Final Assessment Test – April 2019

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Course: CHY1701 - Engineering Chemistry

Class NBR(s): 3977 / 3983 / 4054 / 4060 / 4067 / 4073 / 4087 / 4092 / 4098 / 4101 / 4181 / 6051

Slot: A1+TA1

Time: Three Hours

Max. Marks: 100

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. a) Discuss the, principle and procedure with a diagram to determine the calorific value of a gaseous fuel using Boys Calorimeter. [5]

b) A fuel has the following composition of different elements: C = 92%; H_2 = 4%; O_2 = 2% ; S= 0.5%; N_2= 0.5% and rest is non-combustible matter Calculate the minimum weight of air required for complete combustion of 1 Kg of the fuel. [5]

2. Discuss the principle of electroplating with a relevant example. What is the significance of optimum current density, throwing power, pH and addition of wetting agents during electroplating?

3. Write the principle and process of mixed bed ion exchange technique of water treatment with a diagram. On what basis the regeneration is accomplished? What is its advantage over conventional ion exchange method?

4. Explain with equations all the disinfection methods where HOCl or nascent oxygen is generated as strong bactericides. How is UV method advantageous over the above methods?

5. a) Explain with diagrams, the corrosive or protective nature of the oxides of Mo, Fe and Cu. [6]

b) What will be the fate of iron when a crack develops on (a) zinc coated iron and (b) tin coated iron? [4]

6. Discuss the intercalation mechanism of secondary lithium ion batteries with relevant equations and diagram. Can secondary lithium batteries be used as implants? Justify your answer.

7. Discuss the knocking mechanism, properties and function of additives used for antiknocking in a diesel engine. What is cetane number? How is it related to the quality of diesel? Why diesel cannot be used in a petrol engine?

8. a) What is the role of a dye in Gratzel cell? Discuss the mechanism with a diagram. [5]

b) Define DO. What should be the standard value for DO in potable water? Why DO of distilled water is higher than that of carbonated soft drinks? [5]

9. a) What makes Teflon as tough as a thermosetting polymer? List out its uses. [5]

b) Which articles can be moulded using Extrusion method? Explain the technique with a diagram. [5]

10. a) A water sample contains 24.3 ppm of $Ca(HCO_3)_2$, 7.3 ppm of $Mg(HCO_3)_2$, 13.6 ppm of $CaSO_4$ and 9.6 ppm of $MgCl_2$. Calculate the total hardness of the water sample. TDS of the sample is 550 ppm. What will be the TDS after the water is boiled, cooled and filtered? [5]

b) What is caustic embrittlement? Give any two methods to prevent it. [5]

11. a) Illustrate the eutectic point and composition of Fe-C alloy with the help of phase diagram. [5]

b) Illustrate electroless plating with an example. Elaborate its advantages over electroplating. [5]

12. Discuss the working of SOFC with relevant diagram and reactions. Give details of cathode, anode and electrolyte used to construct SOFC. What precautions need to be taken while selecting the ceramic material for SOFC? What are the advantages and disadvantages of SOFC over HOFC?

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