

Question bank for M.Sc. Entrance Examination

Subject: Chemistry

1. The s-orbitals of any atom are

- (A) Dependent on $\sin \theta$
- (B) Dependent on $\cos \theta$
- (C) Dependent on $\sin \theta \cos \theta$
- (D) Independent of angles

Ans. D

2. Wave function in quantum mechanics represents

- (A) A state of the system
- (B) Shape of the system
- (C) Probability of the system
- (D) Energy of the system

Ans. A

3. A 1s orbital refers to

- (A) A circular track in an atom in which an electron travels
- (B) A one electron wave function
- (C) An observable property of the system
- (D) A Hermitian operator

Ans. B

4. Among the following elements, the one that acts as the major component in a semiconductor is

- (A) C (B) Si (C) Ga (D) As

Ans. B

5. The point group of BF_3 molecule is

- (A) C_{3v} (B) C_{2v} (C) D_{3h} (D) D_{2h}

Ans. C

6. Out of X-rays, infra-red rays, visible rays and microwaves, the largest frequency is of

- (A) X-rays (B) infra-red rays (C) visible rays (D) microwaves

Ans. A

7. Which molecule has the largest dipole moment?

- (A) HCl (B) HBr (C) HI (D) HF

Ans. D

8. How many Bravais lattices can exist in nature?

- (A) 7 (B) 17 (C) 27 (D) 14

Ans. D

9. The weak intermolecular forces of attraction that are caused by induced dipoles are called

- (A) Ionic forces (B) Hydrogen bonding (C) Coordination forces (D) vanderWaals forces

Ans. D

10. On adding a little phosphorous to silicon we get a/an

- (A) Insulator (B) Metallic conductor (C) n-type semiconductor (D) p-type semiconductor

Ans. C

11. The 3s orbital has

- (A) No node (B) 1 node (C) 2 nodes (D) 3 nodes

Ans. C

12. Properties which depend upon the number rather than the nature of the dissolved particles in a solution are called

- (A) General (B) Colligative (C) Isotonic (D) Isoelectronic

Ans. B

13. Sea water will boil at a temperature

- (A) Higher than pure water

- (B) Lower than pure water
(C) Same as that of pure water
(D) Cannot be predicted

Ans. A

14. The *styx* code for diborane is

- (A) 2002 (B) 2020 (C) 2200 (D) 0220

Ans. A

15. Which of the following does not obey 18 electron rule?

- (A) $\text{Cr}(\text{CO})_6$ (B) $\text{Fe}(\text{CO})_5$ (C) $\text{Mn}_2(\text{CO})_{10}$ (D) $\text{V}(\text{CO})_6$

Ans. D

16. The orange colour of $\text{Cr}_2\text{O}_7^{2-}$ is due to

- (A) Metal to ligand charge transfer transition
(B) Ligand to metal charge transfer transition
(C) d-d transition
(D) π - π^* transition

Ans. B

17. The brown ring test for nitrites and nitrates is due to the formation of a complex ion with the formula

- (A) $[\text{Fe}(\text{NO})(\text{H}_2\text{O})_4(\text{CN})]^+$ (B) $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})]^{2+}$
(C) $[\text{Fe}(\text{H}_2\text{O})(\text{NO})_5]^{2-}$ (D) $[\text{Fe}(\text{NO})(\text{CN})_5]^{2+}$

Ans. B

18. In the spectrochemical series, which ligand produces strong field?

- (A) Cl^- (B) H_2O (C) NO_2^- (D) CO

Ans. D

19. Zr and Hf have similar atomic and ionic radii because

- (A) Of diagonal relationship (B) Both are in the same group
(C) Of lanthanide contraction (D) Both are in the same period

Ans. C

20. The actual shape of XeF_6 is

- (A) Square pyramidal (B) Octahedral (C) Pentagonal bipyramidal (D) Distorted octahedral

Ans. D

21. Packing fraction is most closely related with

- (A) Dipole moment (B) Electron spin (C) Relative mass (D) Mass defect

Ans. D

22. The number of P-O-P bonds in cyclic metaphosphoric acid is

- (A) 0 (B) 2 (C) 3 (D) 4

Ans. C

23. C_{60} has

- (A) 14 pentagons and 18 hexagons
(B) 12 pentagons and 20 hexagons
(C) 10 pentagons and 20 hexagons
(D) 20 pentagons and 12 hexagons

Ans. B

24. The compound which has four metal-metal bonds is

- (A) $\text{Fe}_2(\text{CO})_9$ (B) $\text{Co}_2(\text{CO})_8$ (C) $[\text{Re}_2\text{Cl}_8]^{2-}$ (D) $\text{Ru}_3(\text{CO})_{12}$

Ans. C

25. An example of metal cluster is

- (A) $\text{Fe}_2(\text{CO})_9$ (B) $\text{Mn}_2(\text{CO})_{10}$ (C) $\text{Fe}_3(\text{CO})_{12}$ (D) $\text{Co}_2(\text{CO})_8$

