TM243801C

Reg. No :.....

Name :.....

MASTER'S DEGREE (C.S.S) EXAMINATION, FEBRUARY 2024

2022 ADMISSIONS SUPPLEMENTARY (SAY)

SEMESTER III - CORE COURSE Chemistry

CH3C11TM20 - Chemical Kinetics, Surface Chemistry and Photophysics

Time : 3 Hours

Maximum Weight : 30

Part A

I. Answer any Eight questions. Each question carries 1 weight (8x1=8)

1. Describe the principle of stopped flow technique used to determine the rate of very fast reactions.
2. Discuss the usefulness of flash photolysis technique.
3. Explain primary isotopic effect and secondary isotopic effect using a suitable example.
4. Define potential energy surface. Explain its significance.
5. Show that BET isotherm reduces to Langmuir adsorption isotherm under limiting conditions.
6. Deltas are formed at places where rivers pour water into sea. Examine.
7. Describe the technique of surface enhanced raman scattering.
8. Discuss the main causes of ozone layer depletion. Outline the protective measures.
9. Explain the principle laws of photochemistry.
10. List the important characteristics of excimers. Give one example.

Part B

II. Answer any Six questions. Each question carries 2 weight (6x2=12)

11. Explain the oscillatory reaction, Oregonator.
12. Calculate the specific reaction rate k at 556°C for the reaction: $2HI \rightarrow H_2 + I_2$. The activation energy for the reaction is 44000 cals; collision diameter is 3.5×10^{-8}.
13. Explain steady state treatment in chemical kinetics. Identify the two basic conditions in which the steady state approximation is applied to a chemical reaction.
14. Explain Primary Salt effect. How does primary salt effect differ from secondary salt effect?
15. 3g of silica was kept in contact with 1litre of a gas at 27°C. The pressure of the gas dropped from 600 to 300 Torr. Calculate the volume of the gas at STP that is adsorbed per gram of the adsorbent. Given, density of silica - 2.65 g/cc.
16. Explain the term surface pressure. Interpret the different types of surface films using F-A curves.
17. Explain the principle, theory and applications of Thermoluminescence.
18. Discuss thermoluminescence. List thermoluminescent materials and their uses.

Part C

III. Answer any Two questions. Each question carries 5 weight (2x5=10)

19. (a) Explain the salient features of RRKM theory. (b) Discuss the effect of pH on enzyme catalyzed reaction.
20. (a) Derive Bronsted –Bjerrum equation. (b) Explain protolytic mechanism with an example.
21. Discuss the principle and applications of Auger electron spectroscopy and Ion scattering spectroscopy.
22. (a) Discuss Quenching of fluorescence and its kinetics with suitable examples. (b) Differentiate E type and P-Type delayed fluorescence.