CY104S1_MID SEM EXAM-2022

Please read the questions carefully, there are 30 MCQ type questions having one mark each and only one correct answer. The duration of exam is one hour (9:30 am-10:30 am). Submit your response before 10:30 am.

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Name of The Student *

Garvit Shah

2

Admission No. *

e.g. U21EE001

U21CS089

3

Division____ *

F

CY104S1_MID SEM EXAM-2022

A water sample contains 204 mg of CaSO4/L. Calculate the hardness in terms of CaCO3 equivalents in ppm. *
(1 Point)

○ 75

○ 120

◉ 150

○ 136

Permanent hardness is due to the presence of_____ *
(1 Point)

○ $Mg(HCO_3)_2$ & $MgCl_2$

○ $Ca(HCO_3)_2$ & $CaSO_4$

○ $Ca(HCO_3)_2$ & $CaCl_2$

◉ $CaCl_2$ & $MgSO_4$

Which of the following statement is incorrect about zeolites? *
(1 Point)

○ Zeolites is a microporous material

○ Zeolites are used for purification and separation

○ Zeolites cannot be used as adsorbents

◉ Zeolites can be used as dehydrating agents

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Which of the following statement is false in the water softening process? *
(1 Point)

○ No exchange of ions in the Lime-soda process

○ Exchange of only cations takes place in the Zeolite process

○ Exchange of both cations and anions takes place in the Ion-exchange process

◉ Exchange of both cations and anions takes place in the Lime-soda process

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Which of the following statement(s) is incorrect about the boiler corrosion *
(1 Point)

○ Dissolved oxygen can be reduced by adding hydrazine

○ Caustic embrittlement can be prevented by sodium phosphate as softening agent

◉ Caustic embrittlement is due to the presence of Na_2CO_3 in the boiler feed

○ None of above

9

Calculate the total hardness in PPM for 1L of water containing the following salts: $CaCl_2$ =22.2 mg, $Ca(HCO_3)_2$= 8.1 mg and $MgCl_2$=9.5 mg *
(1 Point)

○ 30

○ 40

◉ 35

○ 45

Which of the following statement(s) is true in the water softening process? *
(1 Point)

○ The exhausted zeolite is regenerated by percolating through a solution of NaCl

○ The water containing turbidity can be treated by the zeolite process

○ Exhausted anion exchange resign is regenerated by dil. HCl

○ Exhausted anion exchange resign is regenerated by dil. H2SO4

50 mL of standard hard water containing 1 mg of pure CaCO3 per mL consumed 25 mL of EDTA solution. 50 mL of a water sample consumed 25 mL of same EDTA solution. Using complexometric titration method, calculate the hardness of water sample. *
(1 Point)

○ 750 ppm

○ 500 ppm

◉ 1000 ppm

○ 1250 ppm

When temporary hard water is boiled, one of the substances formed is _____ *
(1 Point)

○ calcium sulfate

◉ carbon dioxide

○ hydrogen chloride

○ calcium bicarbonate

Calculate the temporary and permanent hardness of water sample containing Mg(HCO3)2= 14.6mg/L, Ca(HCO3)2= 16.2mg/L, MgCl2= 9.5mg/L, CaSO4=6.8mg/L. Given molecular weight of Mg(HCO3)2= 146 g/mol, Ca(HCO3)2= 162 g/mol, MgCl2= 95 g/mol, CaSO4= 136 g/mol. *
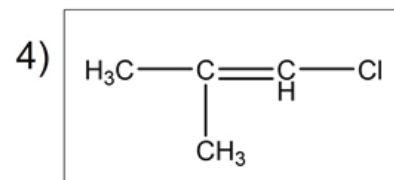(1 Point)
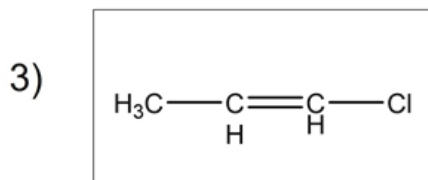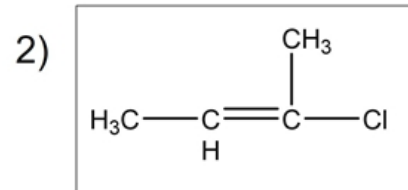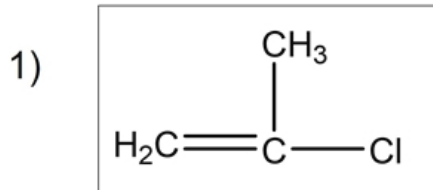
○ 20 ppm and 20 ppm

