**University of Mumbai**

Program: \_First Year (All Branches) Engineering- SEM-II

Curriculum Scheme: Rev 2019

Engineering Chemistry-II

**Question Bank**

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##### NOTE: Atomic Weights: C = 12, H = 1, O = 16, N = 14, S = 32, Na=23 and Br=80

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| **Q1.** | **Choose the correct option for following questions. All the Questions are**  **compulsory and carry equal marks(2 marks each)** |
| 1. | Which of the following spectroscopy can be used to quantify the concentration of protein and DNA in solution |
| Option A: | Infra-Red spectroscopy |
| Option B: | UV spectroscopy |
| Option C: | NMR spectroscopy |
| Option D: | Raman spectroscopy |
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| 2. | The standard emf of the following cell is 0.012V  Sn(s) │Sn2+ (aq)(1M)║Pb2+(aq)1M │Pb(s)  Calculate standard electrode potential of Sn electrode, if standard electrode potential for Pb electrode is -0.125V. |
| Option A: | -0.137 |
| Option B: | -0.113 |
| Option C: | -0.005 |
| Option D: | -0.245 |
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| 3. | In greener synthesis of indigo, traditionally used Aniline is replaced by the following substrate. |
| Option A: | D-glucose |
| Option B: | Benzene |
| Option C: | Toluene |
| Option D: | L-tryptophan |

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| 4. | Galvanization is preferred to tinning since,   1. Zinc is more electro positive than iron 2. Zinc coating protects iron sacrificially 3. Punctured tin coating causes intense corrosion |
| Option A: | Only (i) |
| Option B: | Only (iii) |
| Option C: | (i), (ii) &(iii) |
| Option D: | Only (ii) |
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| 5. | Corrosion in welded stainless steel is an example of ……………… |
| Option A: | Galvanic corrosion |
| Option B: | Pitting corrosion |
| Option C: | Waterline corrosion |
| Option D: | Inter granular corrosion |
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| 6. | A sample of coal has following composition by mass C = 70 %, O = 8 %, H = 10 %, N = 3 %, S = 2%, Ash = 7 %.Calculate H.C.V. using Dulong formula |
| Option A: | 8805.80kcal/kg |
| Option B: | 8277.80 kcal/kg |
| Option C: | 8877.80 kcal/kg |
| Option D: | 8205.80 kcal/kg |
| 7. | Arrange n-octane, naphthalene and isooctane in the increasing order of their knocking tendency. |
| Option A: | n-octane < Naphthalene < isooctane |
| Option B: | Naphthalene < isooctane< n-octane |
| Option C: | Isooctane < Naphthalene < n-octane |
| Option D: | Isooctane = n-octane < Naphthalene |
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| 8. | A cell is constructed from Ni+ 2 / Ni and Cu+2/ Cu half cells . The standard potential of the cell is -------. Given E0Ni = - 0.257 V and E0Cu = 0.337 V |
| Option A: | - 0.594 V |
| Option B: | 0.008 V |
| Option C: | - 0.008 V |
| Option D: | 0.594 V |
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| 9. | Which of the following reactions are Green in nature:  Addition reactions, Substitution reactions, Elimination reactions, Rearrangement reactions |
| Option A: | Addition and Substitution reactions |
| Option B: | Rearrangement and Elimination reactions |
| Option C: | Rearrangement and Addition reactions |
| Option D: | Substitution and Elimination reactions |
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| 10. | An iron object is plated with a coating of Nickel to protect against corrosion. Does the Nickel protect iron by cathodic protection? Give suitable reason for your answer. |
| Option A: | No. The oxidation potential of Ni/Ni+2 is lower than that for Fe/Fe+2 |
| Option B: | Yes. The oxidation potential of Ni/Ni+2 is lower than that for Fe/Fe+2 |
| Option C: | No. The oxidation potential of Fe/Fe+2 is lower than that for Ni/Ni+2 |
| Option D: | Yes. The oxidation potential of Fe/Fe+2 is lower than that for Ni/Ni+2 |
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| 11. | In quantum Mechanics, a set of rule exist, known as ‘Selection rules’ that basically explains which transitions are ‘allowed transitions’. Which amongst the following statements is an ‘allowed transitions’? |
