



Applied Chemistry 2 - May 2016

First Year Engineering (Semester 2)

TOTAL MARKS: 60
TOTAL TIME: 2 HOURS

- (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.

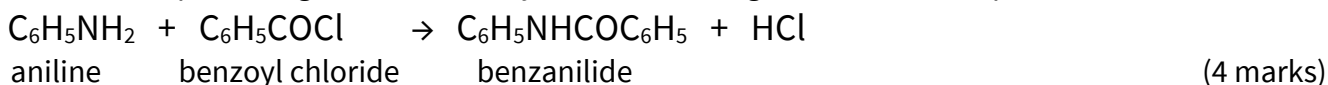
Answer any five of the following

- 1(a)** What are plain carbon steels? Mention any four drawbacks of plain carbon steels. (3 marks)
- 1(b)** Define Octane number and Cetane number. (3 marks)
- 1(c)** Define 'Corrosion' ? Explain how rate of corrosion of the following metals is influenced by atmospheric oxygen.
(i) Molybdenum (ii) Tin (3 marks)
- 1(d)** Give classification of composite materials. (3 marks)
- 1(e)** Mention any three constituents of paint and give their functions. (3 marks)
- 1(f)** What is supercritical CO₂ ? Why is it considered a green solvent? Give one application of supercritical CO₂ (3 marks)
- 1(g)** A sample of coal has the following composition by mass :
C=70% H=9% O=4%
S=2% N=1% and Ash=14%
Calculate gross calorific value of the fuel using Dulong's formula. (3 marks)
- 2(a)** How do the following factors affect the rate of corrosion?
(i) Purity of metal
(ii) Nature of corrosion products (iii) Overvoltage (6 marks)



2(b) What are propellants? Give their classification with an example of each type. Mention any four characteristics of a good propellant. (5 marks)

2(c) Calculate percentage atom economy for the following reaction with respect to benzanilide



3(a) A gaseous fuel has the following composition by volume.

CO=40% H₂=42% C₃H₈=4% CH₄=4% N₂=4% and O₂=6%

Calculate volume and weight of air required for complete combustion of 1m³ of fuel (Molecular wt. of air =28.949) (6 marks)

3(b) Explain conventional & green synthesis of Indigo dye. Mention the green chemistry principle involved. (5 marks)

3(c) Explain Intergranular corrosion with a suitable diagram and example. (4 marks)

4(a) List composition, properties and uses of the following alloys:

(i) Duralumin (ii) Gun metal (6 marks)

4(b) What are metallic coatings? Explain the following methods of coating.

(i) Metal cladding (ii) cementation coating (Sherardizing) (5 marks)

4(c) What are glass fibre reinforced composites? Outline their properties, application and limitations. (4 marks)

5(a) With neat diagram, explain any one method of catalytic cracking. Mention any four advantages of catalytic cracking over thermal cracking. (6 marks)

5(b) What is 'compaction' in powder metallurgy? Explain Powder Injection moulding method of compaction with a suitable diagram. (5 marks)

5(c) Define matrix phase of composite material. State functions of matrix phase. (4 marks)

6(a) What is Electrochemical corrosion? With suitable diagram and electrode reactions explain electrochemical mechanism of rusting of iron in neutral. Aqueous medium. (5 marks)

6(b) 1.5 g of a coal sample was analysed for nitrogen content by Kjeldahl's method. The liberated ammonia required 14 ml of 0.1N H₂SO₄ solution for neutralization. In a separate experiment using Bomb Calorimeter, 1.5g of the same sample gave 0.3g of BaSO₄. Calculate percentage nitrogen and sulphur in the sample. (5 marks)

6(c)(i) Explain any two purposes of alloying with suitable examples. (2 marks)

6(c)(ii) Explain manufacture of high purity alumina ceramic powder. (3 marks)

