

Department of Chemistry
Quaid-I-Azam University
Ph.D Admission Sample Test
Inorganic/Analytical Chemistry

Max. Marks: **50**

Name:

Time: 60 mins

Roll No:

Father's name:

NOTE: Attempt all questions.

Q.1. Encircle the correct option/s in each of the following statements. Thirtyfive (35) such statements will be given. (35)

1. Sol-gel method is _____ approach.
(a) Bottom up, (b) Up bottom, (c) Top down, (d) Down top

2. Which of the following statements is *incorrect*?
 - a) Mass spectrometry gives information about fragmentation patterns.
 - b) Mass spectrometry provides direct structural data.
 - c) Isotopic distribution patterns are observed in mass spectra.
 - d) Parent ions are not always observed in the mass spectra of compounds

3. Which of the following is not an inorganic functional material?
 - a) Ferroelectric
 - b) Reverse micelles
 - c) Magnetic field sensor
 - d) Light detectors

4. The temperature at which paramagnetic materials converted into antiferromagnetic is called:
 - (a). Neel temperature
 - (b). Curie temperature
 - (c). transition temperature
 - (d). fusion temperature

5. Which of the following ion is kinetically labile?
- a) Rh^{3+}
 - b) Ti^{3+}
 - c) Ru^{2+}
 - d) Cr^{3+}
6. CO_2 is isostructural with:
- a). HgCl_2 b). SnCl_2 c). SiO_2 d). NO_2
7. The calculated spin only magnetic moment for $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$ is:
- a). 2.83 b). 3.87 c). 5.06 d). 5.92
8. In chromatography, peaks are well resolved when resolution value is _____
- a) 1
 - b) 1.5
 - c) 0.5
 - d) 0
9. The catalytic activity can be determined by _____ of a catalyst.
- a) Turn over Number
 - b) Turn over frequency
 - c) Stability
 - d) Selectivity
 - e) All of above
10. Which of the following phenomenon gives exotherm in DCS / DTA measurements?
- (a) oxidation (b) adsorption (c) decomposition
 - (d) vaporization

11. Which of the following technique is more useful in determining the crystallite size in polycrystalline material?

- a) Powder X-ray diffraction (PXRD)
- b) X-ray photoelectron spectroscopy (XPS)
- c) Scanning electron microscopy (SEM)
- d) Auger electron microscopy (AEM)
- e) Atomic force microscopy (AFM)

12. The Ziegler-Natta Catalyst for polymerization of ethylene, is a complex of the metals:

- a. Aluminium and Copper
- b. Aluminium and Potassium
- c. Aluminium and Titanium
- d. None of the above.

13. Lithium cations give coloration on flame

- (a) golden yellow (b) green (c) carmine (d) brick-red

14. Which of the following metal ion in a catalyst of type $[\text{Cp}_2\text{M}(\text{C}_2\text{H}_4)]^n$ (where n is appropriate charge) is better for ethene polymerization?

- a) Fe (II)
- b) Pt (II)
- c) Nb (III)
- d) Zr(IV)

15. What is the primary component of an exhaled breath?

- a) N_2 b) O_2 c) CO_2 d) H_2O

16. Select the non-equivalent parameter among the followings.

- (a) total number of transitions
- (b) total number of M_j values
- (c) total degeneracy

- (d) total microstates
17. Secondary wastewater treatment method is
- a) physical
 - (b) biochemical
 - (c) mechanical
 - (d) physicochemical
18. Catalyst poisoning is a major problem in
- (a) BOD
 - (b) coagulation
 - (c) primary treatment
 - (d) COD
19. What charge, n , would be necessary for the complex $[\text{Ru}(\text{CO})_4(\text{SiMe}_3)]^n$ to obey the 18-electron rule?
- (a) -1 (b) -2 (c) 2 (d) 1
20. The oxidative addition of H_2 to $\text{RhCl}(\text{PPh}_3)_3$ is more facile than $\text{RhCl}(\text{CO})(\text{PPh}_3)_2$ because
- (a) Electron-donating phosphine is better able to stabilize the latter in higher oxidation state.
 - (b) Electron-donating phosphine is better able to stabilize the latter in low oxidation state.
 - (c) Electron-donating phosphine is better able to stabilize the former in higher oxidation state.
 - (d) Electron-donating phosphine is better able to stabilize the former in low oxidation state.

Q.2: Define the following terms.

(15)

- a) Back bonding**
- b) McLafferty rearrangement**
- c) Elastomers**