**General Direction: Choose the best answer from the given alternatives**

1. The atoms A and B have the electronic configurations of 1s2 2s2 2p63S2and 1s2 2s 2 2p5 respectively. The formula of the compound they form together is most likely to be;-

A .A2 B5 B.A2 B3 C.A3B D.AB2 E.A3B2

1. Of the following compounds which one contain an element that **violets** the octet rule A. SO2 ..B.BCl3 C .NCl3 D.SiCl4
2. The number of **sigma bonds** and **Pi bonds** present in **CH3CH=CH-CH=CH-CH3** are A. 14 , 2 B. 11, 2 C. 15, 2 D. 4, 2
3. Which statement is **not** true? A. 2 sigma and 2 pi bonds are present in CO2B. The type of orbital overlap in HCl is S-S overlap C. The type of hybridization in CH4 is SP3D. COCl2 contain 3 sigma bonds and 1 pi bonds
4. Which of the following best describes the formation of **pi (π)** bonds? They are formed by the A. side to side way overlapping of S- orbitals B. head to head overlapping of P-orbitals C. side to side way overlapping of P- orbitals D. head to head overlapping of S-orbitals
5. Which of the following orbitals can overlap **both** in head to head and side to side ways A. S-S orbitals B. S-P orbitals C. P-P orbitals D. All
6. The type of orbital overlapping and hybridization respectively in BF3 are A. P-SP2 overlapping B. S-SP2 overlapping C.P-SP3 overlapping D. S-SP3 overlapping
7. Which of the following statement is **true**? A. Two sigma bonds represent one double bond. B. A triple bond consists of one π-bond and two sigma bonds. C. Bonds formed from S-orbitals overlapping are always sigma bonds. D. End to end overlapping has two region of high electron density.
8. Which one of the following types of hybridization **does not** exist? A. SP3d2B. SP2 C. SP3 D. SP2d1
9. A species (molecules) **cannot** exist When: A. There is less number of electrons in its antibonding orbitals B. There are more number of electrons in its bonding orbitals C. There is one more electron in its antibonding orbitals D. There are equal number of electrons in its bonding and antibonding orbitals
10. All of the following molecules have the same type of hybridization except A. H2O B. NH3 C. SO3 D. CH4
11. Which one of the following species **cannot** exist? A. B2+ B. F2-2C. C2+2 D. N2-2
12. Which of the following statement is **not true** about bond order? A. Molecules having zero bond order cannot exist B. The higher the bond order is the less the stable the molecule C. All triple bonds have three bonds order D. It is half the difference b/n bonding electrons & antibonding electrons in molecular orbitals
13. Which one is **not** correctly related with its number of bond order? A. N2 → three bond order B. B2 → one bond order C. C2- → 2.5 bond order D. O2 → 1.5 bond order
14. Which of the following molecule is **not** paramagnetic? A. B2 B. N2- C. C2+2 D. O2+2
15. The diatomic species X2+ has the electron configuration of: ($δ$1S)2($δ$\*1s)2 ($δ$2S)2($δ$\*2s)2 ($δ$2Px)2 ($π$2Py)2 ($π$2Pz)2 ($π$\*2Py)2 ($π$\*2Pz)1. Which of these is the actual diatomic species? A. F2+ B. N2+ C. C2+ D. O2-
16. Which of the ff pair of molecules is paramagnetic in nature? (Åtomic number of O=8,B=5,N=7, F=9, H =1)
17. O2 and B2  B. N2 and O2 C. N2 and F2 D. H2 and N2
18. A neutral molecule having the general formula AB2, has no any non-bonding pairs of electrons on a central atom. What is the hybridization of the central atom? A. SP B. SP2  C. SP3 D. SP3d E. SP3d2
19. In which of the following substances will hydrogen bond **not**present?
20. CH3CH2OH B. HI C. H2O D.HNO3
21. Which species out of the following does **not** contain unpaired electrons? A.N2+ B. $O\_{2}^{2-}$C. O2 D. B2
22. Which of the following has the highest dipole moment? A. CO2  B. HI C. SO2D. H2O
23. Which of the following statements is **incorrect** about molecular orbitals of molecules?
24. Anti- bonding molecular orbitals are higher in energy than bonding molecular orbitals
25. Sigma molecular orbitals are symmetrical around bonding axis
26. Pi molecular orbitals are unsymmetrical around bonding axis
27. Molecular orbitals are singly occupied in diamagnetic molecules
28. All of the following species are correctly matched with their molecular geometers **except:-**
29. $BF\_{4}^{-} \rightarrow $ Tetrahedral C. SO2 $\rightarrow $ angular
30. COCl2$\rightarrow $ Trigonal planar D. I3-$\rightarrow $ Trigonal bipyramidal
31. An element `**M**` when reacted with oxygen form the compound of the form M2O3. Element `M` could be: A. Potassium B. Magnesium C. Aluminum D. Barium
32. Which of the ff ionic compound does not obey the octet rule? A. CaCl2 B. FeCl2 C. KCl D. MgCl2
33. Which of the ff ionic compound has the highest lattice energy? A. LiCl B. NaCl C. CsCl D.KCl
34. Which one the following atoms in its ground state have the highest number of unpaired electron? A.19K B. 16S C. 20Ca D. 15P
35. Which electron configurations describe the ground state electron configuration of Ca2+? A.1s2 2s2 2p6 3p1 B.1s2 2s2 2p6 3s1 C. 1s2 2s2 2p6 3s2 3p6 D. 1s2 2s2 2p6 3s23px23py1
36. What is the electron configuration of sulfur (Z=16)?

 A. 1s22s22p63s23p4 B. 1s22s22p4 C. 1s22s23p63s23p2 D. 1s22s22p63p4

1. **Except** one all of the following molecules are **correctly** written with its type of molecular geometry A. PH3→ Octahedral B.NCl3→Trigonal pyramidalC. COCl2 → Trigonal planar D. CS2 →Linear
2. The type of a molecule containing four bonding pairs and 2 lone pairs electrons on the central atom is likely to be A. AX2E3 B. AX4E2 C. AX3E3 D. AX2E4
3. Except one all have a linear molecular geometry A.CO2 B. XeF2 C. ClF3 D. IF2
4. If element A has low ionization energy and element **B** has high electron affinity. The type of bond formed between element A and B is A. Coordinate covalent bond B. Covalent bond C. Ionic bond D. Metallic bond
5. Which one of the following compound contains**both** ionic and covalent bonds?

A.PCl5 B. K2O C. Na2CO3 D. H3O+

1. Which statement **is correct** among the followings A. SO2, H2O, NH3 and SF4 are all polar molecules B. the total number of electrons in $CO\_{3}^{-2}$are 20 C.Cu2O, LiF, FeCl3 and KF all violet octet rule D. H2O, NH3, HI, CH3OH all contain hydrogen bond
2. Which of the following species represent a molecule? A. CO2 B. CuO C. NaCl D. Li2O
3. As the number of electrons shared between two atoms increased A. number of bonds formed decreases B. strength of bond increases C. bond length increasesD. more number of lone pairs left on the central atom
4. Resonance structure is **not** present in A. NO3- B.CO3-2 C. NH4+ D. O3
5. All of the following species **do not** obey the octet rule except A. ClO3 B. ICl5 C. SF2 D. BF3
6. The type of hybridization in C2H6 , C2H4 and C2H2 respectively are A. SP,Sp2, SP3 B. SP3 , Sp2, SP C. Sp, SP3, SP2 D. SP3, SP, SP2
7. An atom has an atomic number of 31 and mass number of 70. How many electrons will it have in it’s valence shell? A.5 B. 4 C. 3 D. 2
8. In which one of the following does the central atom achieve an octet of electrons?
9. PCl5  B. CO2 C. BH3 D. BrCl3
10. In the ground state of a cobalt atom, there are \_\_\_\_\_ unpaired electrons and the atom is \_\_\_\_\_.
11. 3, paramagnetic B. 5, paramagnetic C. 2, diamagnetic D. 2, paramagnetic
12. What are the over lapping orbitals in the formation of carbon- carbon bond in CH3CN molecules?

