

- N.B. (1) Question No. 1 is compulsory.  
 (2) Attempt any three from remaining five questions.  
 (3) All questions carries equal marks.  
 (4) Atomic weight :—

H = 1,	Cl = 35.5,
C = 12,	Ba = 137.3,
N = 14,	Mg = 24,
O = 16,	Na = 23,
S = 32,	Ca = 40

1. Answer any five from the following :—

15

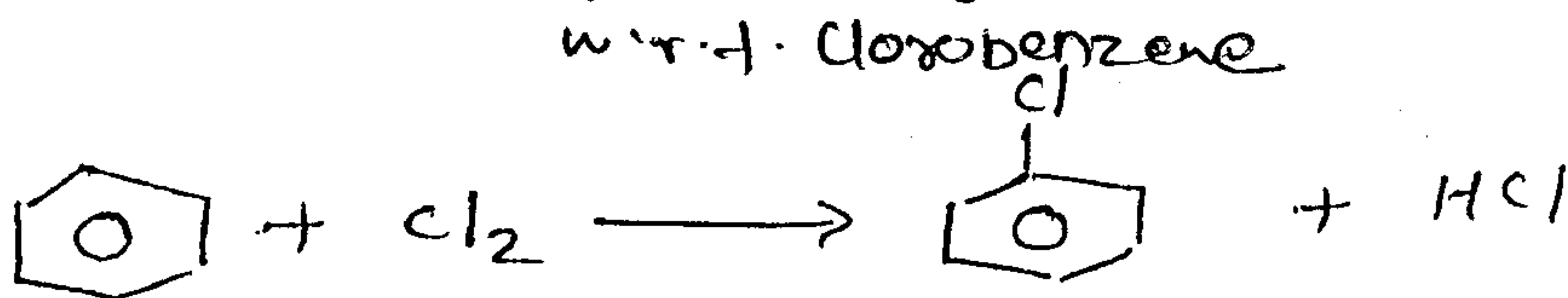
- Why silver, gold and platinum do not undergo oxidation corrosion ?
- Define Octane number and Cetane number. Give their significance.
- Give the composition, properties and uses of German silver.
- Give classification of composite material.
- What is Green chemistry ? List the 12 principles of Green chemistry.
- State the characteristics of a good paints.
- A coal sample was subjected to ultimate analysis, 0.6 gm of coal on combustion in a Bomb calorimeter, produces 0.05 gm BaSO<sub>4</sub>. Calculate the percentage of 'S' in coal sample.

- What are metallic coatings ? Distinguish between Galvanizing and Tinning.
- Explain refining of petroleum with suitable diagram.
- Calculate % atom economy for following reactions :—

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- A coal sample has the following composition by weights : C = 82%, H = 3%, O = 8%, S = 2%, N = 2% and Ash = 3%. Calculate the minimum amount of air required both by weight and volume for complete combustion of 2 kg of coal. (mol-wt. of air = 28.949 gm).
- Explain traditional and greener route of production of Indigo dye. By this reactions which principle of green chemistry is shown ?
- How is the rate of corrosion influenced by :—
  - pH of medium
  - Relative area of cathode and anode parts ?

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**Con. 6921-GS-5481-13.**

2

4. (a) Write a note on Compacting and Sintering. 6  
(b) Explain wet corrosion in acidic medium with schematic diagram and mechanism. 5  
(c) Explain Laminar composite with suitable ~~diagram~~ example. 4
5. (a) What is bio-diesel ? Explain the method to obtain bio-diesel from vegetable oil. 6  
Give advantages of bio-diesel as a fuel.  
(b) Distinguish between Brass and Bronze. 5  
(c) State the chemical factors influencing adhesive action. 4
6. (a) What is cathodic protection ? Describe impressed current method of corrosion control. 5  
(b) A gaseous fuel has the following composition by volume : 5  
 $H_2 = 10\%$ ,  $CH_4 = 30\%$ ,  $C_3H_8 = 20\%$ ,  $CO = 20\%$ ,  $CO_2 = 15\%$ ,  $N_2 = 5\%$ .  
Calculate the volume of air required for complete combustion of  $1m^3$  of this gas.  
(c) Explain the effect of following elements on alloying :— 5  
(i) Nickel  
(ii) Chromium  
(iii) Cobalt  
(iv) Molybdenum  
(v) Tungsten.