



K19U 3309

Reg. No. :

Name :

I Semester B.Sc. Degree CBCSS(OBE)-Regular
Examination, November - 2019
(2019 Admission)
CORE COURSE IN CHEMISTRY
1B01CHE : THEORETICAL AND INORGANIC CHEMISTRY

Time : 3 Hours

Max. Marks : 40

Instructions : Answer the questions in English only.

SECTION - A

Answer **All** questions. Each question carries 1 mark. (4×1=4)

1. An orbital can accommodate only two electrons; this is a consequence of the rule called _____.
2. The lines of the Paschen series of the hydrogen spectrum arise from the electronic transitions from higher energy levels to the _____ Level.
3. The calculated bond order of O_2^+ is _____.
4. The energy released in the formation of a nucleus from its component nucleons is called _____.

SECTION - B

Answer any **Seven** questions. Each question carries 2 marks. (7×2=14)

5. Calculate the wavelength of the spectral line obtained in the Lyman series if the electron in the hydrogen atom has been excited to the 3rd energy level.
6. State and explain Hund's rule of maximum multiplicity.
7. State any two postulates of quantum mechanics.
8. Write the Born-Landé Equation and explain the terms.
9. Explain the structure of NH_3 on the basis of VSEPR theory.
10. Write the MO configuration of O_2 molecule and account for the type of magnetic behaviour shown by it.

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11. Define metallic bond on the basis of free electron model.
12. How does electronegativity vary along a period? Explain the variation.
13. What do you mean by Q values of nuclear reactions?
14. Neutrons are better particles for artificial transmutation than α particles. Why?

SECTION - C

Answer any **Four** questions. Each question carries **3** marks. (4×3=12)

15. Calculate the radius of the first Bohr orbit of a hydrogen atom and calculate the velocity and energy of an electron revolving in it.
[Given: $h = 6.626 \times 10^{-34}$ Js, $\epsilon_0 = 8.854 \times 10^{-12}$ C²m⁻¹J⁻¹, mass of electron = 9.109×10^{-31} kg, and electronic charge = 1.602×10^{-19} c.]
16. Discuss the Davison-Germer experiment on electron diffraction.
17. Describe the shape of SF₆ molecule on the basis of hybridization.
18. Define ionization enthalpy and discuss the factors that determine the ionization enthalpy of an element.
19. How Wilson-Cloud Chamber is used to detect and measure radio activity? Explain.
20. Write a note on radiocarbon dating and its applications.

SECTION - D

Answer any **Two** questions. Each question carries **5** marks. (2×5=10)

21. a) State and explain the de Broglie relation.
b) Discuss the dual nature of electrons.
c) What must be the velocity of a beam of electrons if they are to display a de Broglie wavelength of 10 nm? (2½+1½+2)
22. What is Born-Haber cycle? Discuss with respect to NaCl. Give any two applications of Born-Haber cycle (1½+1½+2)
23. a) Discuss the Mulliken scale of electro negativity.
b) Explain the terms: screening effect and effective nuclear charge. (2½+2½)
24. a) Discuss the applications of radioisotopes as tracers.
b) Write a short note on breeder reactors. (2½+2½)

I Semester B.Sc. Degree CBCSS (OBE) Reg./Sup./Imp.
Examination, November 2020
(2019 Admn. Onwards)
CORE COURSE IN CHEMISTRY
1B01CHE : Theoretical and Inorganic Chemistry

Time : 3 Hours

Max. Marks : 40

Instruction : Answer the questions in English only.

SECTION – A

Answer **all** questions. **Each** question carries 1 mark.

1. The wavelength of a light with wave number $2 \times 10^6 \text{ m}^{-1}$ is _____
2. The designation for an orbital with $n = 4$ and $l = 3$ is _____
3. The geometry of a molecule in which the central atom is in a state of sp^3d hybridization is _____
4. Among the three kinds of radioactive rays, _____ possess the highest ionizing power. (4×1=4)

SECTION – B



8. What are the factors favouring the formation of ionic bond ?
9. State and explain Schrodinger wave equation for the matter wave propagating in three dimensions.
10. Write the MO Configuration of N_2 molecule and account for the type of magnetic behaviour shown by it.
11. What are Van der Waals forces ? Name three types of Van der Waals forces.
12. How does electron affinity vary along a period ? Explain.
13. Write a note on magic numbers.
14. The half-life period of a radionuclide is 4.8 minutes. Calculate its decay constant.

(7×2=14)

SECTION – C

Answer **any four** questions. **Each** question carries **3** marks.

