

University of Mumbai

Program: _First Year (All Branches) Engineering- SEM-I

Curriculum Scheme: Rev 2019

Engineering Chemistry-I

Question Bank

Atomic weights:- H=1, C= 12, O=16, N=14, S=32, Ca= 40, Mg=24, K= 39, Si= 28

MCQ

1.	Select the incorrect statement from following option
Option A:	Permanent Hardness is due to dissolved chlorides and sulfates of Ca and Mg
Option B:	Permanent hardness is removed by boiling water
Option C:	Permanent hardness is known as non alkaline hardness
Option D:	The Difference between the total hardness and alkaline hardness gives non alkaline hardness
2.	A 5ml sample of waste water was refluxed with 30ml of potassium dichromate solution and after refluxing the excess unreacted dichromate required 23ml of 0.1M FAS solution. A blank of distilled water on refluxing with 30ml of dichromate solution required 33ml FAS solution. Calculate the COD value of the waste water.
Option A:	2080 ppm
Option B:	1600 ppm
Option C:	800 ppm
Option D:	2000 ppm
3.	Which of following compound is not aromatic?
Option A:	Pyrrole
Option B:	Cycloheptatriene
Option C:	Cyclopentadienyl anion
Option D:	Naphthalene
4.	Which statement is true for thermoplastics?
Option A:	Thermoplastic do not soften on heating
Option B:	Thermoplastic are crosslinked Macromolecules
Option C:	Thermoplastic are organic solvent insoluble
Option D:	Thermoplastic is prepared by Addition Polymerization
5.	What will be Number of Phases at Eutectic Point
Option A:	1
Option B:	2
Option C:	3
Option D:	4

6.	Calculate Number of Components for following Reaction 1mole NH_4Cl =1mole NH_3 +1mole HCl
Option A:	1
Option B:	2
Option C:	3
Option D:	4
7.	Which of the following impurities is not responsible for hardness?
Option A:	CaCO_3
Option B:	MgCl_2
Option C:	AlCl_3
Option D:	CaCl_2
8.	Calculate P,C and F , for the system:- $\text{C}_{(s)} \rightleftharpoons \text{CO}_{(g)} \rightleftharpoons \text{CO}_2_{(g)} \rightleftharpoons \text{O}_2_{(g)}$
Option A:	P = 4, C= 4, F=2
Option B:	P = 4, C= 3, F=3
Option C:	P = 2, C= 2, F=2
Option D:	P = 2, C= 2, F=1
9.	Which of the following statements is true?
Option A:	2px to 2py overlap is possible since they are degenerate orbitals.
Option B:	2s and 3s overlap is feasible due to same symmetry.
Option C:	2s and 2pz overlap is not possible as they have neither similar symmetry nor comparable energy
Option D:	3s and 3s overlap is possible due to same symmetry and energy
10.	25 ml of effluent sample requires 8.3 ml of 0.1N FAS.Calculate Chemical Oxygen demand of an effluent.
Option A:	534.4 ppm
Option B:	2656 ppm
Option C:	664 ppm
Option D:	265.6 ppm
11.	Which is true for doped conducting polymers?
Option A:	It is an extrinsically conducting polymer whose conductivity can be increased by either oxidation or reduction.
Option B:	It is an intrinsically conducting polymer which is oxidised to create N-doping.
Option C:	It is an intrinsically conducting polymer which is reduced to create N-doping
Option D:	It is an intrinsically conducting polymer which is reduced to create P-doping
12.	Pyrrole is weakly basic because,
Option A:	Lone pair of electrons is involved in delocalisation
Option B:	It does not have any lone pair of electrons
Option C:	There is no delocalization of electrons in pyrrole
Option D:	Since it is a benzenoid compound