| Option A: | The spin quantum number of an electron doesnot change during the absorption or emission of light in an ‘allowed transition’. |
| Option B: | The change in orbital quantum number during an ‘allowed transition’ is zero. |
| Option C: | There is no change in magnetic quantum number during an ‘allowed transition’. |
| Option D: | The change in magnetic quantum number during a ‘forbidden transition’ is either zero, or +1, or -1. |
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| 12. | Small anodic area and large cathode area results in - |
| Option A: | Slow corrosion because of decreased demand of electrons by the small anode. |
| Option B: | Intense corrosion because of huge demand of electrons by the small anode. |
| Option C: | Slow corrosion because of decreased demand of electrons by the large cathode. |
| Option D: | Intense corrosion because of huge demand of electrons by the large cathode. |
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| 13. | Selection rule to produce rotational spectra is |
| Option A: | Dipole moment of molecule must change during vibrations |
| Option B: | Molecule must have permanent dipole moment |
| Option C: | Presence of chromophore in a molecule |
| Option D: | Presence of unpaired electron in a molecule |
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| 14. | Benzene is an important industrial solvent which is classified as |
| Option A: | Non-toxic |
| Option B: | Non-flammable |
| Option C: | Biodegradable |
| Option D: | Carcinogenic |
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| 15. | Which of the following statement is incorrect about an electrochemical cell |
| Option A: | Oxidation occurs at anode and reduction at cathode |
| Option B: | Chemical energy is converted into electrical energy |
| Option C: | Cell can work indefinitely |
| Option D: | Salt bridge maintains electrical neutrality of the electrolytes |
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| 16. | If a metal rod exhibits holes on its surface due to corrosion, the type of corrosion is |
| Option A: | Waterline |
| Option B: | Galvanic |
| Option C: | Pitting |
| Option D: | Stress |
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| 17. | A good fuel has |
| Option A: | Low ignition temperature and high calorific value |
| Option B: | Low ignition temperature and low calorific value |
| Option C: | High ignition temperature and high calorific value |
| Option D: | Moderate ignition temperature and high calorific value |
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| 18. | Spin multiplicity for the two unpaired electrons in excited singlet state is |
| Option A: | 3 |
| Option B: | 2 |
| Option C: | 1 |
| Option D: | 4 |
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| 19. | Which of the following green chemistry principles are applicable to the alternate synthesis of ibuprofen? |
| Option A: | Maximize atom economy, preventaion of waste and use of renewable feedstock |
| Option B: | Maximize atom economy, preventaion of waste and reduce unnecessary derivatisation |
| Option C: | Maximize atom economy, use of auxillary substances and increases energy effieciency |
| Option D: | Prevention of waste, renewable feedstock and increased energy efficiency. |
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| 20. | Proximate analysis of coal is used to determine |
| Option A: | % of Nitrogen |
| Option B: | % of Sulphur |
| Option C: | % of Hydrogen |
| Option D: | % of Moisture |
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| 21. | Season cracking is a special case of |
| Option A: | Chemical corrosion |
| Option B: | Stress corrosion |
| Option C: | Concentration cell corrosion |
| Option D: | Waterline corrosion |
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| 22. | By which process does the knocking starts in diesel engine? |
| Option A: | Due to sudden spontaneous combustion of last portion of fuel |
| Option B: | Due to delay in spontaneous combustion of last portion of fuel |