15. What are quantum numbers ? Give their significances.
16. Calculate the radius of the first Bohr orbit of a hydrogen atom and calculate the velocity and energy of an electron revolving in it.
Given : $h = 6.626 \times 10^{-34}$ Js, $\epsilon_0 = 8.854 \times 10^{-12}$ C²m⁻¹J⁻¹, mass of electron = 9.109×10^{-31} kg and electronic charge = 1.602×10^{-19} C.
17. Discuss the shape of ethane molecule on the basis of hybridization.
18. Explain the general trends in the variation of atomic radii and ionic radii along a period and down a group in the periodic table.
19. Write a note on radiocarbon dating and its applications.
20. Explain with diagram, how Gieger-Muller counter is used to detect and measure radioactivity.

(4×3=12)



SECTION – D

Answer **any two** questions. **Each** question carries **5** marks.

21. Write the merits and demerits of Bohr model of atom. Explain the origin of different series of lines in hydrogen spectrum using Bohr model of atom.
 22. State the postulates of VSEPR theory. Apply the theory to predict the shape of ClF_3 .
 23. a) Discuss the Pauling scale of electronegativity.
b) Explain the terms : screening effect and effective nuclear charge. **(2½+2½)**
 24. Discuss the principles and salient features of nuclear reactors. Give any two examples of nuclear reactors in India. **(2×5=10)**
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SECTION – A

Answer **all** questions. **Each** question carries **one** mark.

1. What is mass defect ?
2. State Hund's rule.
3. What is meant by standard deviation ?
4. List the proper number of significant figures in the following :
 - a) 0.00456
 - b) 8.09.

(1×4=4)

SECTION – B

Answer **any seven** questions. **Each** question carries **2** marks.

5. Explain the terms constant and proportionate error.
6. Compare the boiling points of ortho and para nitro phenols.
7. The result of an analysis is 36.97 compared with the accepted value of 37.07. What is the absolute and relative error ?
8. Write deBroglie relation and establish a relation between wavelength and kinetic energy by using this.



9. Explain the term Q value in nuclear reaction. What is its significance ?
10. What is meant by artificial transmutation ? Give one example.
11. A radioactive substance decays at such a rate that after 46 days only 0.25 of its original amount is left. Calculate its decay constant and half life.
12. Explain the factors affecting lattice energy.
13. List all possible subshells and orbitals for the principle quantum number 3.
14. Write Born Lande Equation and explain the terms. (2×7=14)

SECTION – C

Answer **any 4** questions. **Each** question carries **3** marks.

15. Explain the uses of Born Haber cycle.
16. Describe the different methods for minimization of errors.
17. Determine the uncertainty in the velocity of moving bullet of mass 10 g, whose uncertainty in position is $1.0 \times 10^{-5} \text{m}$.
18. What are the merits of band theory ?
19. Discuss rock dating.
20. Explain the significance of quantum numbers. (3×4=12)

SECTION – D

Answer **any 2** questions. **Each** question carries **5** marks.

21. Discuss the principle and salient features of a nuclear reactor.
22. Write a note on the Van der waals forces.
23. Explain the terms standard deviation, confidence limit, f-test, coefficient of variance.
24. Discuss the postulates of quantum mechanics. (5×2=10)

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**I Semester B.Sc. Degree CBCSS(OBE)-Regular
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CORE COURSE IN CHEMISTRY
1B01CHE : THEORETICAL AND INORGANIC CHEMISTRY**

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3. The calculated bond order of O_2^+ is _____.
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SECTION - BAnswer any **Seven** questions. Each question carries 2 marks. (7×2=14)

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13. What do you mean by Q values of nuclear reactions?
14. Neutrons are better particles for artificial transmutation than α particles. Why?

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[Given: $h = 6.626 \times 10^{-34}$ Js, $\epsilon_0 = 8.854 \times 10^{-12}$ C²m⁻¹J⁻¹, mass of electron = 9.109×10^{-31} kg, and electronic charge = 1.602×10^{-19} c.]
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19. How Wilson-Cloud Chamber is used to detect and measure radio activity? Explain.
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SECTION - D

Answer any **Two** questions. Each question carries **5** marks. **(2×5=10)**

21. a) State and explain the de Broglie relation.
b) Discuss the dual nature of electrons.
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24. a) Discuss the applications of radioisotopes as tracers. **(2½+2½)**
b) Write a short note on breeder reactors. **(2½+2½)**



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I Semester B.Sc. Degree CBCSS (OBE)-Regular
Examination, November - 2019
(2019 Admissions)

COMPLEMENTARY ELECTIVE COURSE IN CHEMISTRY/POLYMER
CHEMISTRY

1C01CHE/PCH : CHEMISTRY (FOR PHYSICAL AND BIOLOGICAL
SCIENCES)

Time : 3 Hours

Max. Marks : 32

Instructions : Answer **All** questions in English only.

