

2E3202

Roll No. _____

Total No. of Pages: 3

2E3202

B. Tech. II - Sem. (Main / Back) Exam., - 2023

2FY2 - 03 Engineering Chemistry

Maximum Marks: 70

Time: 3 Hours

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

PART - A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 Why should an ideal fuel have moderate ignition temperature?
Q.2 What type of dissolved impurities are present in water?
Q.3 What do you mean by the term 'Disinfection'?
Q.4 What is octane number?
Q.5 What are the consequences of corrosion?
Q.6 Define viscosity index.
Q.7 What are the constituents of Portland cement?

Q.8 Define glassy state of matter.

Q.9 Why gypsum is added to cement?

Q.10 Why the complex of $\text{Ca}^{+2}/\text{Mg}^{+2}$ with EDTA is more stable than the complex of $\text{Ca}^{+2}/\text{Mg}^{+2}$ with EBT?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Explain thin layer mechanism of lubrication.

Q.2 Explain in brief, chemistry of setting & hardening of cement.

Q.3 What are (a) Electrophilic reagents (b) Nucleophilic reagents, give two example of each.

Q.4 What is fuel? Give the different types of fuel. What are the requirement of fuel to be used in an industry?

Q.5 Discuss various chemical method for disinfection of water.

Q.6 A sample of coal was found to have the following composition by weight -

C = 70%, O = 14%, H = 6%, N = 5% & rest is ash

Calculate gross & net CV of coal by Dulong's formula.

Q.7 Why annealing is required in the manufacturing of glass?

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 What is corrosion? Discuss the mechanism of electrochemical corrosion.
- Q.2 Describe hot lime-soda process for water softening, give the chemical reactions involved in it.
- Q.3 What are the different types of organic reactions? Explain them with an example.
- Q.4 What is glass? Discuss the manufacturing of ordinary glass.
- Q.5 Draw neat & labelled diagram and explain coke manufactured by Otto-Hoffmann's method.
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1E3103

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY2 – 03 Engineering Chemistry**Time: 3 Hours****Maximum Marks: 70***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 What is carbonate hardness?
- Q.2 What is phosphate conditioning?
- Q.3 Properties and uses liquid fuel.
- Q.4 Define cetane number.
- Q.5 Cathodic protection of metal.
- Q.6 Give proportion basic constitution of cement.
- Q.7 Importance of lubrication in machines.

- Q.8 Properties and uses of hard glass.
Q.9 Discuss elimination reaction with example.
Q.10 Why fire point is higher than flash point?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Analysis report of water is as per the following –
 $\text{Mg (HCO}_3)_2 = 73\text{mg/litre ; MgSO}_4 = 60\text{mg/Litre}$
 $\text{CaCl}_2 = 111\text{mg/litre ; CaCO}_3 = 50\text{mg/Litre}$
 $\text{HCO}_3 = 122\text{mg/litre ; H}_2\text{CO}_3 = 100\text{mg/Litre}$
Calculate the requirement Lime and Soda for softening 1,00,000 Litres of water.
- Q.2 Calculate the gross and net calorific values of coal sample with following composition - <https://www.rtuonline.com>
 $\text{C} = 85\% ; \text{H} = 5\% ; \text{O} = 2\% ; \text{S} = 1\% ; \text{N} = 2\% ; \text{Ash} = 5\%$
- Q.3 Explain galvanic corrosion with proper example.
- Q.4 Discuss the importance of Lime saturation factor and Silica Modulus in cement manufacturing.
- Q.5 Discuss the cloud point and pour point of lubricating oil with its importance.
- Q.6 Explain break point chlorination method of sterilization.
- Q.7 Describe the mechanism of free radical halogenation of alkenes.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 What is water softening? Describe water softening by zeolite method with labelled diagram. [10]
- Q.2 Define coke. Explain Otto-Hoffmann by Product Oven Method for making coke. [10]
- Q.3 (a) Explain the mechanism of electrochemical net corrosion with example. [7]
(b) What is pilling - bedworth rule. [3]
- Q.4 (a) Explain the property of setting and hardening of cement. [7]
(b) Role of gypsum addition in cement. [3]
- Q.5 (a) Explain the manufacturing, properties and uses of Paracetamol. [7]
(b) Importance of drugs in daily life. [3]
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11N503

Roll No.

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B. Tech. I - Sem. (New Scheme) Main Exam., July – 2022
1FY1 – 03 Engineering Chemistry
Common to all Branches

Time: 2 Hours**Maximum Marks: 70****Min. Passing Marks:****Instructions to Candidates:**

Part – A: Short answer questions (up to 25 words) 5×3 marks = 15 marks. Candidates have to answer 5 questions out of 10.

Part – B: Analytical/Problem Solving questions 3×5 marks = 15 marks. Candidates have to answer 3 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving questions 2×20 marks = 40 marks. Candidates have to answer 2 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**PART- A**

- Q.1 What is carbonate hardness?
- Q.2 Enlist methods for removal of carbonate and non-carbonate hardness of water.
- Q.3 Mention composition and properties of Flint glass and Pyrex glass.
- Q.4 Discuss role of gypsum in cement.
- Q.5 What are green solvents?
- Q.6 Enlist alternation sources of energy.