| Option C: | Due to the rise in temperature of diesel engine |
| Option D: | Due to the presence of straight chain paraffins in the diesel |
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| 23. | Which of the metallic structure will require more impressed current density for cathodic protection? |
| Option A: | Water boiler |
| Option B: | a ship hull |
| Option C: | Series of underground gas pipes |
| Option D: | an iron pipe buried in the soil |
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| 24. | In impressed current cathodic protection, anode is provided with a gypsum backfill because |
| Option A: | It enhances the rate of reaction |
| Option B: | It decreases metal to metal contact |
| Option C: | It enhances electrical contact with surrounding soil |
| Option D: | It decreases electrical contact with soil |
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| 25. | Zn metal is corroding in the presence of acid. After sometimes corrosion stops.The reason is |
| Option A: | addition of few drops of CuSO4 |
| Option B: | Increased Hydrogen overvoltage of Zn |
| Option C: | Decreased Hydrogen Overvoltage of Zn |
| Option D: | Increased diffusion of H+ ions |
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| 26. | As per Pilling- Bedworth rule, Greater the specific volume ratio, |
| Option A: | Higher is the oxidation corrosion |
| Option B: | Higher is the electrochemical corrosion |
| Option C: | Lower is the oxidation corrosion |
| Option D: | Lower is the electrochemical corrosion |
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| 27. | Calculate the emf of a concentration cell at 25oC consisting of two Ag electrodes immersed in solutions of Ag+ions of 0.2M and 0.01M concentrations |
| Option A: | 0.777V |
| Option B: | -0.077V |
| Option C: | 0.0385V |
| Option D: | 0.077V |
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| 28. | The number of waves which can pass through a point in one second. This statement justifies, from the following |
| Option A: | Wavelength |
| Option B: | Frequency |
| Option C: | Wave number |
| Option D: | Acceleration |
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| 29. | Which is not the selection rule for the electronic transitions from the following |
| Option A: | Spin selection rule |
| Option B: | Symmetry rule |
| Option C: | Hund’s rule |
| Option D: | Angular momentum rule |
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| 30. | To calculate the net calorific value, the products are \_\_\_\_\_\_\_\_\_ |
| Option A: | cooled |
| Option B: | collected |
| Option C: | allowed to escape |
| Option D: | heated |
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| 31. | Which one of the following is not applicable to a green reaction? |
| Option A: | Should not use hazardous reagents in manufacture of products. |
| Option B: | All the atoms of the reactancts should be incorporated to give only the atoms of products |
| Option C: | Should not use hazardous reagents but can produce toxic products |
| Option D: | Should prevent accidents in chemical industries |
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| 32. | The device in which electrical energy from an external source can be used to produce chemical reactions, such device is known as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Option A: | Voltaic Cell |
| Option B: | Electrolytic Cell |
| Option C: | Concentration Cell |
| Option D: | Fuel Cell |
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| 33. | From the following which is not used as a reference electrode |
| Option A: | Hydrogen electrode |
| Option B: | Calomel electrode |
| Option C: | Silver/Silver chloride electrode |
| Option D: | Glass electrode |
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| 34. | Mechanism of electrochemical corrosion occurs due to evolution of hydrogen gas when |
| Option A: | Corrosive environment is acidic |
| Option B: | Corrosive environment is alkaline |
| Option C: | Corrosive environment is neutral |
| Option D: | Corrosive environment is alkaline and neutral |
