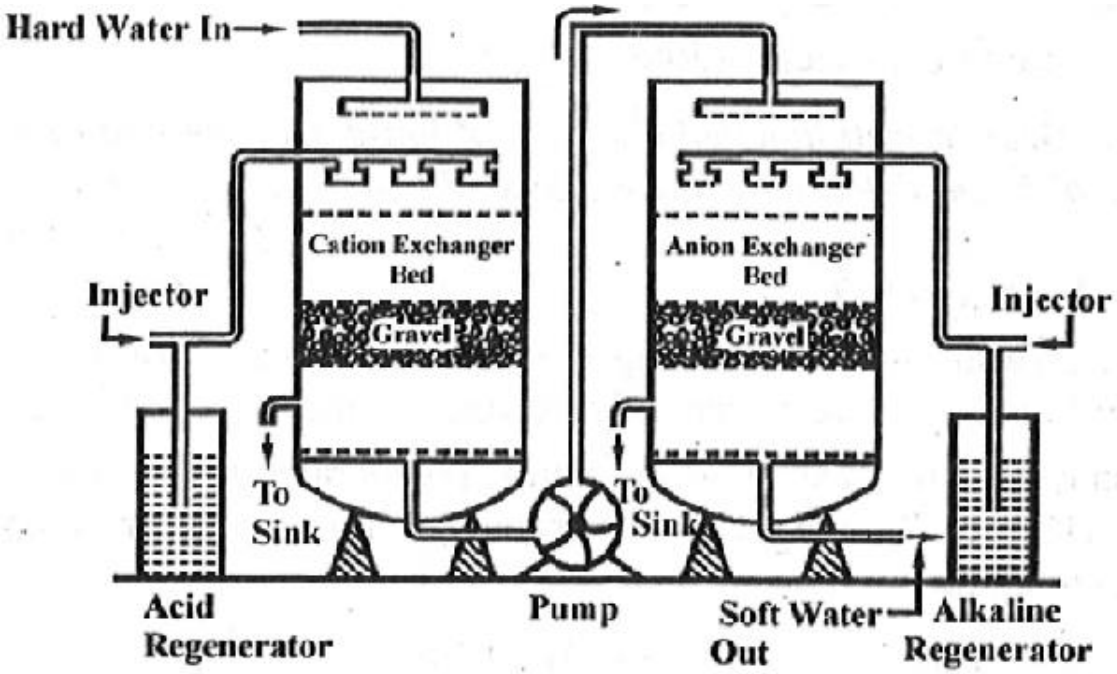


Fig. Demineralization of Water

Q.16) In the ion exchange process,exhaustedcation exchanger can be regenerated by using……..solution.

(a)10%Nacl

(c)Base

(b)Chloramine

(d)Acid

Q.17) Residual hardness in ion exchange process is……..

(a)10-15ppm

(c) 30-60ppm

(b) 15-20ppm

(d)0-2ppm

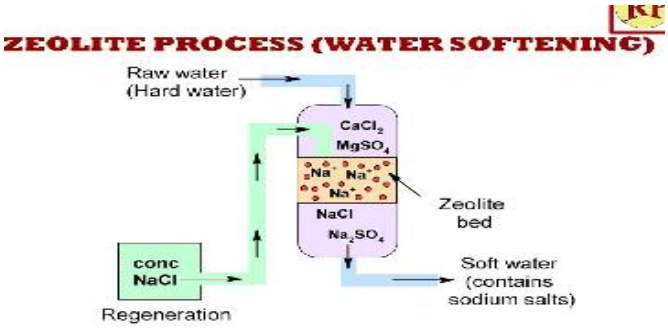
Q.18) In ion exchange process of water softening exhausted cation exchanger resin is regenerated by using……

(a) alkali

(c) dilute acid

(b)sand

(d)zeolite



A base exchange method of treating hard water, in which zeolites, contained in a tank, remove salts. The zeolite layer is regenerated by backflushing with brine.

Q.19) Zeolite softening process removes…….

(a) Only temporary hardness of wate

(b)Only permanent hardness of water

(c) Both temporary hardness &permanent hardness of water

(d)dissolved gases in permanent hard water

Q.20) Lime soda process uses……..

(a)$Ca(OH)_2$ (c) Na_2CO_3

(b)$Ca(OH)_2$ & Na_2CO_3 (d)Chloramine

Q.21) Sedimentation is a physical process used to remove……..

