

CHEMISTRY

31. The electronic configuration of the element X is $[\text{Ar}] 4s^2 3d^{10}$. Which one of the following is the most suitable formula for its oxide?
a) X_2O b) X_2O_3 c) XO d) X_2O_5
32. In which of the following pairs does nitrogen exhibit a valency of +1 and -1 respectively?
a) Nitrous oxide and nitric oxide b) Nitrous oxide and hydroxylamine
c) Hydroxylamine and hydrazine d) Nitric oxide and hydroxylamine
33. Acetylene is dissolved in acetone at increased pressure and is transported. This is based on
a) Boyle's law b) Charles' law
c) Henry's law d) Dalton's law.
34. 200 mL of 1.0 N, 400 mL of 0.5 N and 400 mL of 0.25 N of a solution are mixed together. The normality of the resultant solution will be
a) 0.5 b) 1.0 c) 0.1 d) 0.25
35. The volume of one molal solution of potassium chloride increases by 1.5% when its temperature is raised from 25 to 30°C. The molality of the solution will
a) increase by 1.5% b) remain the same
c) increase by 3.0% d) decrease by 1.5%
36. The increase in bond strength when fluorine is bonded to arsenic is due to
a) $p\pi - p\pi$ bonding b) $d\pi - d\pi$ bonding
c) $p\pi \rightarrow d\pi$ donation d) $d\pi \rightarrow p\pi$ donation
37. For a zero order reaction, the unit for the equilibrium constant is
a) s^{-1} b) $(\text{mol/L})^{-1} \text{s}^{-1}$
c) no unit d) $\text{mol L}^{-1} \text{s}^{-1}$
38. Lanthanides and Actinides exhibit a common oxidation state of
a) +2 b) +5 c) -4 d) +3
39. The catalyst used in an automobile car's exhaust system to oxidize carbon monoxide to carbon dioxide is
a) homogeneous type b) mixed type
c) heterogeneous type d) enzyme type
40. The percentage of empty space in a face centered cubic (FCC) unit cell is
a) 2.6 b) 26 c) 74 d) 7.4
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Rough work

41. By passing certain quantity of electricity through a solution of copper sulphate, 5g of copper is deposited on the cathode. The same quantity of electricity is passed through brine solution in a divided cell. What is the amount of caustic soda in g formed in the cathode compartment? Atomic weights of copper and sodium are 63.5 and 23 respectively.
- a) 63.0 b) 6.3 c) 0.63 d) inadequate data
42. A hydrocarbon of molecular formula C_6H_{12} (A) was subjected to ozonolysis which gave compounds B and C. B on reduction with lithium aluminium hydride gave a primary alcohol C_3H_8O . C on reduction with zinc amalgam and hydrochloric acid gave a hydrocarbon C_3H_8 . C does not respond to Tollen's reagent. What can be A?
- a) 2-methyl pent-2-ene b) 3-methyl pent-2-ene
c) hexene-2 d) hexene-3
43. 22.4 mL of hydrogen gas combines with 11.2 mL of oxygen at NTP. What is the number of molecules of water vapour formed?
- a) 22.4 b) 6.023×10^{23} c) 6.023×10^{20} d) 6.023×10^{17}
44. Chlorine dioxide is formed when
- a) Chlorate ion reacts with a reducing agent
b) Chlorate ion reacts with an oxidizing agent
c) Chlorate ion reacts with hypochlorite ion
d) Chlorite ion reacts with chlorine
45. The correct order of crystal field splitting energy of the following ligands is
- a) $H_2O < C_2O_4^{2-} < NH_3 < CN^-$
b) $NH_3 < C_2O_4^{2-} < H_2O < CN^-$
c) $C_2O_4^{2-} < H_2O < NH_3 < CN^-$
d) $N^- < NH_3 < C_2O_4^{2-} < H_2O$
46. m- dinitrobenzene on treatment with ammonium sulphide gives
- a) m-diaminobenzene b) m-nitroaniline
c) m-amino nitrosobenzene d) benzene
47. Reaction of ethyl benzene with N-bromosuccinimide at room temperature produces
- a) 1-bromo-1-phenyl ethane b) 1-bromo-2-phenyl ethane
c) p-bromo ethyl benzene d) o-bromo ethyl benzene
48. What is the emf of the following cell at $25^\circ C$?
- $$Ni(s) \mid Ni^{++} \parallel Ni^{++} \mid Ni(s)$$
- 0.05M 1.6M
- a) 44.4 mV b) 444 mV c) 4.44 V d) 0.0 V

Rough work

49. 4.0 liters of 0.8M sulphuric acid is prepared from 98% sulphuric acid of specific gravity 1.84 by dilution with water. What is the specific gravity of the diluted solution? Equivalent weight of sulphuric acid is 49.
- a) 10.37 b) 1.037 c) 0.1037 d) 0.01037
50. 70g of ammonium chloride is mixed with 560 mL of ammonia (NH_3) and the mixture is made up to one liter with water. Ionization constant of ammonium hydroxide is 1.8×10^{-5} at 25°C . Atomic weights of nitrogen and chlorine are 14 and 35.5 respectively. Density of liquid ammonia is 0.8gcm^{-3} . Ionic product of water is 1×10^{-14} . What is the pH of this solution?
- a) 1.056 b) 3.44 c) 10.56 d) 7.12
51. Polymer Dispersity Index of a polymer refers to
- a) ratio between number average and viscosity average molecular weights
 b) ratio between weight average and number average molecular weights
 c) ratio between number average molecular weight and chain length
 d) ratio between viscosity average molecular weight and density of polymer solution.
52. Antacid (gelusil) contains
- a) sodium hydroxide and aluminium hydroxide
 b) calcium hydroxide and magnesium hydroxide
 c) aluminium hydroxide and magnesium hydroxide
 d) aluminium hydroxide and calcium hydroxide
53. Which one of the following is the correct statement?
- a) Nucleophilic aromatic substitution occurs selectively at para position to nitro group.
 b) Nucleophilic aromatic substitution occurs selectively at ortho position to nitro group.
 c) Nucleophilic aromatic substitution occurs at ortho and para positions to nitro group.
 d) Nitro group is substituted by the incoming group.
54. Ethyl fluoride is formed by heating ethyl chloride with mercurous fluoride. This type of reaction is called
- a) Finkelstein reaction b) Friedel-Crafts fluorination
 c) Swarts reaction d) Sandmeyer reaction
55. In methyl cyanide C-H bond is longer and weaker than C-N bond because
- a) sp hybridization leads to the formation of shorter and stronger bond
 b) sp^3 hybridization leads to the formation of shorter and stronger bond
 c) sp^2 hybridization leads to the formation of longer and stronger bond
 d) dsp^2 hybridization leads to the formation of shorter and weaker bond

Rough work