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| 35. | Moisture and volatile matter free 3.3 gm of coal sample was ignited in muffle furnace to a constant weight of 0.252 gm of residue. What will be the percentage of ash in coal sample |
| Option A: | 1.84 % |
| Option B: | 11.31 % |
| Option C: | 8.00 % |
| Option D: | 6.63 % |
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| 36. | Which of the following metallic coating method involves hot dipping? |
| Option A: | Metal cladding |
| Option B: | Metal Spraying |
| Option C: | Galvanizing |
| Option D: | cementation |
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| 37. | For estimation of moisture content in coal sample silica crucible is heated at \_\_\_\_ degree Celsius |
| Option A: | 120 degree Celsius |
| Option B: | 105-110 degree Celsius |
| Option C: | 925 degree Celsius |
| Option D: | 750 degree Celsius |
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| 38. | Caustic embrittlement is which type of electrochemical corrosion? |
| Option A: | Waterline corrosion |
| Option B: | Stress corrosion |
| Option C: | Pitting Corrosion |
| Option D: | Galvanic cell corrosion |
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| 39. | \_\_\_\_\_\_\_ is not the green chemistry principle from the following |
| Option A: | High atom economy |
| Option B: | Use of catalyst |
| Option C: | Use of Non-renewable feedstock |
| Option D: | Use of green solvent |
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| 40. | Nobel metals do not undergo oxidation corrosion because it forms\_\_\_\_\_\_\_ |
| Option A: | Unstable oxide film |
| Option B: | Non-porous oxide film |
| Option C: | Porous stable film |
| Option D: | Volatile oxide film |
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| 41. | Which is used as a green solvent from the following? |
| Option A: | Alcohol |
| Option B: | Acetone |
| Option C: | Supercritical CO2 |
| Option D: | Concentrated Sulphuric acid ( H2SO4) |
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| 42. | Dulong's Pettit formula is used for the theoretical calculations of |
| Option A: | Rating of coal |
| Option B: | Saponification value |
| Option C: | Calorific value |
| Option D: | Sulphur from coal |
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| 43. | In which spectrum, molecule falls from excited state to ground state with the emission of photon energy? |
| Option A: | Electromagnetic spectra |
| Option B: | Absorption spectra |
| Option C: | Emission spectra |
| Option D: | Scattering spectra |
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| 44. | Which of the following is not synthesized by greener way? |
| Option A: | Acetic acid |
| Option B: | Adipic acid |
| Option C: | Indigo |
| Option D: | Carbaryl |
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| 45. | Identify the true statement of the following:- |
| Option A: | EMF series includes non metals, metals and their alloys |
| Option B: | EMF series predicts the corrosion characteristics of metals and alloys correctly |
| Option C: | position of metals in EMF series changes with the change in the environment |
| Option D: | It talks about the relative displacement tendencies of metals and non metals |
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| 46. | Electromagnetic spectrum is nothing but the arrangement of electromagnetic radiations according to |
| Option A: | Increasing order of wavelength & Decreasing order of frequency |
| Option B: | Decreasing order of frequency & Decreasing order wave length |
| Option C: | Increasing order of wavelength & Increasing order of frequency |
| Option D: | Not related to frequency and wavelength order |
|  |  |
| 47. | Which of the following is not a principle of proper designing? |
| Option A: | Avoid the contact of dissimilar metals |
| Option B: | Anode should be smaller than cathode |
| Option C: | Corrosion should not be localized but uniform |
| Option D: | Anode should not be painted. |
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| 48. | In galvanic cell ------ energy is converted into ------ energy. |
| Option A: | Chemical into electrical energy |
