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Reg. No. :

Code No. : 10446 E Sub. Code : CMCH 11

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

First Semester

Chemistry — Core

INORGANIC CHEMISTRY — I

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Select the de-Broglie equation from the following

- (a) $E = mc^2$ (b) $(\Delta x) \times (\Delta p) = h/4\pi$
(c) $\lambda = h/p$ (d) $n\lambda = 2d \sin \theta$

2. Quote the shape of 's' orbital

- (a) dumb-bell (b) spherical
(c) circle (d) elliptical

3. Identify the atom which has the highest electronegativity

- (a) Cl (b) F
(c) Br (d) I

4. Predict the atom which has the biggest size

- (a) Na (b) Cs
(c) Be (d) I

5. Express which of the following has the highest bond order among the following

- (a) N_2 (b) O_2
(c) H_2 (d) F_2

6. Find out the molecule which has two lone pair of electrons and V shaped structure

- (a) H_2O (b) NH_3
(c) PCl_5 (d) BeH_2

7. Identify the element which has diagonal relationship with Li

- (a) Be (b) Al
(c) Mg (d) Na



8. Predict the element which has the electronic configuration $4s^2$ as the outermost orbital
- (a) K (b) Ca
(c) Mg (d) Ba
9. Select the cation which gives green colour in flame test
- (a) Ca^{2+} (b) Ba^{2+}
(c) Sr^{2+} (d) Na^+
10. Illustrate the indicator from the following which is used as an acid-base indicator
- (a) EDTA
(b) Phenolphthalein
(c) $KMnO_4$
(d) Potassium ferrocyanide

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Describe briefly the Rutherford's atom model.

Or

- (b) State Pauli's exclusion principle and Hund's rule of maximum multiplicity. Explain briefly.

12. (a) Discuss the factors affecting the ionising energy.

Or

- (b) Explain the factors influencing the electronegativity.

13. (a) Examine the various factors favouring the formation of ionic bond.

Or

- (b) Sketch the MO diagram of HF molecule and explain its bond order and magnetic nature based on this diagram.

14. (a) Discuss the inert pair effect.

Or

- (b) Describe the chemistry of zeolites.

15. (a) Analyse the principle of complexometric titrations with suitable example.

Or

- (b) Distinguish between post-precipitation and co-precipitation.



PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) State the four types of quantum numbers and explain their significance with shape of the orbitals.

Or

- (b) Describe briefly the photoelectric effect and Heisenberg's uncertainty principle.

17. (a) Explain briefly the following :

- (i) Modern periodic law
- (ii) Electron affinity
- (iii) Covalent radius.

Or

- (b) How is electronegativity determined using Mullikan's and Pauling's approach?

18. (a) State and explain Born-Haber cycle and its applications.

Or

- (b) (i) Describe the structure of H₂O and NH₃ molecule based on VSEPR theory.
(ii) Describe the magnetic behaviour of O₂⁺, O₂²⁺, O₂⁻ and O₂²⁻.

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19. (a) Discuss the allotropes of carbon and sulphur.

Or

- (b) Explain the periodicity of s block elements with respect of electronic configuration, atomic and ionic size, ionisation energy and electronegativity.

20. (a) Illustrate the solubility product, common ion effect, complexation, oxidation, reduction reactions involved in the identifications of anions and cations.

Or

- (b) Analyse the various conditions for the precipitation and minimisation of errors.

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