(a)colloidal particles **(c) suspended particles**

(b) Microorganism (d)all of these

Q.22) The Liquid waste from kitchens,bathroom,and wash basins are not called……

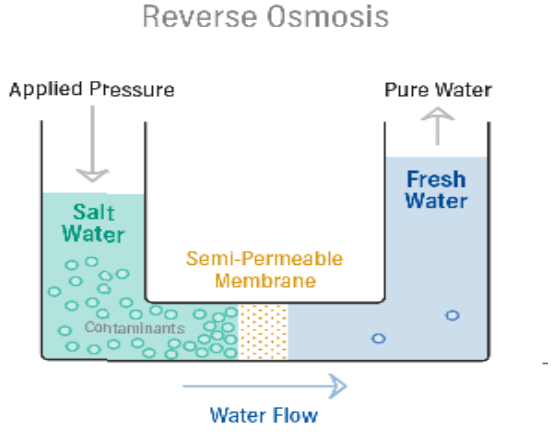
(a) Liquid wastes (c) sludge

(b) Sewage (d) none of these

Q.23) Fresh sewage may became stale in ……..

(a)one hour (c) two to three hour

(b) three to four hour (d)six hour



Q.24) Reverse osmosis is a water purification technique that uses ……

(a) coagulant (c) resins

(b) semi permeable membrane (d)lime soda

Q.25) The standard B.O.D of water is taken for ……..

(a) 1day (c) 2days

(b)5days (d)10days

Q.26) Permant hardness is the hardness that cannot be removed by……

(a) Boiling water (c) mineral water

(b)soda (d)distilled water

Q.27) In ion exchange process of water softening exhausted anion exchanger resin is regenerated by using……

(a) alkali (c) dilute acid

(b)sand (d)zeolite

Q.28) Total hardness of potable water should be less than…….

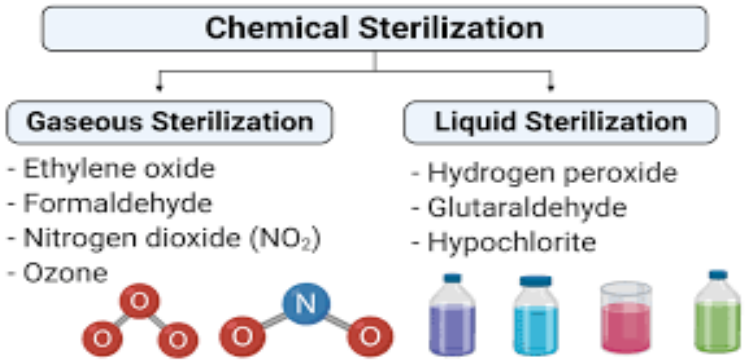
(a)500PPM (c) 700PPM

(b)900PPM (d)1000PPM

Sterilization of water is the process that kills, eliminates or deactivates the all form of microorganisms in the water. It is the critical stage for safe potable water. This method must achieve all most 100% deactivation so that prevents the spread of water-borne diseases.

$$NaOCl + H_2O \rightleftharpoons NaOH + HOCl$$

$$Ca(OCl)_2 + 2H_2O \rightleftharpoons Ca(OH)_2 + 2HOCl$$



Q.29) Swimming pool water should be sterilized by……..

(a)sedimentation (c) chlorine

(b) aeration **(d)Uv rays**

Q.30) In chlorination process germs are killed by……..

(a) chlorine gas (c) chloramin

(b) bleaching powder **(d)all of these**

Q.31) Ozone acts as……..

(a)sterilizing agent (c) decolourising agent

(b)deodorizing agent **(d)all of these**

Q.32) Fresh sewage should be stable in……..

(a)One hour (c)two to three hours

(b) three to four hours (d)Six hour

Q.33) Coagulation like alum is added to water to temove……..

(a)biological impurities **(c)colloidal impurities**

(b) floating material (d) all of these

Chapter No 06
FUELS AND COMBUSTION

Total Marks: 12

MCQ Question-

(Total number of Question=Marks*3=12*3=36)

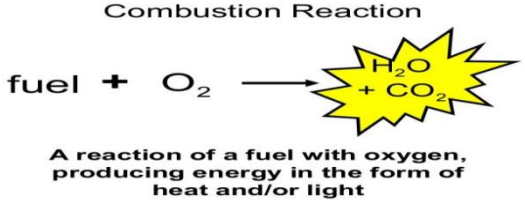
FUEL-Material such as coal, gas, or oil that is burned to produce heat or power