A. sp2- sp2B. sp3- sp C. sp- spD. sp3- sp2

1. The hybrid orbitals around a central atom in phosphorous pentachloride molecule are:-
2. sp3d B. sp2d C. sp3 D. sp3d2
3. Which one of the following compounds has non- zero dipole moment?

 A, CH4 B. O2 C. CCl4 D. CH3Cl

1. Which type of attractive forces are being overcome when liquid oxygen molecules boils at certain temperature?
2. Dipoles – dipole forces C. Dipole- induced dipole forces
3. Dispersion forces D. Covalent bonds
4. What does the **correc**t Lewis structure for the carbonate ions ($CO\_{3}^{2-}$ ) show?
5. 22 valence electrons C. 16 unshared electrons
6. 4 lone pairs of electrons around the carbon atom D. 3 bond pairs of electrons
7. What are the total numbers of sigma( $∝ $) and pi( $π$) bonds present in the structure,

CH3-CH = CH - C- OH, respectively? A.11 & 2 B. 8 & 1 C. 12 & 3 D. 10 & 2

 O

1. What is the total number of valence electrons in$ BrO\_{3}^{-}$? A.20 B. 26 C. 32 D. 40
2. The molecular geometry of a covalent molecule with four sets of electrons from which two are bonding pair and two are lone pair is; A. Seesaw B. T - shape C. Trigonalbipyramid D. Angular
3. How many lone pairs of electrons are there on the sulfur atom in sulfite ion, (SO3**2-**)? A. 0 B. 1 C. 2 D. 3
4. What hybridization change does the carbon atom undergo in the combustion of methane?

CH4 (g) + 2O2 (g) →CO2 (g) + 2H2O (g) A. Sp→ Sp2 B. Sp2 → Sp3C. Sp3 → spD. Sp2 → Sp

1. The VSEPR theory predicts the molecular geometry of ICl3 as:

A. triangular planar C. triangular pyramidal

B. triangular bi pyramidal D. T -shaped

1. How many sigma and pi bonds are present in the following molecule? CH3-CH=CH-CH3

A. 11 sigma bonds and 1 pi bond C. 9 sigma bonds and 2 pi bonds

B. 10 sigma bonds and 2 pi bonds D. 8 sigma bonds and 1 pi bond

1. Except one all of the followings are a non-polar covalent molecule.

A.CS2 B. I2 C. CO2 D. BF3 E. SO2

1. If the electronic configuration of an element is 1s2 2s2 2p6 3s2 3p6 4s2 3d2, the electrons involved in chemical bond formation will be\_\_\_\_\_.

A. 4S2 B. 3p6**,** 4s2  C 3p6**,** 3d2  D. 3d2**,** 4s2

1. Which of the following bond angle corresponds to sp2 hybridization?

A.90° B. 120° C. 180° D. 109°

1. Which among the following is paramagnetic?A. N2B. N2**2–**C. C2D. O2**2–**
2. Which of the following statements is **not correct**?

A. NaCl being an ionic compound is a good conductor of electricity in the solid state.

B. Molecular geometry and electron set arrangement for the given molecule are the same.

C. pi- orbital electrons form weaker bonds than sigma orbital electrons.

D. VSEPR theory can explain the square planar geometry of XeF4.

1. What is the bond order of F2**2-** ?A.1 B.2 C.0 D.3
2. Which of the following molecules would you expect to be non-polar? A. NH3 B. H2O C. PH3 D. BF3
3. If a molecule has **V-shape (angular)**, how many **lone pairs** of electrons are there on the central atom? A. 0 B. 2 C. 3 D.4
4. Which of the following molecule can be described by more than one Lewis structure? A. NH4+ B. C2H2 C. CO3-2 D. PCl5
5. Which of the following usually produces the weakest interaction between particles of similar molar mass? A. London force B. Dipole-Dipole force C. Covalent bond D. Hydrogen bond
6. Which of the following contain species that are **iso-electronic** with each other? A. 11Na+,12Mg+2,13Al ,9F-, 8O-2 B. 11Na+, 12Mg,13Al+3 ,9F-, 8O-2 C . 11Na, 12Mg,13Al+3 ,9F-, 8O-2 . D. 11Na+,12Mg+2,13Al+3 ,9F-, 8O-2
7. Atoms can attain 8 electrons on their outer valence shell by A. Losing of electrons B. gaining of electrons C. Sharing of electrons D. all of the above
8. Which one is differ from the rest? A. Ionic bonding B. Hydrogen bonding C. Covalent bonding D. Metallic bonding
9. Atoms in a covalent molecules can violet octet rule due to all of the followings except: A. deficiency of electrons B. Excess of electrons C. even number of total electrons D. odd number of total electrons
10. Which of the following ionic compounds has the smallest lattice energy? A. MgCl2 B. CaCl2 C. AlCl3 D. KCl
11. The number of bonding pair and lone pair of electrons respectively in H2S are A. 2 , 2 B. 2 , 3 C. 3 , 2 D. 2 , 4
12. Which of the following molecule is AX3 type? A. BrF5 B. POCl3 C. COCl2 D. PCl3
13. All molecules with AX2E3 type have a linear geometry. Which one of the following can fulfil this condition? A. ClF3B. I3- C. SF4 D. XeF4
14. Dipole-Dipole force is **not** present in A. CH4 B. HCl C. HI D. HF
15. A neutral molecule having a general formula of AB3 has two lone pair of electron on the central A. What is the hybridization of A? A. SP B. SP2 C. SP3 D. SP3d E. SP3d2
16. The type of hybridization in BCl4- is A. SP B. SP2  C. SP3 D. SP3d1
17. The type of hybridization in alkanes, alkenes and alkynes respectively are A. SP,Sp2, SP3  B. SP3 , Sp2, SP C. Sp, SP3, SP2 D. SP3, SP, SP2
18. According to molecular orbital theory, one of the following molecules does not exist. Identify it.
19. O2 B. N2 C. Be2 D. C2
20. In the following equation, what type of hybridization change occurs at the carbon atoms CH3- CH3 + 7/2 O2 2CO2 +3H2O
21. SP3 to SP2 B. SP3 to SP C. SP3 to SP3d D. SP2 to SP
22. From CO2, H2O, $I\_{3}^{-}$ and BeF2, which ones have the same molecular shape
23. H2O and , $I\_{3}^{-}$ B. CO2, BeF2 and , $I\_{3}^{-}$ C. CO2 and BeF2 D. H2O, BeF2 and CO2
24. One of the following is not the property of metals.
25. malleable and ductile C. Hard and brittle
26. good conductors of electricity D. Lustre and durable
27. How many sigma and pi bonds are present in phenol (C6H5OH) respectively?

 OH

1. 10,3 B. 13,3 C. 9,3 D. 12,3
2. How many new hybrid orbitals are formed in hybridization of central atom phosphorous in PCl3?

A.3 B. 4 C. 5 D. 2

1. What are the over lapping orbitals in the formation of carbon- carbon bond in CH2=CH2 molecules? A. sp2- sp2 B. sp3- sp C. sp- sp D. sp3- sp2
2. The bond order and magnetic nature in a molecule of CN- are
3. 3, paramagnetic B. 2, paramagnetic C. 2, diamagnetic D. 3, diamagnetic
4. Identify the compound formed by an overlap of sp3 and p orbital’s
5. H2O B. NF3 C. CH4 D. PF5
6. Which one of the following compounds has non- zero dipole moment?