Descriptive Questions

1.	0.28g of CaCO_3 was dissolved in HCl and Solution Made up to 1litre with distilled Water. 50 ml of above solution required 14ml of EDTA solution. 100ml of Hard water sample required 33 ml of EDTA solution. After boiling of this water, cooling and filtering 50ml of this solution on titration required 2.5 ml of EDTA solution. Calculate each type of Hardness of water.
2.	Write a short note on Reverse Osmosis and give its applications.
3.	Give Preparation, Properties and applications of Kevlar.
4.	In Phase diagram of Water system Explain invariant system, Univariant system and Bivariant system
5.	Write main theoretical requirements for a substance to possess aromaticity.
6.	What are the main features of MOT?
7.	Give Chemical structure of Anion and Cation exchange Resin and explain merits of demineralization process
8.	What are factors that affect glass transition temperature?
9.	500 kg of sample of argentiferous lead containing 0.05% silver is melted and then allowed to cool. If eutectic contains 2.6% Ag 1) What mass of Eutectic will be formed ? 2) What mass of lead will be separated out ?
10.	What are the advantages of Phase Rule?
11.	Explain the aromaticity of Pyrrole with a diagram.
12.	Explain with MO diagram, Why Be_2 does not exist?
13.	Write four points of comparison between COD and BOD.
14.	Give a brief account of Ultrafiltration.
15.	With a neat labeled diagram explain injection molding.
16.	If a polymer sample has following population, 11 molecules of molecular mass=5000 21 molecules of molecular mass=7500 21 molecules of molecular mass=10000 26 molecules of molecular mass=15000 21 molecules of molecular mass=20000 6 molecules of molecular mass =25000 Calculate its Number- average and Weight- average molecular mass of the polymer.
17.	State Gibbs phase rule and explain the terms involved in it by giving two examples.
18.	Standard hard water is prepared by dissolving 2.5g of CaCO_3 in 1000 ml distilled water. 100 ml of above solution required 42 ml EDTA. 100 ml water sample required 27 ml of same EDTA. 100 ml of water sample upon boiling and filtration required 20 ml EDTA. Calculate all types of hardness of water.
19.	Which polymeric material would you choose for making protective clothing? Give its synthesis and comment on its unusual strength.
20.	Differentiate between reverse osmosis and ultra-filtration which process produces water of better quality?

21.	Explain the term component by giving examples.
22.	Explain the shape and structure of atomic orbital with azimuthal quantum number $l = 0$
23.	Justify :- Why does Anthracene qualify as an aromatic molecule but Cyclobutadiene does not?
24.	Define glass transition temperature and melting. Why is Tg of Nylon 6:6 is greater than that of polyethylene?
25.	1 Kg argentiferous lead containing 1% silver is melted and then allowed to cool. If eutectic contains 2.6% Ag, then, A) What mass of eutectic is formed ? B) What mass of lead will separate out?
26.	With the help of Molecular orbital theory, explain structure and bonding in benzene.
27.	Explain eutectic point, with the help of neat and labeled phase diagram of two component system.
28.	Explain the formation of bonding and antibonding molecular orbitals with the help of LCAO theory.
29.	What is 'Deionised water'? With the help of diagram and reactions, explain the process by which we obtain the same.
30.	Define BOD.50 ml waste water sample 628 ppm of dissolved oxygen. This sample when diluted with 150 ml dilution water and incubated for 5 days, its dissolved oxygen content reduces to 357 ppm. Calculate the BOD of waste water sample.
31.	With the help of a phase diagram, derive the degrees of freedom for one component system and explain the concept of non-variance.
32.	With the help of electronic configuration, draw the M.O diagram of CO molecule and explain its bond order, stability and magnetic property.
33.	Explain the moulding technique used for fabrication of intricate articles from thermosetting plastics with the help of neat and labeled diagram.
34.	What happens when water with temporary hardness is boiled? Calculate temporary, permanent and total hardness of water sample with following impurities:- CaSO ₄ =122ppm, Mg (HCO ₃) ₂ = 15ppm, CO ₂ = 20 ppm, Mg(NO ₃) ₂ =29.6ppm, SiO ₂ =2 ppm.
35.	In a polymer sample, 20% molecules have molecular weight 10000 , 25% have molecular weight 25,000, 30% molecules have molecular weight 15,000 and remaining have molecular weight 50,000. Calculate the Polydispersity index.
36.	Distinguish between bonding and antibonding.
37.	With the help of electronic configuration, draw the M.O diagram of O ₂

	molecule and explain its bond order, stability and magnetic property.
38.	<p>How many degrees of freedom are present in the following systems?</p> <p>i) A solution of a solid in a liquid in equilibrium with solvent vapour</p> <p>ii) $\text{H}_2\text{O}(\text{l}) \longrightarrow \frac{1}{2} \text{H}_2(\text{g}) + \text{O}_2(\text{g})$</p> <p>iii) Two partially miscible liquids in the absence of vapour.</p>
39.	What is triple point? Calculate its degree of freedom.
40.	What are the limitations of phase rule?