Applied Chemistry 2 - Dec 17

First Year Engineering (Semester 2)

Total marks: 80
Total time: 3 Hours

INSTRUCTIONS
1]Question 1 is compulsory.
*2]Attempt any **three** from the remaining questions.*
3]Use suitable data wherever required.
4]Figures to the right indicate full marks.
5] Atomic wt:Al=27,Ca=40,S=32,Cl=35.5,Fe=56,K=39,C=12,N=14,O=16,Na=23,Mg=24

1(a) Select the compound which posses highest octane number and highest cetane number out of n-heptane, n-octane and isooctane. (3 marks)

1(b) Iron does not rust even if the zinc coating is broken in a galvanized iron pipe. Give reasons.(3 marks)

1(c) Calculate the higher and lower calorific values of coal sample containing 84% carbon 1.5% sulphur, 0.6% Nitrogen, 5.5% hydrogen and 8.4% oxygen. (3 marks)

1(d) What are the drawbacks of plain carbon steel. (3 marks)

1(e) Explain the principle 'Prevention of waste ' In Green Chemistry. (3 marks)

1(f) Define and classify composite materials. (3 marks)

1(g) Mention three functions of thinner in paint. (3 marks)

2(a) Define corrosion of metals. Explain the electrochemical theory of wet corrosion, giving its mechanism. (6 marks)

2(b).i 1.56 g of a coal sample was Kjeldahised and NH_3 gas thus evolved was absorbed in 50 ml of 0.1N H_2SO_4. After absorption the excess and required acid required 6.25 mL of 0.1N N_3OH for exact neutralized. Calculate the percentage of N in the coal sample. (3 marks)

2(b).ii What is super critical CO2CO2? Why is it considered a green solvent. (2 marks)

2(c) Write a short note on Particle reinforced composites. (4 marks)

3(a) What is Cracking. With the help of diagram explain Fixed Bed Catalytic cracking. (6 marks)
3(b).i Write a brief note on Heat resistant steel (3 marks)

3(b).ii A metal rod half immersed in water starts corroding at the bottom. Give reasons. (2 marks)

3(c) Calculate the % atom economy of the following reaction w.r.t the product Allyl Chloride. (4 marks)
$CH_3-CH=CH_2 \rightarrow Cl-CH_2-CH=CH_2 + HCl$ (allylchloride)

4(a) How do the following factors affect the rate of corrosion:
   (i)pH of medium   (ii) Ratio of anode to cathode areas

   (iii) Position of metal in galvantic series   (6 marks)

4(b).i Write a brief note on products obtained from natural materials.   (3 marks)

4(b).ii Define structural composites   (2 marks)
4(c) Define Shape memory Alloys and mention its applications (at least four)   (4 marks)

5(a) A sample of coal was found to contain the following constituents C=81% , O=8% S=1% H=5% N=1% and Ash =4%. Calculate the minimum weight and volume of an required for the complete combustion of 1kg of coal.   (6 marks)

5(b).i Discuss in brief sacrificial anode method of corrosion protection.   (3 marks)

5(b).ii What is powder metallurgy? Mention any two advantages and two limitations of powder metallurgy.   (2 marks)

5(c) Explain with suitable equations conventional and green synthesis of carbaryl. Also mention the principle of green chemistry involved.   (4 marks)

6(a) Mention the composition, properties and uses of : i) Duralumin ii) German Silver . iii) Gun metal.

                     (6 marks)

6(b).i Mention the advantages of composite materials.   (3 marks)

6(b).ii Distinguish between anodic and cathodic coating.   (2 marks)

6(c) What is biodiesel? Discuss the method to obtain biodiesel. What are the advantages of biodiesel?

                     (4 marks)