Q.1) Ideal fuel has …….calorific value.
(a)Low **(c)High**
(b)Moderate (d)zero

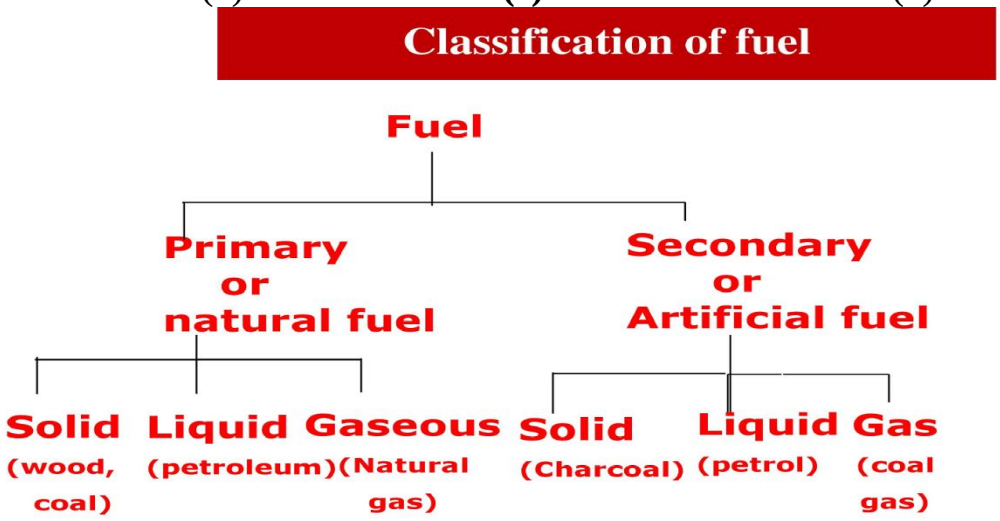
Properties of Good Fuel-
A good fuel should have the following characteristics.

- It should be easily available. ...
- It should be cheap.
- It should have a high **calorific value**.
- It should have a low ignition point, which is not lower than room **temperature** (so that it does not catch fire at room **temperature**).
- It should not burn too fast or too slowly.

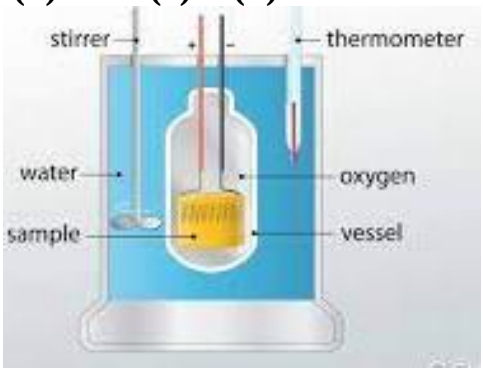
Q.2) Calorific value gives the……..
(a)Fuel efficiency **(c) Amount of heat**
(b)Amount of light (d)None of these
Q.3) In complete combustion gives……..
(a) CO_2 **(c) CO**
(b) Carbon (d) None of these
Q.4) Combustion reaction of fuels is a/an……reaction.
(a)auto catalytic **(c) exothermic**
(b)Endothermic (d)None of these
Q.5) Dry air requied to burn 1kg of carbon completely may be around ……kg**.**
(a)38 (c) 20
(b) 11 (d)4



Q.6) Combustion reaction of fuels is a/an……reaction.
(a)auto catalytic **(c) exothermic**
(b) endothermic (d)None of these
Q.7) which fuel is used for running automobiles?
(a)wood (b) Coal **(c) Diesel** (d)Charcoal



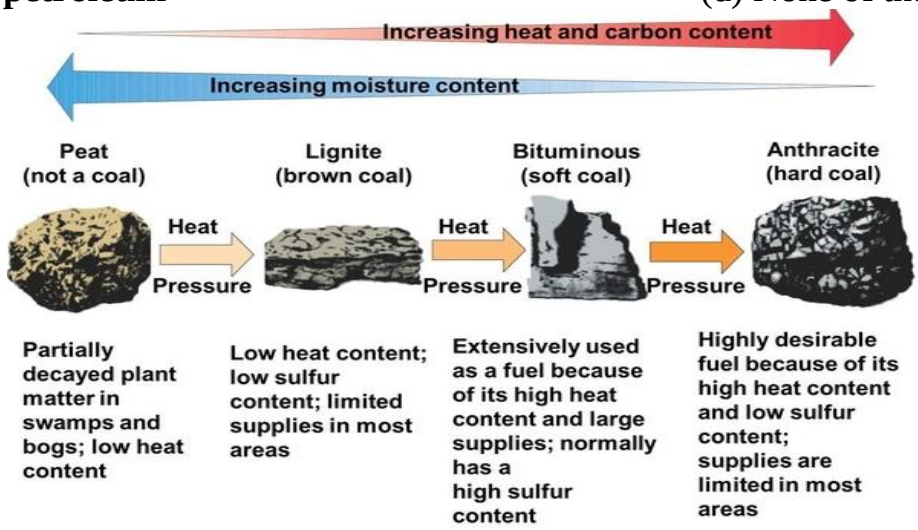
Q.8) fuel may be……
(a)Solid (c) Liquid
(b) Gas **(d) All of the above**
Q.9) for combustion……is necessary.
(a)Air (c) Water
(b) Paper (d) fuel
Q.10) Petrol and disel can be obtained from……..
(a) coal tar (c) coal
(b) petroleum (d) coal gas
Q.11) Bomb calorimeter is used to determine…….the calorific value of the following fuels
(a)Solid fuels (c) Liquid fuels
(b) both (a) &(b) (d) None of the above