| Option B: | Electrical into Chemical energy |
| Option C: | Chemical into Chemical energy |
| Option D: | Electrical into Electrical energy |
|  |  |
| 49. | Corrosion between two dissimilar metals in electrical contact is which type of corrosion |
| Option A: | Differential aeration corrosion |
| Option B: | Galvanic corrosion |
| Option C: | Liquid metal corrosion |
| Option D: | Oxygen concentration cell corrosion |
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| 50. | Standard Hydrogen electrode is arbitrarily assigned ----- potential |
| Option A: | Zero |
| Option B: | Two |
| Option C: | One |
| Option D: | Three |
|  |  |
| 51. | When cathodic area is large and anodic area is small then corrosion is known as |
| Option A: | Galvanic corrosion |
| Option B: | Concentration cell corrosion |
| Option C: | Pitting corrosion |
| Option D: | Dry corrosion |
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| 52. | In atmospheric corrosion, which film is developed over Aluminum, Titanium and Vanadium |
| Option A: | Stable porous film |
| Option B: | Volatile film |
| Option C: | Unstable film |
| Option D: | Stable Non porous film |
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| 53. | Intergranular corrosion is also known as |
| Option A: | Galvanic corrosion |
| Option B: | Dry corrosion |
| Option C: | Grain boundary corrosion |
| Option D: | Wet corrosion |
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| 54. | Which of the following constituent is measured in both proximate and ultimate analysis? |
| Option A: | Moisture |
| Option B: | Ash |
| Option C: | Volatile matter |
| Option D: | Nitrogen |
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| 55. | Which of the following are principal constituents of fuel |
| Option A: | Carbon and Hydrogen |
| Option B: | Oxygen and hydrogen |
| Option C: | Sulphur and Oxygen |
| Option D: | Sulphur and Hydrogen |
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| 56. | Quality of petrol is decided by it’s |
| Option A: | Cetane number |
| Option B: | Octane number |
| Option C: | Carbon number |
| Option D: | Hydrogen number |
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| 57. | Which of the following method is used for nitrogen estimation |
| Option A: | Precipitation method |
| Option B: | Combustion method |
| Option C: | Kjeldahl’s method |
| Option D: | Titration method |

**Descriptive Section**

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|  | A sample of coal has the following composition by mass:  C = 85%, H = 6%, O = 8%, S = 0.5% and Ash = 0.5%. Calculate HCV and LCV using Dulong’s Formula. Given Atomic Weights: C=12, H = 1, S = 32, O = 16 |
|  | Discuss differential aeration corrosion with the help of a suitable example. |
|  | Explain the conventional and Green route of manufacturing Carbaryl. Highlight the green chemistry principle involved. |
|  | Define Spectroscopy and Electromagnetic spectrum. Also explain the origin of spectrum. |
|  | The standard emf of the following cell is 0.462 V.  Cu(s) / Cu+2 (aq)(1M) // Ag+(aq)(1M) / Ag(s)  Write the cell reaction. If the standard potential of Cu electrode is 0.337 V, what is the standard potential of Ag electrode? |
|  | What is cathodic protection? What are the two types of cathodic protection? Discuss any one with the help of a suitable diagram. |
|  | Calculate the percentage atom economy for the following reaction with respect to acetanilide.  C6H5NH2 + (CH3CO)2O C6H5NHCOCH3 + CH3COOH  Given Atomic Weights: C = 12, H = 1, O = 16, N = 14 |
|  | Calculate the volume of air required for complete combustion of 1m3 of gaseous fuel having the following composition: CO = 5%, C2H4 = 10%, CH4 = 40%, N2 = 2.5 %, H2 = 35%, CO2 = 2%, O2 = 2.5%  Given Atomic Weights: C = 12, H = 1, O = 16, N = 14 |
|  | How do the following factors affect the rate of corrosion:  (i) relative areas of anodic to cathodic part  (ii) position of metal in galvanic series. |
|  | (i) Distinguish between anodic and cathodic coating.  (ii) What is Biodiesel? Give the trans-esterification reaction of the preparation of Biodiesel. |