Ans. C

26. Which of the following combinations can be regarded as soft acids?

(A) BF_3 and Sn^{4+} (B) Cu^+ and Cd^{2+} (C) SCN^- and H^+ (D) Na^+ and NH_3

Ans. B

27. The intense colour of KMnO_4 can be accounted by

- (A) d-d transition (B) Intra ligand charge transfer transition
(C) Ligand to metal charge transfer transition (D) Metal to ligand charge transfer transition

Ans. C

28. Which group of compound does not involve the $\pi-\pi^*$ transition in UV spectroscopy?

- (A) Alkenes (B) Azo compounds (C) Alcohols (D) Cyanides

Ans. C

29. The closeness of data to other data that have been obtained in exactly the same way is

- (A) Accuracy (B) Absolute error (C) Relative error (D) Precision

Ans. D

30. The closeness of a result to its true or accepted value is

- (A) Precision (B) Accuracy (C) Median (D) None of the above

Ans. B

31. Which type of error affects to the same degree the results of a series of determinations?

- (A) Indeterminate (B) Determinate (C) Accidental (D) Erratic

Ans. B

32. Mossbauer effect is also related with resonance fluorescence of

- (A) α -rays (B) β -rays (C) γ -rays (D) X-rays

Ans. C

33. Which one is an auxochromic group?

- (A) $-\text{OH}$ (B) $-\text{NO}_2$ (C) $-\text{OR}$ (D) $-\text{NH}_2$

Ans. B

34. In which of the following reaction, amide is reduced to amine which has one carbon less than the starting material?

- (A) Lossen rearrangement (B) Beckmann rearrangement
(C) Dickmann rearrangement (D) Hofmann rearrangement

Ans. D

35. The mechanism of the dehydration of an alkene involves

- (A) Carbanion formation (B) Hydride ion transfer
(C) Free radical formation (D) Carbonium ion formation

Ans. D

36. Many free radical reactions are inhibited by substances like

- (A) Hydrogen peroxide (B) Benzoyl peroxide (C) Hydroquinone (D) Finely divided metals

Ans. C

37. Optically active 2-octanol rapidly loses its optical activity when exposed to

- (A) Dilute acid (B) Dilute base (C) Light (D) Humidity

Ans. A

38. A molecule is divided into two halves which are mirror images of each other by

- (A) A centre of symmetry (B) A plane of symmetry
(C) An axis of symmetry (D) None of the above

Ans. B

39. If separate replacements made on a symmetric molecule produce the same molecule, the groups are said to be

- (A) Enantiotopic (B) Homotopic (C) Diastereotopic (D) None of the above

Ans. B

40. IUPAC name of $K_3[Al(C_2O_4)_3]$ is

- (A) Potassiumaluminiumtrioxalate
(B) Potassiumaluminium(III)trioxalate

(C) Potassiumtrioxalatealuminate(III)

(D) Potassiumtrisoxalatoaluminate(III)

Ans. D

41. The formula of the complex tris(ethylenediamine)cobalt(III)sulphate is

(A) $[\text{Co}(\text{en})_3\text{SO}_4]$ (B) $[\text{Co}(\text{en})_3]\text{SO}_4$ (C) $[\text{Co}(\text{en})_3]_2\text{SO}_4$ (D) $[\text{Co}(\text{en})_3]_2(\text{SO}_4)_3$

Ans. D

42. BF_3 is used as a catalyst in several industrial processes due to

(A) Strong reducing nature (B) Weak reducing action

(C) Strong Lewis acid nature (D) Weak Lewis acid character

Ans. D

43. Water gas is an equimolar mixture of

(A) CO and N_2 (B) CO and H_2O (C) CO_2 and N_2 (D) CO and H_2

Ans. D

44. Sodium cobaltinitrite is used in the detection of

(A) K (B) Ca(C) Sr(D) Ba

Ans. A

45. Iodine is an example of

(A) Ionic crystal (B) Covalent crystal (C) Molecular crystal (D) Metallic crystal

Ans. C

46. The isomerism shown by $[\text{Cu}(\text{NH}_3)_4][\text{PtCl}_4]$ and $[\text{Pt}(\text{NH}_3)_4][\text{CuCl}_4]$ is

(A) Coordination isomerism (B) Linkage isomerism

(C) Ionization isomerism (D) Ligand isomerism

Ans. A

47. Mercury is best purified by

(A) Dry distillation (B) Steam distillation

(C) Distillation under high pressure

(D) Vacuum distillation

Ans. D

48. The particle having a major role in binding the nucleus is

(A) Neutron

(B) Electron

(C) Meson

(D) Proton

Ans. C

49. Which of the following alkali metal ions has the lowest ionic mobility in aqueous solution?

(A) Li^+

(B) Na^+

(C) Rb^+

(D) Cs^+

Ans. A

50. Which one of the following is the weakest Lewis base?

(A) CH_3^-

(B) NH_2^-

(C) OH^-

(D) F^-

Ans. D

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