○ 15 ppm and 20 ppm

◉ 20 ppm and 15 ppm

○ 15 ppm and 15 ppm

*

(1 Point)

The monomer of the polymer

$$\left[\begin{array}{cccc} & CH_3 & & CH_3 \\ H_2C & C & H_2C & C \\ & | & & | \\ & Cl & & Cl \end{array}\right]_n$$

is

1)
$$H_2C=\overset{\overset{\displaystyle CH_3}{|}}{C}-Cl$$

2)
$$H_3C-C=\overset{\overset{\displaystyle CH_3}{|}}{\underset{H}{C}}-Cl$$

3)
$$H_3C-\underset{H}{C}=\underset{H}{C}-Cl$$

4)
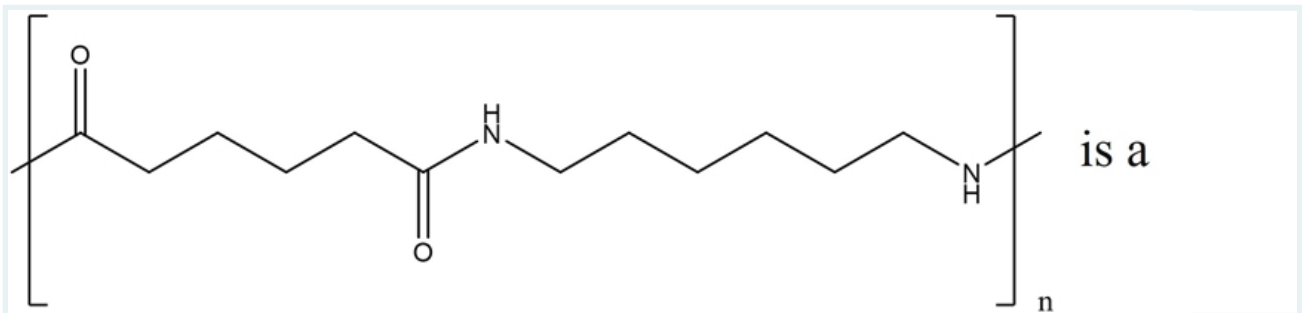$$H_3C-C=\overset{\overset{\displaystyle}{\underset{H}{C}}}{\underset{CH_3}{|}}-Cl$$
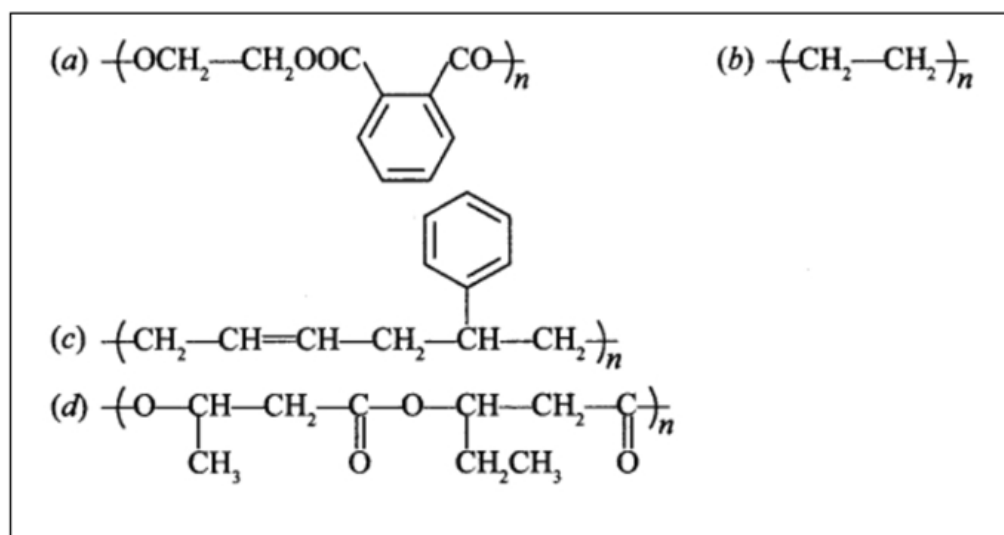
◉ 1

○ 2

○ 3

○ 4

15

*

(1 Point)

 is a

○ Chain growth polymer

○ Homopolymer

◉ Condensation polymer

○ Addition polymer

16

*

(1 Point)