A.NH3 B. H2 C. CCl4 D.Cl2

1. According to molecular orbital theory, one of the following molecules does not Exist. Identify it.
2. H2 B. C2+2 C. Ne2 D. O2-2
3. How many sigma and pi bonds are found in Ethyne (C2H2)?
4. 2$δ \&$2$π$ B. 3$δ \&$2$π$ C. 4$δ \& π$ D. 2$δ \& π$
5. A neutral molecule having the general formula AX2 has two lone pairs of electrons on central atom. What is the hybridization of A? A.Sp3 B. Sp3d C. Sp2 D. sp
6. Which of the following represent the correct electron pair arrangement and molecular shape of BrF3 respectively? A. trigonal planar, angular C. trigonal bi pyramid, v- shape
7. trigonal planar, T- shape D. trigonal bi pyramid, T- shape
8. How many pairs of unshared valence electrons are present on the central atom of$ ICl\_{4}^{-}$ ?
9. 0 B. 1 C. 2 D. 3
10. In which of the following compounds intermolecular hydrogen bonding occurs?
11. HCl B. CH3OH C. H2CO D. COCl2
12. Which of the following ionic compound does not obey the octet rule? A. SNO2 B. FeCl2 C. ZnO D. SrCl2
13. Which of the following molecule has **trigonal pyramidal** molecular geometry A.PH3B. XeF2 C. ClF3 D. IF2
14. All of the followings are characteristics of ionic compounds in their solid phase except A. high melting and boiling point B. solubility in water C. high electrical conductivity D. insolubility in organic solvents
15. The molecular geometry of a covalent molecule with five sets of electrons from which three are bonding pair and two are lone pair is; A. Seesaw B. T - shape C. Trigonalbipyramidal D. Linear
16. How many lone pairs of electrons are on the bromine atom in bromine triflouride, (BrF3)?

 A. 0 B. 1 C. 2 D. 3

1. The VSEPR theory predicts the molecular geometry of SF2 as:

A. triangular planar C. triangular pyramidal

B. triangular bi pyramidal D. V -shaped

1. Which among the following is paramagnetic? A.N2B. N2**2–** C. C2D. O2**2–**
2. Two atoms each contribute **two electrons** for bonding. The type of covalent bond formed by this way is: A. Single covalent bond B. double covalent bond C. Triple covalent bond D. Coordinate covalent bond
3. Which of the following molecules would you expect to be not non-polar? A. CO3-2 B. HCN C. IF5 D. BF3
4. If a molecule has **Trigonal pyramid geometry**, how many **lone pairs** of electrons are there on the central atom? A. 1 B. 2 C. 3 D.4
5. Which of the following molecule has no Resonance Lewis structure? A. O3 B. SO2 C. NO3- D. COCl2E. N2O4
6. Which of the following usually produces the strongest interaction between hydrogen and FON?A. London force B. Dipole-Dipole force C. Covalent bond D. Hydrogen bond
7. The number of bonding pair and lone pair of electrons respectively in XeF4 are A. 4, 12 B. 4 , 13 C. 4 , 12 D. 4 , 14
8. Which of the following molecule is AX2E2 type? A. BrF5 B. POCl3 C. COCl2 D. PCl3 E. H2S
9. All molecules with AX4E type have a **seesaw**geometry. Which one of the following can fulfil this condition? A. IF3 B. COCl2 C. SF4D. XeF2
10. Dipole-Dipole force is present in A. CO2 B. BF3 C. HI D. PCl5
11. A neutral molecule having a general formula of A2B has two lone pair of electron on the central B. What is the hybridization of A? A. SP B. SP2 C. SP3 D. SP3d E. SP3d2
12. The type of hybridization of carbon atoms in C3H8,C3H6 and C3H4 respectively is:-
13. Sp, SP2, Sp3  B. Sp3,Sp2, Sp C. Sp, Sp3, Sp2 D. SP3, SP, SP2
14. Which molecule is AX4E2 type [atomic number of S=16,F=9, Xe=54, Br=35 & cl=17]
15. SF4 B. XeF4 C. BrF5 D. ClF3
16. Which statement is **not** true for the reason why atoms combine together? A. to get a nearest noble gas electron configuration B. to lower their energy C. to produce new substances wit new properties D. to become electrically unstable
17. Which of the following pairs of energies are totally endothermic? A. heat of sublimation and lattice energy B. ionization energy and dissociation energy C. electron affinity and lattice energy D. ionization energy and electron affinity
18. Which of the following is not a factor for the formation of ionic bonding? A. Ionization energy B. Electro negativity C. Lattice energy D. Electron affinity
19. The molecular geometry of a covalent molecule with five sets of electrons from which three are bonding pair and two are lone pair is A. Seesaw B. T - shape C. Trigonal bipyramidal D. Linear
20. If element A has low ionization energy and element **B** has high electron affinity. The type of bond formed between element A and B is A. Coordinate covalent bond B. Covalent bond C. Ionic bond D. Metallic bond
21. Which one of the following compound contains both ionic and covalent bonds?
22. PCl5 B. K2O C. Na2CO3D. H3O+
23. The change in enthalpy that occurs when an ionic solid is separated in to an isolated ions in the gas phase is A. Ionization energy B. Sublimation energy C. Electron affinity D. Lattice energy
24. As the number of electrons shared between two atoms increase A. number of bonds formed decreases B. strength of bond increases C. bond length increase D. more number of lone pairs left on the central atom
25. Resonance structure is not present in A. NO3- B.CO3-2 C. NH4+ D. O3
26. All of the following species **do not** obey the octet rule except A. ClO3 B. ICl5 C. SF2 D. BF3
27. In which one of the following does the central atom achieve an octet of electrons?
28. PCl5  B. CO2 C. BH3 D. AlCl3
29. Except one all of the following molecules are **correctly** written with its types of hybridization A. SO2→ Octahedral B.$BF\_{4}^{-}$→Tetrahedral C. COCl2 → Trigonal planar D. CS2 →Linear
30. What does the **correc**t Lewis structure for the carbonate ions ($CO\_{3}^{2-}$ ) show?
31. 22 valence electrons C. 16 unshared electrons
32. 4 lone pairs of electrons around the carbon atom D. 3 bond pairs of electrons
33. According to molecular orbital theory, one of the following molecules does not Exist. Identify it. A. O2 B. N2 C. Be2 D. C2
34. Atoms take part in bond formation to A/ attain a stable electronic configuration B/ increase their charge density C/ increase their energy D/ neutralize their charge
35. The atoms A and B have the electronic configurations of 1s2 2s 2 2p63S2and 1s2 2s 2 2p5 each **respectively**. The formula of the compound they form together is most likely to be;- A .A2 B5 B.A2B3 C.A3B D.AB2  E.A3B2
36. Two elements Aand B belong to the same group in the periodic table. The atomic number of "B" is twice that of 'A'. The electronegativity of A is\_ A. Equal B .Lower C.Higher D. Twice
37. The type of orbital overlapping and hybridization respectively in BF3 are A. P-SP2 overlapping B. S-SP2 overlapping C.P-SP3 overlapping D. S-SP3 overlapping
38. Which of the following is true about an atom?
39. There is an atom with more than one proton but no neutron
40. An atom has equal number of proton, electron and neutron
41. An atom of one element is differ from an atom of another element only by their physical properties.
42. Atoms of the same elements have different masses
43. “The mass of one element combining with affixed mass of the other element must be in whole number ration” This is according to the law of
44. Conservation of mass B. Definite proportion C. Multiple proportion D. Mass action
45. The model of the atom that developed the statement that electrons can be described only interms of the probability of their location is
46. Bohr’s model B. Rutherford’s model C. Quantum mechanical model D. Thomson’s model
47. Which of the following is the correct ground state electronic configuration for 29Cu?
48. 1S2 2S2 2P6 3S2 3P6 4S2 3d9 C. 1S2 2S2 2P6 3S2 3Pd10
49. 1S2 2S2 2P6 3S2 3P6 4S1 3d10 D.1S2 2S2 2P6 3S2 3P64S03d10
50. Which of the following groups of elements have the same number of electronic configuration?
51. 8O-2, 15P-3, 12Mg+2, 9F- C. 12Mg+2, 11Na+, 2Ca+2, 13Al+3
52. 19K+, 13Al+3, 14Si+4, 9F- D. 19k+, 17Cl-, 15P-3, 20ca+2
53. A certain ion of an atom has a charge of -1 and a valence electron configuration of 4S2 4p6, what is the atomic number of the atom?
54. 35 B. 36 C. 26 D. 37
55. An element ‘A’ has only two naturally occurring isotopes. The first isotope have 29 protons and 34 neutrons with fractional abundance of 70%. If the average atomic mass of the element ‘A’ is 63.5, the number of neutrons present in the second isotope must be
56. 65 B. 36 C. 35 D. 29
57. Which of the following ideas is introduced by Bohr’s model of an atom?
58. The structure of an atom resembles the solar system
59. For atoms of the known elements there are four types of sublevels
60. Electrons revolve around the nucleus in a circular orbit called shell
61. Electrons are embedded in appositively charged sphere
62. The property of the element with atomic number 24 resembles that of the element with atomic number of
63. 42 B. 25 C. 29 D. 37
64. Which of the following species has the largest atomic radii?
65. 17Cl- B. 15P-3 C. 16S-2 D. 7N-3
66. An atom is electrically neutral because it contains

