

# CHEMISTRY (Theory)

Time allowed : 3 hours

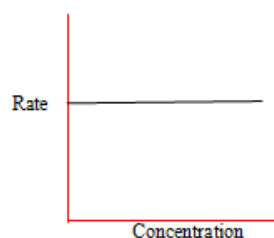
Maximum Marks : 70

## General Instructions :

- (i) *All questions are compulsory.*
- (ii) *Questions number 1 to 5 are very short answer questions and carry 1 mark each.*
- (iii) *Questions number 6 to 10 are short answer questions and carry 2 marks each.*
- (iv) *Questions number 11 to 22 are also short answer questions and carry 3 marks each.*
- (v) *Question number 23 is a value based question and carry 4 marks.*
- (vi) *Questions number 24 to 26 are long answer questions and carry 5 marks each.*
- (vii) *Use log tables, if necessary. Use of calculators is **not** allowed.*

1. One gram of pulverized wood burns faster than a gram piece of wood. Explain.

2. For a reaction, the graph of the rate of reaction against molar conc of the reactant is as shown. What is the order of reaction.

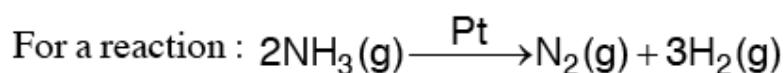


3. What is the role of pine oil in froth floatation process ?

4. What is the role of depressants in froth floatation process ?

5. What happens when hydrated ferric oxide and arsenious sulphide sols are mixed in almost equal proportions?

6



$$\text{Rate} = k$$

(i) Write the order and molecularity of this reaction.

(ii) Write the unit of k.

7. Show that half life period of a reaction is independent of a reaction.

8. What is rate of reaction ? Write two factors that affect the rate of reaction.

9. Name the fixed layer and the diffused layer

(1) when  $\text{AgNO}_3$  is added to KI

(2) When KI is added to  $\text{AgNO}_3$

10. Write chemical equations for the preparation of sols : (a) Gold sol by reduction.  
(b) hydrated ferric oxide sol by hydrolysis

11.

For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.

12. Describe the principle involved in the following metallurgical operations:

- (i) Electrolytic refining
- (ii) Froth-floatation process of concentrating sulphide ores
- (iii) Mond's Process for refining of Nickel

13 Account for the following

(a) How is copper extracted from a low grade ore of it?

(b) What is the composition of 'Copper matte'?

(c) **Why is reduction of metal oxide easier if metal formed is in liquid state at temperature of reduction**

14.

**Distinguish the following:**

**i) Roasting and calcination**

**ii) Electrolytic reduction and chemical reduction**

15.

Write the chemical reactions involved in the extraction of metallic silver from argentite.

16. Illustrate following :

(a) Although thermodynamically feasible, in practice, magnesium metal is not used for the reduction of alumina in the metallurgy of aluminium. Why ?

(b)

The reaction,



is thermodynamically feasible as is apparent from the Gibbs energy value.

Why does it not take place at room temperature?

17. Explain the following :

a) CO is a better reducing agent below 983 K Where as C IS a better reducing agent above 983 k.

b) Carbon and hydrogen are not used as reducing agents at high temperature.

c) what is pyrometallurgy?

18 Define

(i) Micelles(ii) Desorption (iii) colloidion

19. What happens : (a) by persistent dialysis of a sol. (b) when river water meets the sea water. (c) when alum is applied on cuts during bleeding

20.

The decomposition of hydrocarbon follows the equation

$$k = (4.5 \times 10^{11} \text{s}^{-1}) e^{-28000\text{K}/T}$$

Calculate  $E_a$ .

21. For the decomposition of azoisopropane to hexane and nitrogen at 543 K, the

following data are obtained.

$t$ (sec)	P(mm of Hg)
0	35.0
360	54.0
720	63.0

Calculate the rate constant.

22.

A first order reaction takes 10 minutes for 25% decomposition. Calculate  $t_{1/2}$  for the reaction.

(Given :  $\log 2 = 0.3010$ ,  $\log 3 = 0.4771$ ,  $\log 4 = 0.6021$ )

23. Colloidal solutions are used as medicines, are more effective because they have large surface area and are therefore easily assimilated

- Name a colloidal solution used in eye lotion.
- What is the use of colloidal gold
- What is Milk of magnesia? Give its use.

24.

(a) For a reaction  $A + B \rightarrow P$ , the rate is given by

$$\text{Rate} = k [A] [B]^2$$

- How is the rate of reaction affected if the concentration of B is doubled ?
  - What is the overall order of reaction if A is present in large excess ?
- (b) A first order reaction takes 23.1 minutes for 50% completion. Calculate the time required for 75% completion of this reaction.

$$(\log 2 = 0.301, \log 3 = 0.4771, \log 4 = 0.6021)$$

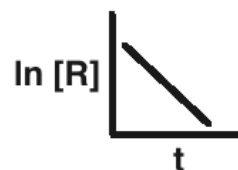
25. Explain the following observations:

- Lyophilic colloid is more stable than lyophobic colloid.
- Sky appears blue in colour
- Artificial rain is caused by spraying salt over clouds
- coagulation takes place when NaCl solution is added to a colloidal solution of ferric hydroxide.
- Write difference between physical adsorption and chemical adsorption.

26. For a certain reaction, variation in the concentration in  $[R]^n$  vs time plot is given in fig:

For this reaction write or draw

- What is the order of reaction?
- What are the units of rate constant K ?
- Give the relationship between  $k$  &  $t_{1/2}$
- What does the slope of line indicate?



(v) Draw the plot  $\{[R]_0 / [R]\}$  vs time