[11N503]

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- ~~Q.7~~ Mention classification of coal with carbon content.
- ~~Q.8~~ Define gross and net calorific value of coal.
- ~~Q.9~~ Discuss briefly ultimate analysis of coal and its applications.
- Q.10 What is green energy?

PART- B

- Q.1 What is boundary lubrication? What is its importance?
- ~~Q.2~~ How is disinfection of water carried out? Mention various methods.
- Q.3 Draw flow diagram of steps involved in cement manufacture by Vertical Shaft Kiln technology. Write a few lines also.
- ~~Q.4~~ Explain working of Redwood viscometer with the help of neat diagram.
- Q.5 Why is small amount of ethylene dibromide along with TEL used in IC engines?
- Q.6 Calculate weight and volume of air required for carbonization of 3 kg carbon.
- ~~Q.7~~ Describe manufacture and uses of producer gas.

PART-C

- ~~Q.1~~ What is anodic protection? How does it work?
- ~~Q.2~~ What is diversification of glass? What is importance of annealing in glass manufacture? What is importance of borosilicate glass in industry?
- Q.3 Write structure of graphite. Based on this, suggest why is this used as a solid lubricant?
- Q.4 Discuss concept of green chemistry in pollution prevention in industry. What is pollution prevention hierarchy?
- ~~Q.5~~ Percentage composition of a sample of bituminous coal was found to be as follows –
 C=75.4%, H=5.3%, O=12.6%, N=3.2%, S=1.3% and remaining % of ash content.
 Calculate minimum weight of air necessary for complete combustion of 1.0 kg of coal and the % composition of dry products of combustion (by wt.).

1E3103**1E3103**

B.Tech. I Sem. (Main) Examination, April/May - 2022
1FY2-03 Engineering Chemistry

Time : 3 Hours**Maximum Marks : 70****Instructions to Candidates:**

Attempt all ten questions From Part A, five Questions out of seven questions from Part B and three questions out of five questions from Part C .

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination (As mentioned in form No. 205).

PART - A

(Answers should be given up to 25 words only)

All questions are compulsory.

(10×2=20)

1. What principle is applied to remove the hardness of water by lime-soda process?(2)
2. Why do we express hardness of water in terms of calcium carbonate equivalent? (2)
3. What is sweetening of petrol? (2)
4. Why is net calorific value less than gross calorific value? (2)
5. What is pilling - Bedworth rule? (2)
6. A steel screw in a brass marine hardware corrodes. Give reason. (2)
7. What should be the flash-point of a good lubricant? (2)
8. What will happen, if gypsum is not added during grinding of clinkers? (2)
9. In S_N^1 reaction, racemization occurs if the reaction Occurs at a stereogenic centre. However, 50:50 mixture of enantiomers are rarely obtained , why? (2)
10. Why do substitution reactions occur in benzene? (2)

1E3103/2022**(1)****[Contd....**

PART - B

(Analytical/Problem solving questions)

(5×4=20)

Attempt any five questions:

1. Calculate the temporary and total hardness of a sample of water containing $Mg(HCO_3)_2 = 73mg/L$; $Ca(HCO_3)_2 = 162mg/L$, $MgCl_2 = 95mg/L$, $CaSO_4 = 136mg/L$. (4)
2. Calculate the gross and net calorific value of coal sample having the following composition:
 $C=80\%$, $H=7\%$, $O=3\%$, $S=3.5\%$, $N=2.1$ and $ash = 4.4\%$ (4)
3. Iron does not rust if the zinc coating is broken in a galvanized iron pipe, but rusting occurs much faster if the tin coating over iron is broken. Explain. (4)
4. Under what situations greases are used? What are the main functions of soap in Greases? (2+2=4)
5. Write the chemistry of setting and hardening of cement. (4)
6. What is annealing of glass? Write significance of annealing of glass. (2+2=4)
7. Describe synthesis, properties and uses of Aspirin. (4)

PART - C

(Descriptive/Analytical/Problem solving/Design Questions))

Attempt any three questions.

(3×10=30)

1. a) Describe the calgon and phosphate conditioning of water to overcome the boiler feed problem. <https://www.rtuonline.com>
b) Calculate the amount of lime and soda required for softening 100000 litres of water containing the following:
 $HCl = 7.3mg/L$, $Al_2(SO_4)_3 = 34.2mg/L$, $MgCl_2 = 9.5mg/L$,
 $NaCl = 29.25mg/L$.
Purity of lime is 90% and that of soda is 98%. 10% of chemicals are to be used in excess in order to complete the reaction quickly. (5+5=10)
2. a) Describe the manufacturing of gasoline by Fisher-Tropsch method in detail. Draw neat and labelled diagram of the process.
b) A sample of coal was found to contain the following constituents; $C = 81\%$, $O=8\%$, $S=1\%$, $H = 5\%$, $N=1\%$, $ash=4\%$. Calculate the minimum weight and volume of air required for the complete combustion of 2 kg of coal.

(5+5=10)

3. a) Describe the mechanism of electrochemical corrosion by hydrogen evolution and oxygen absorption.
b) Explain impressed current cathodic protection method of controlling corrosion.

(7+3=10)

4. Write notes on:

- a) Extreme-pressure lubrication.
b) Chemical reaction involved during manufacture of portland - cement by rotary kiln method.
c) Borosilicate glass and glass wool.

(3+4+3=10)

5. Explain mechanism of electrophilic and free radical addition in alkenes. **(5+5=10)**