A. An equal number of electrons and protons

B. An equal number of electrons and neutrons

C.More electrons than protons

D. More protons than electrons

1. To which group and period of the periodic table does an elements with atomic number of 31 belongs?

 A. Group IA and period 4 C. Group IIIA and period 4

 B. Group IIIA and period 2 D. Group IIA and period 4

1. Which of the following statement is not true about the properties of the elements in the periodic table?

 A. Elements at the left side of the period have low ionization energy

 B. The reason for the increase of atomic radii down in the group is due to the

increase in nuclear charge

 C. Elements at the left side of the period have large atomic size

 D. Electron affinity of the elements increase from right to left across the period

1. In any groups of the periodic table elements

A. Become more reactive in moving down a group

B. Accept electron more readily as atomic number increase

C. Gain electron more readily as ionization energy decrease

D. Lose electron more readily as electron negativity decrease

1. The formula of ionic compound between group IIIA metals “M” and group VIA non-metal

 “X” will be A.M3X2 B.M2X3 C.MX3  D.M2X

1. The type of bond formed between elements of low ionization energy and highly electron affinity is

 A. Ionic bond B. Covalent bond C. Coordinate covalent bond D. Metallic bond

1. In the Lewis structure of PCl3 Phosphorous is surrounded by \_\_\_\_ bonding pairs and

 \_\_\_\_\_\_\_lone pair respectively

 A. 3 ,10 B.5,1 C.3,1 D.3,10

1. Which of the following molecule is polar covalent molecule?

 A.CO2  B.Ccl4  C.Ncl3 D.BF3

1. Among the following which one contain ionic and covalent bond?

 A.Pcl5  B.Sf6 C.K2NO3 D.Al2O3

1. The centeral atom violet an octet rule

 A. CO2 B.H2S C. SF4 D. SO2

1. Which of the following forces is not intermolecular force?

 A. Dipole- Dipole force B. Dispersion force

 C. Coordinate covalent bond D. Hydrogen bond

1. Hydrogen bond is not present in

 A.NH3  B.CH3OH C.H2O D. HCl

1. An element will atomic no. 11 would form ionic bond when bonded with an element with

atomic number of A.13 B.17 C.18 D.20

1. The type of bond formed when NH3 reacts with H+ (proton) is

 A. Ionic bond B. Covalent bond C. dative bond D. dispersion force

1. Which of the following is no a chemical change?

 A. Souring of milk C. heating of sugar

 B. Rusting of iron D. dissolving of NaCl in water

1. In every balanced chemical equation all of the following s are conserved except

 A. Number of atoms B. Number of mole C. Mass of number D. Number of charge

1. When the reaction :- A. Al2(SO4)3 +Mgcl2$\rightarrow $Alcl3  + MgsO4 is correctly balanced, the sum of the coefficients of the reactants and product is A.7 B.9 C.13 D.11
2. Assume that the energy of the product in a chemical reaction is 650KJ. This reaction could be endothermic if the energy of the reactants was A.650KJ B.700KJ C.600KJ D.1000KJ
3. Which of the following is an example of synthesis reaction?

 A. Nacl+ MgNO3$\rightarrow $ NaNO3 +Mgcl2 C. 2kClO3$\rightarrow $2kcl+2O3

 B.K2O +H2O$\rightarrow $2KOH D.2Al + 6Hcl$\rightarrow $2Alcl3 + 3H2

1. The type of reaction in which two or more product are formed from a single reaction is

 A. Combination B. Decomposition C. Metathetical D. Single displacement

1. Give the reaction :- 4Al + 3O2 $\rightarrow $ 2Al2O3. How many grams of Al2O3 are produced when 54g of aluminum reacts with excess oxygen?

 A. 51g B. 102g C. 204g D. 78g

1. How many litres of NO2 gas at STP are required to react with water to form 11.2 litres of No

gas according to the equation

 3NO2 + H2O $\rightarrow $ 2HNO3 +NO

1. 3.73 L B. 33.6L C. 4.31L D. 22.4L
2. In the reaction :- N2 + 3H2$\rightarrow $ 2NH3, if 7 grams of N2 gas reacts with 2 grams of H2 gas, which one of the following is not true?

 A. hydrogen is the limiting reactant C. only 0.5 gram of the excess reactant is left unreacted

 B.8.5 grams of NH3 is formed D. formation of NH3 depends on nitrogen

1. When 50g of CaO3 undergo decomposition by heat, 16g of CO2 gas was obtained. What was the percentage yield of CO2? The reaction is caco3 CaO +CO2

 A. 58.4% B. 72.7% C. 66.3% D. 89.27%

1. The oxidation number of phosphorous in Na4P2O7 is

 A. +6 B. +2 C. +5 D. +3

1. What happens to an oxidizing agent in an oxidation- reduction reaction?

 A. It is oxidized as it loss electron (s) C. It is oxidized as if gains electron (s)

 B. It is reduced as it loses electron (s) D. It is reduced as if gains electron (s)

1. which of the following is not a non- redox reaction?

 A. KOH + HCl Kcl+H2O C. Zn + H2SO4 ZnSO4+H2

 B. CaCO3 + AlCl3  Al2 (CO3)3 +Cacl2  D. Agcl+ NaNO3 AgNO3 +Nacl

1. One of the following is not a pre- condition for a reaction to occur?

 A. proper orientation B. activation energy C. nature of the reactant D. effective collision

1. Except one all of the followings can affect the rate of a reaction?

 A. surface area B. temperature C. concentration D. solubility

1. Which of the following molecules has no lone pairs of electrons on the central atom?

 A. NH3  B. OF2  C. SF2 D. BC$l$

1. The amount of heat released when one mole of liquid is converted a solid is called

 A. the amount of heat released C. molar heat of crystallization

 B. Molar heat of fusion D. Molar heat of sublimation

1. Which of the following is not a characteristic of chemical equilibrium?
2. Rate of forward and reverse reactions are constant
3. The macroscopic properties are kept constant
4. The concentration of reactants and products are equal D.The reaction are dynamic
5. Given the reaction 2SO2(g) + O2(g) + heat 2SO2(g) which change will result in a decrease in the amount of SO3?
6. Increasing concentration of SO2 C. Decreasing pressure
7. Increasing temperature D. Decreasing volume
8. Which of the following reactions of equilibrium is not affected by pressure?
9. N2(g) + 3H2(g) 2NH3(g) C. H2(g) + F2(g) 2HF(g)
10. 2(g) + O2(g) 2H2O(l) D. PCl3(g) + Cl2(g) PCl5(g)
11. The equilibrium constant (kc) expression for:-2H2O(l) 2H2(g) +2(g) is
12. [H2] [O2] C. [H2]2 [O2]
13. [H]2 + [O2] D. [H2]2 [O2]
14. 3 moles of (NH4)2 HPO4 contains
15. 16 moles of nitrogen C. 7 moles of oxygen atoms
16. 27 moles of hydrogen atoms D. 24 moles of hydrogen atoms
17. Which of the following changes will always increase the amount of products at equilibrium?
18. An increase in pressure C. Increase the reactant concentration
19. An increase in temperature D. Addition of catalyst
20. The volume of a certain confined gas is doubled while the pressure is held constant. What will happen to the temperature of this gas?
21. It will decrease by half C. It will increase by four factor
22. It will be doubled D. It will remain the same
23. The average kinetic energy of gas molecules is directly proportional to