|  | Explain the conventional and Green route of manufacturing Adipic acid. Highlight the green chemistry principle involved. |
|  | Give in tabular form the relation between electromagnetic spectrum, types of spectroscopy and corresponding energy changes. |
|  | What is an electrochemical cell? What are the types of electrochemical cell? Briefly discuss the different types. |
|  | What is green chemistry? Explain the principle of ‘Designing safer chemicals and products’ and the principle of ‘Use of renewable feedstocks’. |
|  | (i) 1 g of coal sample was used for determination of nitrogen by Kjeldhal’s method. The ammonia evolved was passed into 50 ml of 0.1 N H2SO4. The excess acid required 42 mL of 0.1 N NaOH for neutralisation. Calculate the percentage of N in the sample.  (ii) One of the design and material selection principle is ‘ the anodic material should not be painted or coated’ . Give reason for the same. |
|  | Discuss season cracking. |
|  | What are ‘oxygenates’ used in the fuel industry? Where and why are they added? Explain by giving examples. |

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|  | By kjeldahl’s method 3 gm of coal sample was analysed. The ammonia evolved was absorbed in 40 ml of 0.5 N H2SO4. After absorption, the excess H2SO4 required 18.5 ml of 0.5N KOH for neutralization. A coal sample was subjected to ultimate analysis 2.45 g of coal on combustion in a Bomb-Colorimeter gave 0.67 of BaSO4. Calculate percentage of Nitrogen and sulphur. |
|  | Discuss Bimetallic corrosion with the help of a suitable example |
|  | Explain the conventional and Green route of manufacturing indigo dye. Mention the green chemistry principles involved. |
|  | Explain construction and working of SHE with neat and labeled diagram. |
|  | Explain different types of electromagnetic radiations. |
|  | Draw a diagram of a cell made up of aluminium and silver half cells. Give representation of the cell along with electrode reactions. |
|  | Calculate the volume and weight of air required for complete combustion of 1m3 of  gaseous fuel having the following composition: CO = 10%, C3H8 = 12%, CH 4 =  30%, N 2 = 3 %, H 2 = 40%, CO2 = 3%, O2 = 2.0% (Molecular weight of air =28.949). |
|  | How do the following factors related to nature of environment affect corrosion? i) Anodic and Cathodic area ii) Purity of metal |
|  | Find atom economy of the reaction with respect to 2-methyl propene. |
|  | Explain ‘Selection rules’ that basically decide which transitions are ‘allowed or forbidden’ in spectroscopy |
|  | Distinguish between Octane number and Cetane number |
|  | 1. Explain the principle of ‘use of catalytic reagent’ with respect to green chemistry. 2. How would you synthesize benzimidazole using green catalyst. |
|  | Calculate the minimum amount of air required for the complete combustion of 1 kg of fuel containing C= 80%, H= 6%, O=8%, S= 1.5%, H2O= 1.0%, N= 1.5% and ash= rest. |
|  | Explain why a “pure Zinc metal rod half immersed in saline water starts corroding at the bottom” Explain with neat diagram, reactions & corrosion product formation. |
|  | Explain construction and working of a reference electrode which is used in pH meter. |
|  | Write cell reaction and calculate the standard emf of the following cell.  Cd(s)│ Cd +2 (aq)(1M)║ Ni2+ (aq)(1M)│Ni(s)  If the standard potential of Cd electrode is -0.40 V and the standard potential of Ni electrode is -0.25 V |
|  | Write a note on Catalytic converter with the help of chemical reactions. |
|  | 1. Give significance of determination if moisture in coal. 2. What is season cracking? |
|  | Which molecule is used as a component in various therapeutic drugs? Give any one traditional and green synthesis of the same. |
|  | Write the Nernst Equation and calculate Emf of the following cell at 298K:  Mg(s)/Mg2+(0.001M) || Cu2+(0.0001M)/Cu(s).  = 0.34 V and = -2.37 V |
|  | With the help of traditional and green synthesis of ibuprofen, list the principles of green chemistry involved in it. |
|  | What is knocking? How is knocking of gasoline related to chemical structure of hydrocarbons present in it? Define octane rating. |