SECTION - A

Answer **All** questions. Each question carries **1** mark. **(5×1=5)**

1. Calculate the de Broglie wavelength of an electron of mass 9.1×10^{-31} kg moving with a velocity 5.9×10^5 m/s.
2. The shape of BF_3 molecule is _____.
3. The lowermost layer of atmosphere is the _____.
4. The earth is protected from the harmful UV radiations by _____ layer.
5. Give one example for a Lewis acid.

SECTION - B

Answer any **Four** questions. Each question carries **2** marks. **(4×2=8)**

6. Calculate the wavelength of spectral line in the Balmer Series if $n_2=3$.
7. How can VSEPR theory explain the shape and bond angle of water molecule?

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8. Comment on the consequences of ozone depletion.
9. What is meant by chemical oxygen demand?
10. What are conjugate acids? Give the conjugate acids of SO_4^{2-} and OH^- .
11. What are buffer solutions? Give one example.

SECTION - C

Answer any **Three** questions. Each question carries **3** marks. **(3×3=9)**

12. Discuss the atomic spectrum of Hydrogen?
13. What is ionization potential? How is it varied along a period and down a group of the periodic table?
14. Explain on the basis of MOT why Ne_2 molecule does not exist. [At. No. of Ne is 10].
15. Define lattice energy of an ionic compound. Give the Born-Landé equation.
16. What are the important water quality parameters? Explain.

SECTION - D

Answer any **Two** questions. Each question carries **5** marks. **(2×5=10)**

17. a) What are the postulates of Bohr's atomic theory?
b) State and explain the de Broglie relation? **(4+1)**
18. Explain the molecular geometries associated with sp^2 and sp^3 hybridizations using illustrative examples.
19. a) Write a note on toxicity and environmental hazards of pesticides.
b) What is meant by radiation pollution? **(3+2)**
20. a) Discuss the Lewis theory of acids and bases.
b) Indicate the Lewis acid and base in each of the following equilibria:
 - i) $\text{Ag}^+ + 2\text{CN}^- \rightarrow [\text{Ag}(\text{CN})_2]$
 - ii) $\text{SiF}_4 + 2\text{F}^- \rightarrow [\text{SiF}_6]^{2-}$ **(3+2)**

Reg. No. :

Name :

II Semester B.Sc. Degree (CBCSS-OBE-Reg./Sup./Imp.)
Examination, April 2021(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN CHEMISTRY/POLYMER
CHEMISTRY

2C02CHE/PCH : Chemistry (For Physical and Biological Sciences)

Total Marks : 32

Time : 3 Hours

Instruction : Answer the questions in English only.

SECTION – A

Answer **all** questions. **Each** question carries **1** mark.

1. Give the relation between K_x and K_p .
2. The energy of one mole of photons is known as _____
3. If the dispersed phase is liquid and the dispersion medium is solid, the colloidal system is called _____
4. The substance which stabilizes an emulsion is called _____
5. In inorganic qualitative analysis, group III cations are precipitated as their _____

(5×1=)

SECTION – B

Answer **any four** questions. **Each** question carries **2** marks.

6. Write the structural formula of ethyl methyl ketone and give its IUPAC name.



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9. Define flocculation value of a sol.
10. Calculate the molality of a solution obtained by dissolving 18 g of glucose in 4 kg of water. (4×2=8)
11. What is meant by iodometric titrations ?

SECTION – C

Answer **any three** questions. **Each** question carries **3** marks.

12. Arrange the following ions in the increasing order of their stability and explain the reason.
- i) $(\text{CH}_3)_3\text{C}^+$
 - ii) CH_3CH_2^+
 - iii) $(\text{CH}_3)_2\text{CH}^+$
 - iv) CH_3^+
13. State and explain law of mass action.
14. Distinguish between fluorescence and phosphorescence.
15. What are the reasons for the stability of lyophilic sols ?
16. Describe the principle of colorimetry. (3×3=9)

SECTION – D

Answer **any two** questions. **Each** question carries **5** marks.

17. Discuss the structure and stability of benzene on the basis of Molecular Orbital theory.
18. On the basis of Le Chatelier principle, discuss the effect of pressure, temperature and concentration on the equilibrium : $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}); \Delta H = -93.74 \text{ kJ}$.
19. Write a note on different classes of colloidal systems.
20. Briefly outline the application of the principles of solubility product and common ion effect in the separation of cations in qualitative analysis. (2×5=10)
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