A. The total pressure of the gas

 B. The volume occupied by the gas

 C. The absolute temperature of the gas

 D. The number of molecule of the gas

1. The type of physical state which occur at high temperature and low pressure

 A. Solid state C. Gaseous state

 B. Liquid state D. The number of moles of the gas

1. What is the density of CO2 gas at 1atm & 25oc? [R=0.082L.atm/mol.k]

 A. 21.5g/L B. 1.8g/L C. 0.5g/L D. 1.2g/L

1. Oxygen gas (O2) diffuses 2 times an unknown gas. What is the molar mass of the unknown gas?

 A. 128 B. 64 C. 22.6 D. 8

1. Equal volume of different gasses at constant temperature and pressure have equal number

of molecules. This is the law of stated by

 A. Boyle’s B. Charle’s C. Lussac’s D. Avogadro

1. A 10 litres of gas exerts a pressure of 40 atm at constant temperature. What is the new

volume of the gas if the pressure is changed to 80 atm at constant temperature?

 A. 5L B. 20L C. 2.5L D. 10L

1. The volume of 64g of methane gas (CH4) at 27oc and 4atm is

 A. 11.2L B. 49.2L C. 24.6L D. 2.214L

1. The first organic compound synthesized from inorganic compounds has a molecular formula of

A. NH4Cl C. AgCNO

B. NH4CNO D. (NH2)2CO

1. Isomers are different in all of the following except

 A. Physical properties C. Molar Mass

 B. Structure D. Arrangement of atoms

1. Which one of the following reaction is a good example of elimination rxn?

 A. CH4 + 2O2$\rightarrow $ CO2+2H2O C. CH2= CH2+H2O $\rightarrow $ CH3 CH2OH

 B. CH3 CH2 CH3 +Cl2$\rightarrow $ CH3 CH2 CH2Cl +HCl D. CH3 CH2CH2 CH3$\rightarrow $ CH3CH= CH2+CH4

1. All of the following reactions can produce alkane except

 A. CH3COONa +NaOH$\rightarrow $ C. 2CH3Cl + 2Na$\rightarrow $

 B. CH3 CH2 CH= CH2 +H2$$ D. CH2= CH2 +H2ON $ \rightarrow $ H2SO4

1. Which one of the following hydro carbon can exhibit cis – trans geometrical isomerism? cis- trans

 A. Cl2C= Ccl2  B. CH2= CH2 = CH2- CH3 C. CHCl = CHBr D. CHCl= CBr2

1. The compound CH3CH2OCH2CH2CH3 is

 A. aldehyde C.Ester

 B. Ketone D. Ether

1. Which of the following element is found in the most organic compounds combined with carbon atom?

 A. Nitrogen C. Hydrogen

 B. Oxygen D. Chlorine

1. Which of the following represents aternary acid? A. HF B. H2SC. HNO3 D. HCN
2. During electrolysis process

 A. Cations lose electrons to form atoms C. Cations are oxidized

 B. Anions are attracted to the positive electrodes D. Anions are reduced

1. Suppose that you want to electroplate a spoon made of iron with silver which of the following conditions will make the process workout correctly?

