

Indian Institute of Science Education and Research- Kolkata

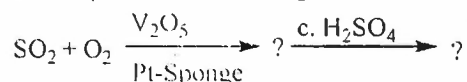
End Sem Exam. 3rd Year BS-MS and Int. PhD CH3201

Time-2h 30 mins

Full Marks-50

1. 2 main group elements react with PtF_6 to form compounds. What are those elements? Why do they react? Give those two reactions. (2+1+2=5)

2. Complete the following reaction:



Why is this reaction important? (1+1+1=3)

3. In liquid Sulphur viscosity increases from low temperature to high temperature and then it decreases again. Why? 2

4. Write the reaction for oxidation of water to oxygen. This reaction is said to be a critical step in harvesting energy from light if carried out photochemically. Why? How can you further trap this energy into chemical energy? How do plants do it regularly? (1+1+2+1=5)

5. Write water gas shift reaction. Why is this reaction important? Can it cater to our energy demands? How? (1+1+1+2=5)

6. Why are some oxides basic, some acidic and some amphoteric? Explain with examples. 3

7. You are given some dried clay. You add water and then it becomes mud which is like a gel, why? If you take a bit of that mud and dilute it further with water it becomes colloidal but never a solution. Why? (2+2=4)

8. Write Wittig reaction. Can you carry out Wittig reaction with N containing precursor instead of a P containing precursor? If yes how, if not why? (2+1=3)

9. You are asked to test for structural {MNO} linearity in a compound but you do not have crystals for that compound. How will you do it? 2

10. Draw the structure of $\text{Si}_3\text{O}_9^{m-}$ and $\text{Si}_6\text{O}_{18}^{n-}$. Furthermore find m and n. 4

11. What is Stoeber's method for synthesis of silica nanoparticles? 2

12. $\text{MX}_2 + \text{X}_2 \rightarrow \text{MX}_4$

For M= Ge, the reaction is very rapid at 25°C, for M= Sn, the reaction is slow and for M= Pb the reaction has to be carried out under extreme conditions. Identify X and explain why? 2

13. Write the structure of the following: C_{18} , C_{24} , C_{12}O_9 , $\text{Al}_6\text{O}_{18}^{6-}$, $\text{B}_3\text{O}_6^{3-}$. 5

14. What is a gas hydrate? Give 2 examples. Write the structure of the following: H_5O_2^+ , H_7O_3^+ , H_9O_4^+ . 5

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