In which of the polymer ethylene glycol (HO-CH_2-CH_2-OH) is one of the monomer units?
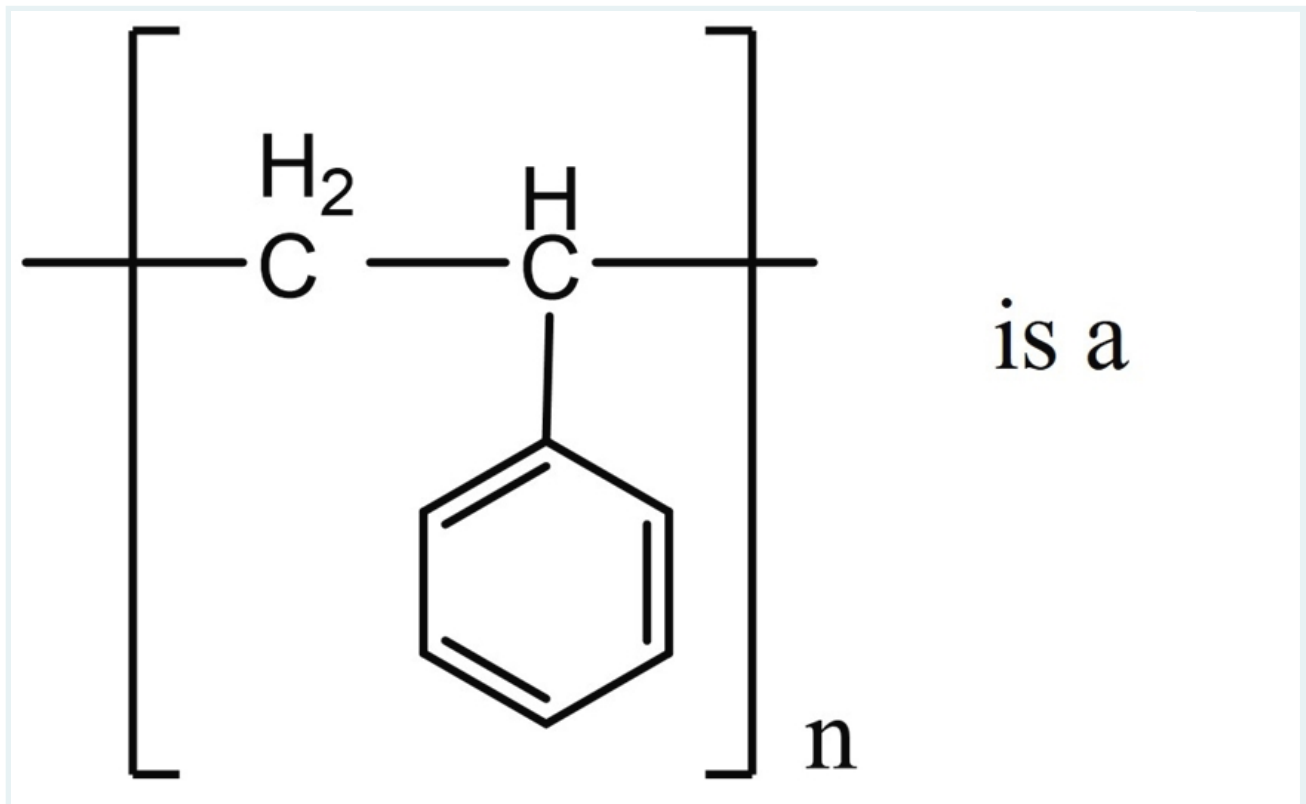

○ d

○ c

○ b

○ a

17

*
(1 Point)

○ Alternating copolymer
○ Block copolymer
◉ Homopolymer
○ Random copolymer

18

A polymer has a number average molecular weight of 50,000 and a polydispersity of 2.
What is the weight average molecular weight? *
(1 Point)

○ 250,000

○ 50,002

○ 25,000

○ 100,000

*

(1 Point)

A sample of atactic polystyrene is separated into 5 fractions;

Fraction	Number of Moles	Molecular Weight
1	20	10,000
2	20	20,000
3	20	30,000
4	20	40,000
5	20	50,000

What is the number average molecular weight?