 A.The electrolyte should be made of any soluble salts of iron

 B. The spoon should be made the chathode

 C. The electrolyte should be made of any soluble salts of iron and silver

 D. The electrolyte can be made from any soluble salts except from iron and silver

1. Which of the following is used as an electrolyte in Leclanche dry cell?

 A.NH4Cl B. MnO2 C. ZnCl2 D. H2SO4

1. Which of the following process uses a Galvanic cell?

 A. Purification(refining) of metals C. Lead storage battery

 B. Electrolysis of brine solution D. Production of sodium from NaCl

1. Which of the following solution shows current flow in an electronic cell?

 A. Molten solution of sugar C. Solid sodium chloride

 B. Solution of ethanol D. Hydrochloric acid

1. Compounds that occur widely in glass, cement and ceramics are

 A. Carbonates B. Chlorides C. Silicates D. Nitrates

1. What substance is used as a bleaching agent to bleach the brown syrup in the sugar manufacturing process?
2. Cl2  B. SO2  C. H2O2  D. O3
3. Which of the following methods is used to reduce air pollution?
4. Recycling of agricultural wastes C. reducing emission of CO2
5. Increasing use of organic fertilizers D. Recycling of non-biodegradable materials
6. Nitrates and phosphates as water pollutant
7. Causes death of water organisms C. increase the amount of dissolved oxygen
8. Speed up water borne diseases D. accelerate the growth of plants in the water
9. The substance that deplete the ozone layers is A. CO2 B. CFCs C. Heavy metals D. oxides of nitrogen
10. Global warming is caused by the high accumulation of --------- in the air. A.SO2 B. NO2 C. CH4 D. CO2
11. Which of the following cycles is the slowest cycle?
12. Carbon cycle B. Nitrogen cycle C. Phosphorous cycle D. Sulphur cycle
13. Which of the following process is not included in the sulphur cycle?
14. Mineralization Incorporation C. Assimilation D. Oxidation
15. The permissible level of toxicity in the atmosphere is known by
16. Threshold limit value B. Dissolved oxygen C. Biological oxygen demand D. Dissolved organic matter
17. The major source of land, air and water pollutant among the followings is
18. Harmful heavy metals C. Excessive use of fertilizers
19. Non-biodegradable materials D. Un treated wastes
20. Which of the following is not a member of greenhouse gases? A. CO2  B. CH4 C. N2O D. O2& N2
21. A way of treating and cleaning wastes after it is generated is
22. Prevention B. Atom economy C. Reduce derivatives D. Design of saferchemicals
23. Which of the following is the best definition of **electro negativity**? A. Electro negativity is the energy required for a gaseous atom to gain an electron. B. Electro negativity is the attraction of an atom for a bonding pair of electrons. C. Electro negativity is the attraction b/n the nucleus and the valence electrons of an atom. D. Electro negativity is the ability of an atom to attract electrons from another atom.
24. Which of the following electromagnetic radiation has the shortest wave length but has highest frequency and energy? A. Ultraviolet (UV) rays B. microwaves C. Gamma rays D. Infrared (IR) rays
25. Ionic compounds are formed between elements of: A. High ionization energy & high electron affinity B. Low ionization energy & low electron affinity C. High ionization energy & low electron affinity D. Low ionization energy& high electron affinity
26. Which one is **not** the property of ionic compounds? Ionic compounds: A. have high boiling & melting points at room temperature B. do not occur in molecular form C. are aggregates of positive and negative charges D. can conduct electricity in all physical states
27. An element `**M**` when reacted with oxygen form the compound of the form M2O3. Element `M` could be: A. Potassium B. Magnesium C. Aluminum D. Barium
28. Which property generally decreases down a group in the periodic table? A. atomic size valence electron B. Number of energy level C. first ionization energy
29. The energy change when an extra electron is added to an atom or ion is:A. Electro negativityB. Ionization energy C. Electron affinity D. Electro positivity
30. Which of the following element has the lowest first ionization energy? A. Potassium B. Sodium C. Calcium D. Aluminium
31. Which of the following is not correctly arranged based on their atomic size (radius)? A. Al3+,F- ,Na+,Mg2+,O2-B. Al3+Mg2+, ,Na+, F-, O2-C. O2-,F-, Na+, Mg2+ ,Al3+D.F- ,O2-,Al3+, Mg2+ , Na+
32. The four possible quantum numbers for the valence shell (last electron) of Potassium (19K) is A. n=3, l=2, ml=2, ms=+1 B. n=4, l=1, ml=0, ms=-1/2 C. n=4, l=0, ml=0, ms=+1/2 D. n=4, l=2, ml=1, ms = +1/2
33. Copper has two isotopes. These are **63Cu** and **65Cu**. If the average atomic mass copper is 63.546amu, what is the percentage abundance of the two isotopes respectively? A. 69.1% and 30.9%B. 48.67% and 51.33% C. 30.9% and 69.1% D. 51.33% and 48.67% E. None
34. The classification of elements in the modern period table is mainly based on A. mass number B. physical property C. Electron arrangement D. Natural abundance
35. Which of the following ionic compound does not obey the octet rule? A. Cacl2B. FeCl2C. KClD. MgCl2
36. What is the atomic number of a neutral atoms having outer most shell electron configuration of 4d7? A. 45 B.43 C. 51 D. 47
37. For degenerate orbitals, each must be singly occupied with an electron before any one orbital doubly occupied. This statement refers to A. Aufbau principle B. Hund`s rule C. Pauli`s exclusion principle D. Heisenberg`s uncertainity principle
38. Isotopes of an element has the same chemical properties due to: A. have the same number of proton B. have different number of neutrons C. have the same atomic number D. have the same valence electrons
39. The energy required to remove an electron from an iron atom is 7.21x10-19J. What is the wave length of light(in nm)? A. 250 B. 300 C. 289 D. 276
40. Which of the following has the lowest electro negativity? A. Carbon B. Beryllium C. Magnesium D. Boron
41. Which of the following is not a physical property? A. Dissolving ionic compounds in water B. Reacting NaOH with HCl C. Boiling of water D. Converting solid sodium to gas
42. An atom has an atomic number of 31 and a mass number of 70. How many electrons will it have in its valence shell? A. 3 B. 2 C. 4 D. 5
43. Which pairs fails to represent atomic number of elements that belong to the same group in the periodic table? A. 20 and 56 B. 39 and 21 C. 33 and 51 D. 18 and 52
44. The electron configuration of the ion M2+ ends with 3d10. Which of the following is true about this element? A. its atomic number is 28 B. its electron configuration is [Ar]4s23d8C. its found in period 3 and group IIB D. it is representative element
45. The subshell that is found in every main shell is A. P B. d C. f D. S
46. Which group of elements is characterized with ns2np6 outer electron configuration? A. IVB B. VIIA C. VIA D. VA
47. Which of the following ionic compound has the highest lattice energy? A. LiCl B. NaCl C. CsCl D.KCl
48. The branch of chemistry that study about oxides, silicates, sulphates, carbonates, nitrates,phosphates and chlorides is A. Physical chemistry B. Analytical chemistry C. Organic chemistry D. Inorganic chemistry
49. The basic criteria for 12Mg2+ and 9F- to be called **iso-electronic**is that: A. Both have the same number of proton C. Both have the same electron figuration B. Both are found in the same period in the periodic table D. Both are electrically charged
50. Which of the following is not a factor for the formation of ionic bonding? A. Ionization energy B. Electro negativity C. Lattice energy D. Electron affinity
51. As the value of principal quantum number becomes larger and larger A. Electrons move from higher to lower orbit B. The radius of the orbit decreases C. Atoms loss more energy D. The frequency of the atom increases
52. The molecular geometry of a covalent molecule with five sets of electrons from which three are bonding pair and two are lone pair is A. Seesaw B. T shape C. Trigonal bipyramidal D. Linear
53. The expression X + e− → X− + energy, where X =nonmetal indicates A. Electro negativity B. Ionization energy C. Electro positivity D. Electron affinity
54. Which one of the followings electronic configurations is reasonable for the ground state of an atom? A. 1s22s22p63s13p1 B. 1s22s22p63s23p5 C. 1s22s22p63s23p63d104s24p1 D. 1s22s22p63s23p64s23d84p1
55. The correct increasing order of energy of 4f, 5p, 6s and 5d orbital is: A. 4f <5p <5d <6s B. 4f <6s< 5d< 5p C. 5p <6s <4f< 5d D. 5p< 5d <6s <4f
56. Which of the following atom in the ground state has two half filled orbital? A. Oxygen B. Silicon C. Phosphorous D. Nitrogen
57. Which of the following quantum number is **not** allowed for an electron of n, l, ml and ms respectively? A. 3, 2, -1, ½ B. 3, 0, -1, ½ C. 1, 0, 0, ½ D. 6, 5, -4, ½
58. Which sub shells with the following designations cannot exist in an atom? A. 3S B. 3P C. 3f D. 3d
59. Which sub shell notation is written correctly for a given n and l - values A. n=4, l=2 is 4p B. n=3, l=1 is 3s C. n=4, l=2 is 4d D. n=3, l=1 is 3s
60. If an electron undergoes all the possible transitions from higher n- orbit to the second excited state(n=3),the line produced is A.Lyman series B. Paschen series C. Balmer series D. Bracket series
61. An electron drops from n=5 to n=1 and produce a continuous spectral lines called Lyman series which is equal to A. Ultraviolet series B. Visible series C. Infrared series D. Microwaves series
62. Except one all of the following molecules are correctlrly written with its type of hybridization A. SO2→ Octahedral B.BF4-→Tetrahedral C. COCl2 → Trigonal planar D. CS2 →Linear
63. The wave length of a photon emitted during a transition from ni =5 State to nf = 2 state in the hydrogen atom is A.434nm B.242nm C. 138nm D. 327nm
64. If an electron makes a transition from n =2 to n= 3 in the Bohr model of the hydrogen atom, the energy of the hydrogen line that corresponds to this transition is A.4.58x10-19 J B.3.03x10-19J C. 2.76x10-19JD. 1.96x10-19J
65. The velocity of an electron is 1x106 m/s.What is the de Broglie wave length? A.3.27x10-9m B.6.17x10-14 m C. 7.27x10-10m D. 4.25x10-10m
66. Which of the following elements has the lowest first ionization energy? A. Potassium B. Aluminium C. Magnesium D. Sodium
67. The type of a molecule containing four bonding pairs and 2 lone pairs electrons on the central atom is likely to be A. AX2E3 B. AX4E2 C. AX3E3 D. AX2E4
68. Except one all have a linear molecular geometry A.CO2 B. XeF2 C. ClF3 D. IF2
69. If element A has low ionization energy and element **B** has high electron affinity. The type of bond formed between element A and B is A. Coordinat covalent bond B. Covalent bond C. Ionic bond D. Metallic bond
70. How many possible values of the azimuthal quantum numbers are there for an electron on 6P? A. 0,1,2,3,4,5 B.6 C. 1,2,3,4,5 D.7
71. Which set of quantum number (n, l, ml, ms) is not permitted by the rules of quantum numbers respectively? A. 3,1,0,1/2 B. 3,2, -2, ½ C. 4 , 2, -1, ½ D. 2 , 2, 1 , ½
72. For a 5p orbital, the value of n and l respectively are A. 5 , 2 B. 5, 1 C. 4, 2 D. 4 , 1
73. Which molecule is **not** correctly matched with its dominant intermolecular force? A. NH3 –hydrogen bond B. Cl2 –dispersion force C. HCl – dipole-dipole force D. CH3CH2OH- London force
74. Which statement **is correct** among the followings A. SO2, H2O, NH3 and SF4 are all polar molecules B. the total number of electrons in CO3-2 are 20 C.Cu2O, LiF, FeCl3 and KF all violet octet rule D. H2O, NH3, HI, CH3OH all contain hydrogen bond
75. Which statement is **not** true for the reason why atoms combine together? A. to get a nearest noble gas electron configuration B. to become electrically unstable C. to lower their energy D. to produce new substances wit new properties
76. All of the followings are characteristics of ionic compounds in their solid phase except A. high melting and boiling point B. solubility in water C. high electrical conductivity D. insolubility in organic solvents
77. The change in enthalpy that occurs when an ionic solid is separated in to an isolated ions in the gas phase is A. Ionization energy B. Sublimation energy C. Electron affinity D. Lattice energy
78. Which of the following pairs of energies are totally endothermic? A. heat of sublimation and lattice energy B. ionization energy and dissociation energy C. electron affinity and lattice energy D. ionization energy and electron affinity
79. Which of the following species represent a molecule? A. CO2 B. CuO C. NaCl D. Li2O
80. As the number of electrons shared between two atoms increase A. number of bonds formed decreases B. strength of bond increases C. bond length increase D. more number of lone pairs left on the central atom
81. Which of the following atom in the ground state has **two unpaired** electrons? A. Oxygen B. aluminum C. Phosphorous D. Nitrogen
82. Which of the following electronic configurations for the electrons in P-orbital of nitrogen atom satisfies Hund`s rule? A. $↾ ⇂ ↾$ B.$ ↾⇂ ↾$ C.$ ↾ ↾ ↾$ D. $↾ ↾ ⇂$
83. Which of the following quantum number is **not** allowed for an electron of n, l, ml and ms respectively? A. 3, 2, -1, ½ B. 3, 0, -1, ½ C. 1, 0, 0, ½ D. 6, 5, -4, ½
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85. Which **sub shell notation** is written **correctly** for a given n and l - values A. n=4, l=2 is 4p B. n=3, l=1 is 3s C. n=4, l=2 is 4d D. n=3, l=1 is 3s
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91. How many possible values of the **azimuthal quantum** numbers are there for an electron for n=6? A. 0,1,2,3,4,5 B.6 C. 1,2,3,4,5,6 D.7
92. Which one of the following compound contains ionic bond? A.PCl5 B. H2O C. Li2O D. CO2
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95. Which of the following pairs of energies are totally endothermic? A. heat of sublimation and lattice energy B. ionization energy and dissociation energy C. electron affinity and lattice energy D. ionization energy and electron affinity
96. All of the following species in the central atom **do not** obey the octet rule except A. FeCl3 B. BeF2 C. K2O D. BF3
97. How many 3d electrons are present in the ground state of chromium (Cr)? A. 5 B. 4 C. 3 D. 10
98. Which of the following periodic properties of elements **decrease** down a group in main group elements? A.Nuclear charge B. atomic size C. Electro negativity D. metallic character
99. The correct electronic configuration of **P-3** is? A.1s22s22p63s23p3 B. 1s22s22p63s2 C. 1s22s22p63s23p6 D. 1s22s22p63s23p1
100. Which of the following is not a factor for the formation of ionic bonding? A. Ionization energy B. Electro negativity C. Lattice energy D. Electron affinity
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109. Ionic compounds are formed between elements of: A. High ionization energy & high electron affinity B. Low ionization energy & low electron affinity C. High ionization energy & low electron affinity D. Low ionization energy& high electron affinity
110. What is the scientific notation of a number 0.004851 in two significant figures?
111. 4.8 x $10^{-3}$ B. 4.8 x $10^{-2}$ C. 4.9 x $10^{-3}$ D. 4.851 x $10^{-3}$
112. Which of the following is not a base SI unit?
113. Kelvin B. second C. Joule D. Ampere
114. Daltons was correct in his statement that states as
115. Atoms of different element have different chemical properties
116. Matter is made up of very small particles called atoms
117. Atoms are indivisible and indestructible
118. Atoms of the same elements are alike
119. The information obtained from the following quantum number is **not correctly** related in A. Principal quantum number → size of the orbital B. Azimuthal quantum number → number of sub shells present with in any shell C. Magnetic quantum number → Shape of the orbitals D. Electron spin quantum number → direction of the electron
120. A compound always contains the same element in the same proportion by mass. This

