

(7 pages)

Reg. No. :

Code No. : 6399

Sub. Code : HCHM 32

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2014.

Third Semester

Chemistry

INORGANIC CHEMISTRY – III

(For those who joined in July 2012 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL the questions.

Choose the correct answer :

1. How many α and β particles will be emitted, when ${}_{90}^{232}\text{Th}$ and ${}_{82}^{208}\text{Pb}$?

- (a) $3\alpha + 4\beta$ particles (b) $6\alpha + 4\beta$ particles
(c) $4\alpha + 6\beta$ particles (d) $2\alpha + 4\beta$ particles

2. Graphite is used as _____ in a nuclear reactor.

- (a) Coolant (b) Control rod
(c) Moderator (d) Reflector

3. The proper rays for radio carbon dating are

- (a) UV rays (b) IR rays
(c) Cosmic rays (d) X rays

4. ${}_{15}^{30}\text{P}$ is unstable because

- (a) it is an odd-odd nucleus
(b) its n/p ratio is just 1
(c) its z is odd
(d) it is chemically reactive

5. The general formula of zeolites

- (a) $M_{\frac{x}{n}} + n[\text{Al}_x \text{ Si}_y \text{ O}_{2x+2y}]^x \cdot \text{ZH}_2\text{O}$
(b) $M_{\frac{x-1}{n}} + n[\text{Al}_x \text{ Si}_y \text{ O}_{x+y}]^x \cdot \text{ZH}_2\text{O}$
(c) $M_{\frac{x}{n}} + n[\text{Al}_x \text{ Si}_y \text{ O}_{2x+2y}]^{\frac{x}{2}} \cdot \text{ZH}_2\text{O}$
(d) $M_{\frac{x}{n}} + n[\text{Al}_x \text{ Si}_y \text{ O}_{2x+y}]^x \cdot \text{ZH}_2\text{O}$



6. Inorganic benzene is
 (a) $B_3N_3H_6$ (b) $B_3H_3H_6$
 (c) $H_3Cl_3B_3N_3$ (d) B_2H_6
7. Vitamin B_{12} is also known as
 (a) Methionine (b) Homocysteine
 (c) Cyanocobalamin (d) Cytochrome
8. In the oxymyoglobin/oxyhemoglobin, the oxygen molecule is coordinated via an angular with _____ hybrid lone pair.
 (a) sp^3 (b) sp^2
 (c) sp (d) d^2sp^3
9. Addition of ferrous salts to ferricyanides produces
 (a) Blue copper (b) Turnbull's blue
 (c) Cyano dark green (d) Brick red
10. The intensity of an overtone depends on
 (a) Harmonicity vibration
 (b) Harmonicity rotation
 (c) Anharmonicity vibration
 (d) Anharmonicity vibration

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PART B — ($5 \times 5 = 25$ marks)

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

11. (a) Write notes on nuclear shell model.
 Or
 (b) Explain neutron evaporation and spallation reactions.
12. (a) Write short notes on :
 (i) Liquid and solid radioactive wastes
 (ii) Radio chromatography.
 Or
 (b) How will you prepare radioisotopes and discuss the application of it in elucidating reaction mechanism.
13. (a) Describe the structure and bonding in boranes.
 Or
 (b) Discuss anionic and hydrido clusters with relevant examples.

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14. (a) Describe geometrical and linkage isomerism with examples.

Or

- (b) Explain the isomeric shift involved in Sn(IV) compounds.

15. (a) Write short notes on :

- (i) Chlorophyll
- (ii) Blue copper proteins.

Or

- (b) Describe hemoglobin modeling.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL the questions, choosing either (a) or (b), each answer should not exceed 600 words.

16. (a) Describe the types of nuclear reactions in detail.

Or

- (b) Explain nuclear fission and nuclear fusion reactions in detail.

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17. (a) Discuss the classification, components, reproduction factor and design parameter of nuclear reactors.

Or

- (b) Write notes on :

- (i) Neutron activation analysis
- (ii) Radiometric titrations.

18. (a) Discuss :

- (i) Any two classification of silicates and
- (ii) Structure of heteropoly anions.

Or

- (b) Write notes on :

- (i) Metal carbonyl clusters
- (ii) Octahedral clusters.

19. (a) Discuss the application of IR and Raman spectra for metal carbonyls and nitrosyls.

Or

- (b) Discuss the quadrupole interactions and magnetic hyperfine splitting in the study of iron compounds.

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20. (a) Discuss the biological importance and toxicity of Fe, Cu and W in biological system.

Or

- (b) Write notes on :
- (i) Vitamin B₁₂
 - (ii) Fixation of nitrogen.
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