○ 3.66×10^4

○ 2.33×10^4

◉ 3.0×10^4

○ 4.33×10^4

*

(1 Point)

What is the number average molecular weight of polypropylene polymer with following composition

$$\left[-CH_2-\overset{\overset{\displaystyle CH_3}{|}}{CH}- \right]_{400} \text{is 25 \%} \qquad \left[-CH_2-\overset{\overset{\displaystyle CH_3}{|}}{CH}- \right]_{800} \text{is 35 \%}$$

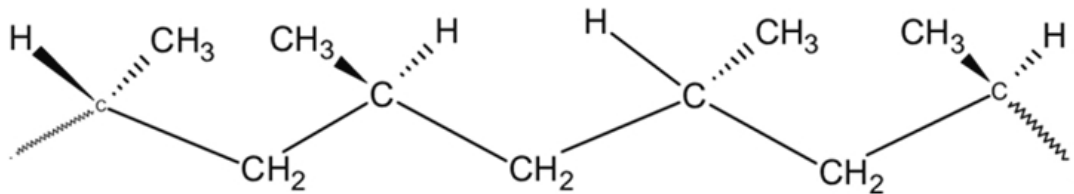$$\left[-CH_2-\overset{\overset{\displaystyle CH_3}{|}}{CH}- \right]_{600} \text{is 40 \%}$$
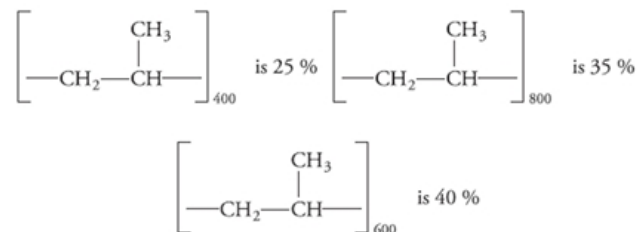
◉ 26,040

○ 42,000

○ 25,556

○ 21, 000
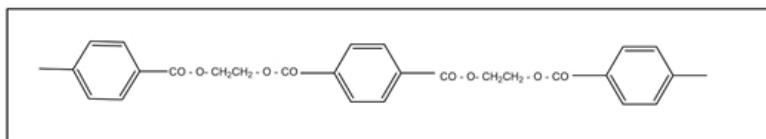
21

*

(1 Point)

The following polymer is an example of

- Graft polymer
- Atactic polymer
- Isotactic polymer
- ◉ Syndiotactic polymer

22

*

(1 Point)

A representation of a section of a polymer chain that has been produced from two different monomers is given below

The two monomers are

1) HO—⟨benzene⟩—OH   and $HOOCCH_2CH_2COOH$

2) HO—⟨benzene⟩—COOH   and $HO\ CH_2CH_2\ COOH$

3) HOOC—⟨benzene⟩—COOH   and $HO\ CH_2CH_2\ OH$

4) HOOC—⟨benzene⟩—COOH   and $HO\ CH_2\ OH$

- 2

○ 4

○ 1

◉ 3

23

Which type of initiator is needed for emulsion polymerization? *
(1 Point)

◉ Soluble in water

○ Partial soluble in water

○ Insoluble in water

○ Neither soluble nor insoluble in water

24

By adding chromium to steel which of the following property is enhanced? *
(1 Point)

◉ Resistance to corrosion

○ Electrical characteristics

○ Magnetic property

○ Ductility

25

The alloy used for dental filling is____ *
(1 Point)

◉ Amalgam

○ Bronze

○ Manganin

○ Brass

26

The property of metals to be hammered into thin sheets by virtue of this feature *
(1 Point)

○ Rancidity

○ Ductility

○ Conductivity

◉ Malleability

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Invar steel contain____ *
(1 Point)

○ Tungsten

○ Vanadium

◉ Nickel

○ Molybdenum

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Choose the correct allotrope of Iron, generally found in steel. *
(1 Point)

○ Austenite

○ Hematite

◉ cementite

○ bauxite

29

Iron exists in two crystalline forms in steel: *
(1 Point)

○ bcc and primitive

○ fcc and primitive

◉ bcc and fcc

○ Iron does not found in the crystalline form

30

Which material is used for filling in sandwich structures? *
(1 Point)

○ Polymer

○ Wood

◉ Honeycomb

○ All of the above

31

Which is a 2D nano material? *
(1 Point)

◉ Graphene

○ Nanotube

○ Fullerene

○ Liposome

32

According to solvent selection guide of Green Chemistry the chlorinated solvents are____ *
(1 Point)

○ Best choice

○ Reasonable

◉ Not recommended

○ None of the above

33

The first listed of the 12 Principles of Green Chemistry is? *
(1 Point)

◉ Prevent waste

○ Benign solvents

○ Atom economy

○ Catalysis