statement refers to \_\_\_\_\_

1. The law of conservation of mass C. The law of indestructibility of matter
2. The law of multiple proportion D. The law of constant composition
3. In which one of the following numbers are all of the zeros significant?
4. 0.0201 B. 200.080 C. 1040 D. 0.1000
5. In the titration process, an acid or base with the **unknown concentration** is called A. analyte B. titrant C. end point D. equivalent point
6. In which of the following acid- base titration, the resulting solution will have a **PH less than seven (7)** at the equivalence point?
7. Strong acid- strong base titration C. weak acid- strong base titration
8. Strong acid- weak base titration D. non e of the above
9. What is the ionization constant (Ka) for a weak acid (HA) that is 1.60% ionized in a 0.005M solution? A.1.28x10-6 B. 8 x10-5 C. 3.5 x10-8 D. 2.52 x10-4
10. Salt of a weak acid with strong base when dissolved in water gives:-
11. Acidic solution B. Basic solution C. Neutral solution D. strongly acidic solution
12. How many milliliters (Ml) of water are required to dilute 100mL of 2.5MH2SO4 to 2MH2SO4? A. 125 B. 25 C. 80 D. 150
13. What grams of calcium metal must react with 100mL of 2MHCl according to the balanced reaction Ca + 2HCl 🡺 CaCl2 + H2 A. 4g B. 0.4g C. 40g D. 0.04g
14. According to an Arrhenius concept, an acid is defined as any substance that
15. Donates a pair of electrons C. Donates a proton to abase
16. Releases hydrogen ion in water D. Increases the concentration of hydroxide ion in water solution
17. A solution of weak base “B” has PH of 9. If we add small amount of a salt containing the conjugate acid of “BH+”, which of the following statement is true about the solution?
18. The PH increase and the POH decrease C. the PH decrease and the POH increase
19. Both the [OH-] and POH increase D. [OH-] increase and PH decrease
20. The conjugate acid of C6H5NH2 is
21. C6H5NH-  B. C6H5NH$$C. C6H5NH3 D. C6H5NH$$
22. The PH of a solution containing 0.1M HF is (Ka= 6.8x10-4)
23. 3.43 B. 0.89 C. 1.74 D. 2.08
24. HF(Ka= 6.8 x10-4) is a weak acid and NH3(Kb= 1.8x10-5) is a weak base. A salt solution of NH4F would be A. Strongly acidic B. weakly basic C. neutral D. weakly acidic
25. Consider the following acids with their Ka values Acids Ka values

CH3COOH 1.8x10-5

 HCN 4.9X10-10

 HF 6.8 x10-4

HNO2 4.5 x10-4Which of the following aqueous solutions of these acids will have the **smallest**PHvalue? A. 1MCH3COOH B. 1MHCN C. 1MHF D. 1MHNO2

1. The hydrogen ion concentration for a solution with **POH** of 9 at 250C is
2. 1x10-9M B. 1x10-7M C. 1x10-5M D. 1x 10-14M
3. Which of the following is a conjugate acid /base pair?
4. HCl/OCl-  B. H2SO4/$HSO\_{3}^{-}$ C. H2O/ H3O+ D. $NH\_{4}^{+}$|$NH\_{3}^{- }$
5. Which of the following combination **cannot** produce a buffer solution?
6. HCN/NaCN B. HNO3/NaNO3 C. HNO2/NaNO2  D. NH3/NH4Cl
7. Which of the following statement is**true**?
8. Addition of NaOH to a solution of HNO3 will increase the POHof the solution
9. Addition of HCl to a solution of NaOH will decrease the POH of the solution
10. Addition of HNO3 to a solution of H2SO4 will decrease the POH of the solution
11. Addition of NaOH to a solution of HCl will decrease the POH of the solution
12. What is the conjugate base of$ HPO\_{4}^{2-}$? A. H3PO4 B. H2$PO\_{4}^{-}$ C. $HPO\_{4}^{2-}$ D. $PO\_{4}^{3-}$
13. What is the concentration of hydroxide ions (OH-) in solution with PH= 4at 250C? A.4 x 10-4B. 1 x10-10 C. 1 x 10-4 D. 4x 10-10
14. Which of the following is conjugate acid- base pairs for the reaction

 H2$PO\_{4}^{-}$ (aq) + H2O (l) $\rightarrow $ H3O+ (aq) +$ HPO\_{4}^{2-}$

1. H2$PO\_{4}^{-}$ /$PO\_{4}^{3-}$B.H2O/H$PO\_{4}^{2-}$ C.H2$PO\_{4}^{-}$/$HPO\_{4}^{2-}$ D.H$PO\_{4}^{2-}$/$PO\_{4}^{3-}$
2. All of the following can act as Bronsted- Lowry base **EXCEPT**;-
3. I- B. NH3 C. $HCO\_{3}^{-}$ D. $NH\_{4}^{+}$
4. Which one of the following is **not** the correct feature of the strong acid- weak base titration?
5. The POHis less than seven before equivalence point
6. The PH is less than seven at equivalence point
7. The PH continues its sharp rise after equivalence point
8. Has a decreasing titration curve
9. Which of the following species can **NOT** act as a Lew’s acid?