Q.12) …… is not a stage of clarification.
(a) Anthracite **(c) Carbide**
(b) Bituminus (d) Lignite

Q.13) Naphthalene balls are obtained from……

(a) carbon
(c) coke
(b) petroleum
(d) None of the above



Q.14) Bitumen is used for……

(a) road surfacing
(c) lubricant
(b) motor fuel
(d) None of the above

Q.15) Gasoline is known as……

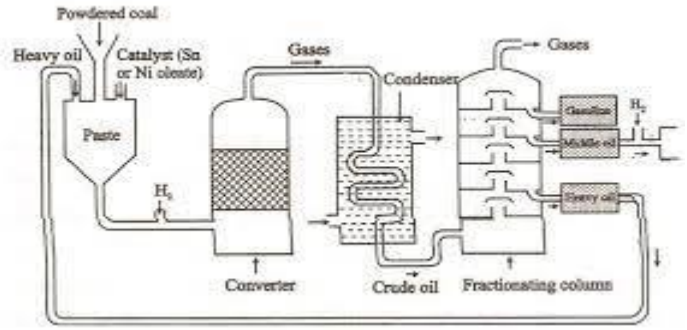
(a) wax
(c) petrol
(b) disel
(d) CNG

Q.16) Octane number is a measure of……

(a) quality of petrol/gasoline
(c) quality of disel
(b) quality of coal
(d) quality of all these

Q.17) Cetane number is a measure of……

(a) knocking ability/quality of petrol
(c)ignition quality of disel fuel
(b) calorific value of coal
(d) ignition quality of coal

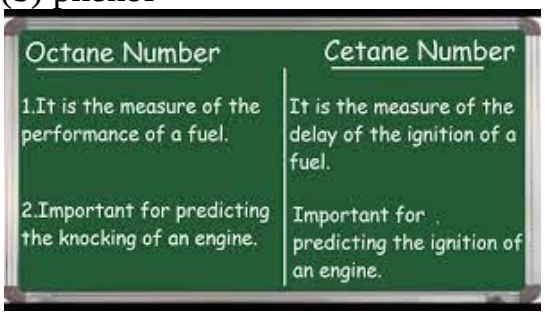


Q.18) Otto-Hofmanns oven is used in……

(a) calcification of coal
(c)carbonation of coal
(b) proximate analysis
(d) ultimate analysis

Q.19) The most popular antiknock agent is……

(a) amyl nitrate
(b) phenol
(c)Tetra ethyl lead
(d) None of the above



Q.20) Octane number is an important test for……
(a)LPG
(c) Kerosene
(b) gasoline
(d) light diesel oil

Q.21) Cetane number is an important test for……
(a)petrol
(c) Kerosene
(b) diesel
(d) fuel oil

Q.22) Proximate analysis of coal does not include the determination of……
(a)volatile matter
(c) percentage of ash
(b) fixed carbon
(d) percentage of sulphur

Q.23) CNG is……
(a) highly polluting
(c) less polluting
(b)not at all polluting
(d) None of the above

Q.24) The major constituent of natural gas is……
(a) Methane
(c) Ethane
(b)Propane
(d) Butane

Q.25) CNG contained ……% metane
(a) 75%
(c) 88%
(b)62%
(d) 58%

Q.26)The main constituent of LPG ……
(a) Butane
(c) Methane
(b) Propane
(d) None of the above

Q.27) …… is not secondary fuel.
(a) CNG
(c) Coal
(b) Charcoal
(d) None of the above

Q.28) Peat is …… colored coal.
(a) Black
(c) bown
(b)gray
(d) None of the above

Q.29) Which of the following fuel can not be used in I.C. engines?
(a) LPG
(c) CNG
(b) Coke
(d) Gasoline

Q.30) Added ethyl mercaptan impart distinct odour to …….
(a) Kerosene
(c) Petrol
(b) LPG
(d) CNG

Q.31) Petrol, diesel, and petroleum gas can be obtained from…….

(a) Coal tar **(c) Petroleum**

(b) Coal (d) Naphtha

Q.32) Petroleum is a mixture of…….

(a)petrol (c) disesl

(b) petroleum **(d) all of these**

Q.33) Which of the following constituents of coal is most important in the production of the heat?

(a)moisture **(c) carbon**

(b)ash (d) all of these

Q.34) Which of the these is being used as solvent for dry cleaning?

(a)disel **(c)kerosene**

(b)petrol (d) all of these

Q.35) The fraction of crude oil that is used in LPG is…….

(a)naphtha **(c)uncondensed gases**

(b)petrol (d) all of these

Q.36) ….is used to prepare candles,Vaseline.

(a)naphtha (c)wax oil

(b)paraffin wax (d) all of these