



K22U 3430

Reg. No. :

Name :

I Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/
Improvement) Examination, November 2022

(2019 Admission Onwards)

CORE COURSE IN POLYMER CHEMISTRY

1B01 PCH : Theoretical and Inorganic Chemistry

Time : 3 Hours

Max. Marks : 40

Instruction : Answer the questions in English only.

SECTION – A

(Very short answer type. **Each** carries **1** mark. Answer **all 4** questions.)

1. Mention any two limitations of the Bohr model of atom.
2. As per the quantum mechanical model, the orbitals belonging to each shell in an atom are classified into subshells. Which quantum number distinguishes these subshells ?
3. What is the shape of PCl_3 molecule ?
4. Give an example of an antibiotic drug. (4×1=4)

SECTION – B

(Short answer type. **Each** carries **2** marks. Answer **7** questions out of 10.)

5. What is Heisenberg's uncertainty principle ? What is its significance in atomic structure ?
6. The orbital diagram representing the electronic configuration of Helium is $\boxed{\uparrow\downarrow}$.

1s

Similarly write the orbital diagram representing the electronic configuration of nitrogen. State the rule that governs the filling of electrons in its p-subshell.

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7. What is the state of hybridization of Cl in ClF_3 molecule ? Draw shape of ClF_3 molecule indicating the lone pairs, if any.
8. What is meant by electronegativity of an element ? What is the general trend of electronegativity of elements across a period, in the periodic table of elements ?
9. How is the atomic radius varying from Oxygen to Tellurium in the 16th group of the periodic table of elements ? Explain the possible reason for this variation.
10. What is radioactivity ? Name the three important radiations/particles emitted from radioactive elements.
11. What is artificial transmutation ? Give an example.
12. What are magic numbers in nuclear chemistry ?
13. What are antipyretics ? Give an example.
14. What are the essential raw materials used for the manufacture of Portland cement ? What are the chemical constituents provided by each of these materials ? (7×2=14)

SECTION – C

(Short essay type. **Each** carries **3** marks. Answer **4** questions out of 6.)

15. With the help of electronic configuration/orbital diagram, explain how carbon atom shows a covalency of four.
16. Write any three postulates of quantum mechanics.
17. What is meant by hybridization of atomic orbitals ? Explain the hybridization in CH_4 molecule.
18. Write a brief note on long form of periodic table of elements.
19. What is half-life of a radioactive substance ? Calculate the half-life of a radioactive substance whose disintegration constant is 0.003/year.
20. Comment on the importance of n/p ratio in the stability of nuclei. (4×3=12)



SECTION – D

(Long essay type. **Each** carries **5** marks. Answer **2** questions out of 4.)

21. Give a brief description and explanation of the atomic emission spectra of hydrogen with the help of energy level diagram indicating the electronic transitions corresponding to radiations of various series in the spectra.
22. a) The halogens belong to the 17th group in the periodic table. As we move down the group from fluorine to iodine, the physical states of the elements changes from gas to solid at 25°C. How will you explain this observation ? **2**
- b) In the 16th group, oxygen is a gas while sulphur is a solid. However, among their hydrides H₂S is a gas while H₂O is a liquid. What property/phenomenon is attributed for the high boiling point of water ? Explain the phenomenon. **3**
23. The first element of each group of the representative elements in the periodic table of elements shows anomalous behaviour. Illustrate with any two examples. Give the reason for the phenomenon.
24. What is glass chemically ? How ordinary glass is manufactured ? **(2×5=10)**