|  | A sample of coal was found to contain C = 80%, H = 5%, O = 1%, N = 2%, Ash=12%. Calculate the minimum amount of air required for complete combustion of 1kg of coal sample. |
|  | Draw the energy level diagram showing various molecular energies and explain why molecular spectra contains broad bands whereas atomic spectra consist of sharp lines. |
|  | A cell uses Zn2+/Zn and Ag+/Ag electrodes. Write the cell representation, Half-cell reactions, Net cell reactions and calculate the standard Emf of the cell.  = -0.76 V and = 0.8 V |
|  | Define Green chemistry. As per Green chemistry Principles, why is it essential to design energy efficient process. Explain with suitable examples. |
|  | What is oxidation corrosion. Name the different types of oxide layer formed and state which oxide layers are non-protective in nature. Explain with suitable examples. |
|  | Determine C, H, N elements as % from the following observations in experiments of analysis of coal.  0.25g coal on burning in a combustion tube and passing the gases through tubes containing anhydrous CaCl2 and KOH increases their weight by 0.09 g and 0.8g respectively. In Kjeldahl’s method, ammonia evolved by 0.42g coal was absorbed in 49.5ml of 0.12 N HCl solution. After absorption, the excess acid required 36.5ml of 0.12 N NaOH for neutralization. |
|  | What are antiknocking agents? Explain the factors affecting antiknocking characteristics of a compound |
|  | What is electrochemistry? Write the cell reaction and Calculate the standard emf of the following cell *(****5)***  Zn(s)│ (1M)││ (1M)│Cu(s) = -o.763 V and = 0.337 V |
|  | What is Green Chemistry? Calculate percentage atom economy for the following reaction with respect to acetophenone ***(5)***  **C6H6 + CH3COCl C6H5COCH3 + HCl**  **Acetophenone**  (Atomic weights: C=12, H=1, O=16, Cl=35.5) |
|  | Define corrosion. Explain sacrificial anode method with suitable diagram. ***(5)*** |
|  | Calculate the weight and volume of air required for complete combustion of 1 kg of coal containing  C=65%, H=4%, O=7%, N=3%, moisture=15% and remaining is ash. (molecular weight of air=28.94 gm) ***(5)*** |
|  | Give the classification of Spectroscopy based on atomic level of study**.**  Distinguish between absorption and emission spectra. ***(2+3)*** |
|  | What is metallic coating? Differentiate between Galvanizing and Tinning. ***(5)*** |
|  | List 12 principles of Green Chemistry. Explain Biodiesel as a Green fuel ***(5)*** |
|  | List the factors affecting the rate of corrosion. Explain Galvanic cell Corrosion ***(5)*** |
|  | 3.2 gm of coal in Kjeldahl’s experiment evolved NH3 gas was absorbed in 40 ml of 0.5 N H2SO4. After absorption the excess acid required 16 ml of 0.5N NaOH for complete neutralization. 2.5 gms of coal sample in quantitative analysis gave 0.42 gm BaSO4. Calculate the % N and S. ***(5)*** |
|  | Define spectroscopy and explain different regions of electromagnetic spectrum with the help of diagram |
|  | What is Electrochemistry? Differentiate between electrolytic cell and Galvanic cell |
|  | List the 12 Principles of Green chemistry and calculate % atom economy for the following reaction with respect chlorobenzeneC6H6 +Cl2 C6H5Cl + HClAtomic weight C = 12, H = 1, Cl = 35.5 |
|  | What is Electrochemical corrosion? Explain Hydrogen evolution mechanism with the help of diagram |
|  | Calculate the amount of air needed for complete combustion of 1Kg of coal containing C = 65%, H = 13 %, O = 6 %, N = 2% S = 4% |
|  | Give construction and working of hydrogen-oxygen fuel cell with the help of diagrams and reactions. |
|  | What is standard potential? Calculate standard emf of following cellZn(s)|Zn2+ (aq) (1M) || Cu2+(aq) (1M) |Cu(s)Given E0 Zn =-0.763 V and E0 Cu = 0.337V |
|  | Explain the mechanism of ‘Rusting of iron in water’ with the help of diagram and reactions. |
|  | Explain sacrificial anode method for prevention of corrosion with the help of diagram and also distinguish between Galvanizing and Tinning |
|  | What is Fuel? and what are ideal characteristics of fuel. Give classification of fuels. |