 A. Fe2+ B. BeCl2 C. BF3D. NH3

1. What is the molarity of a solution containing 20g of sulphuric acid (H2SO4)in 200ml of solution respectively?
2. 0.4M B. 1.25M C. 0.1M D. 0.5M
3. Which of the following aqueous solution will be basic ?
4. NaCl B. Na2CO3 C. Na2SO4 D. KNO3
5. Consider the following: PO4**3-**, HPO4**2-**, H2PO4**-**,H3PO4**.** The term amphiprotic can be used to describe:

 A. PO4**3-**only C. HPO4**2-**and H2PO4**-**only

 B. PO4**3-**, HPO4**2-**, H2PO4**-**only D.HPO4**2-**, H2PO4**-**, H3PO4 only

1. What is the [H3O**+**] at the equivalence point for the titration between HCl

and KOH? A. 1**.**0x10**-9** M B. 1**.**0x10**-7** M C. 1**.**0x10**-5** M D. 0**.**01 M

1. When equal volumes of the following four 0.1M aqueous solutions are arranged in order of increasing PH value, what is the correct order?
2. CH3COOH <HNO3< CH3COONa< KOH
3. HNO3<CH3COOH< CH3COONa< KOH
4. CH3COONa<HNO3<CH3COOH< KOH
5. KOH < CH3COONa<CH3COOH<HNO3
6. Which of the following classes of chemistry studies about inter conversion between electrical and chemical energies? A. Thermochemistry B. Electrochemistry Thermodynamics D. Physical chemistry
7. Which of the following chemical reaction shows oxidation reaction? A. SN+4 + 2e- → Sn+2 B. Cl2 → 2Cl- -2e- C. S-2 -2e- → S D. Mg → Mg+2 +2e-
8. A non-redox reaction among the followings is A. Ca +H2SO4 → CaSO4 +H2 B. 2KClO3 → 2KCl + 3O2 C. Cl2 + H2O → HCl + HClO D. AgCl + KNO3 → AgNO3 + KCl
9. Reactions in which the same compound can serve as both reducing agent and oxidizing agent is called A. Spectators B. Non-redox reactions C. Disproportionation reaction D. Overall reaction
10. In the reaction:- 2H2S + SO2 → 3S + 2H2O, the reducing agent is A. H2S B. SO2  C. S D. H2O
11. The oxidation number of chlorine is large in A. HClO B.HClO2 C. HClO3 D. HClO4
12. After the reaction : P + HNO3 → H3PO4 + NO2 + H2O is completely balanced, the coefficients of the reactants and products respectively are: A. 1,5,2,5,2 B. 2,5,1,5,2 C. 2,5,2,5,2 D. 1,5,1,5,1
13. Methane (CH4) undergoes combination reaction to form CO2 and H2O. What is the ratio of the coefficients of oxygen to methane when the reaction is completely balanced? The reaction is: CH4 + O2 → CO2 + H2O A. 1:2 B. 2:1 C. 5:2 D. 1:1
14. Which of the following reaction is not balanced? A. Cr2O7-2 + 3H2S + 8H+ → 2Cr+3 +3S +7H2O B. 5SO3-2 + 2MnO4- + 3H2O → 5SO4-2 + 2Mn+2 +6OH- C. 2I- + 2NO2- + 4H+ → I2+ 2NO + 2H2O D. 5Fe + MnO4- + 8H+ → 5Fe+3 + Mn+2 + 4H2O
15. Which one of the following solutions **shows current flow** in an electrolytic cell? A. water solution of sodium chloride B. solution of glucose C. solution of sugar D. solid forms of ionic compounds
16. Which one of the following is not correct about voltaic cells? A. anode is negative B. cathode is positive C. oxidation takes place at the anode D. redox reaction produce electricity in the cell
17. Electrolysis is not used for A. Production of metals and non-metals B. Production of electricity C. Purification of metals D. Electroplating of metals
18. The charge carriers in metallic (electronic) conductors are A. freely moving ions B. anions only C. delocalized electrons D. Cations and anions
19. During the electrolysis of brine solution, the anode half reaction involves A. the oxidation of sodium atoms in to ions B. the reduction of chlorine atoms to give chloride ions C. the oxidation of hydroxide ion (OH-) in to hydrogen and oxygen D. the oxidation of chloride ions to elemental chlorine.
20. Voltaic cells and electrolytic cells are differ in that A. anode is positive and cathode is negative in both types of cells B. both types of cells contain two electrodes in contact with electrolysis C. Reduction half reactions occurs at the anode and oxidation half reactions occurs at the cathode in both types of cells D. reduction half reactions occurs at the anode in both types of cells.
21. The conduction of electricity through each of the following substances is caused by the migration of ions except in one case. The exception is A. molten NaCl B. fused PbBr2 C. aqueous solution of KCl D. copper metal
22. Four different solutions of equal concentration (1M) were prepared as an electrolyte. The conduction of electricity is least in the solution containing A. CH3COOH B. HCl C. H2SO4  D. HNO3
23. If Cl2 and Br2 are added into an electrolytic cell contains an aqueous solution of Cl- and Br-, what amount of potential will be produced by the cell?

Given: Cl2 + 2e- 2Cl-, Eo= +1.36V

Br2 + 2e- 2Br-, Eo= +1.08V

1. -0.28V B. 0.28V C.2.44V D. -2.44V
2. Which of these processes is **NOT** spontaneous process?
3. The cooling of a block of hot metal to the temperature of its surroundings.
4. The expansion of a gas into a vacuum.
5. The boiling of water in an open pot at a very hot day.
6. The flow of viscous oil out of an overturned bottle.
7. What amount of electric current is needed to deposit 0.52g of chromium metal from a solution of Cr3+ in a period of 965 sec?
8. 0.408A B. 7.9A C.3A D. 0.79A
9. Which one of the following reaction represents the following cell notation?

Co(s)/Sn4+(aq)//Co2+(aq)/Sn2+(aq)

1. Co2+ (aq ) + Sn2+(aq) Co(s) + Sn4+(aq)
2. Co2+(aq) + Sn4+(aq) Co(s) + Sn2+(aq)
3. Co (s) + Sn4+ (aq)  Co2+(aq) + Sn2+(aq)
4. B and C
5. Which of the following electrolysis have the same cell reaction with the electrolysis of dilute aqueous H2SO4? A. Electrolysis of brine solution B. Electrolysis of concentrated lead chloride salt C. Electrolysis of concentrated HCl solution D. Electrolysis of dilute NaCl solution
6. Which of the following is not always correct?
7. Active metals are prepared by electrolytic reduction of their salt solutions
8. Metals prepared by chemical reduction of their ores are purified by electrolysis method
9. Elements with higher reduction potential are strong oxidizing agents
10. Electrolytic cells convert electrical energy to chemical energy
11. In an operating Galvanic cell, the function of a **salt bridge** is to A. allow hydrolysis to occur B. allow a non-spontaneous reaction to occur C. allow electrical neutrality between the solutions D. transfer electrons from the cathode to the anode
12. For the reaction: Mg(s) + Ni+2(aq) → Ni(s) + Mg+2 (aq) E0Mg+2/Mg = -2.37V and EoNi+2/Ni = -0.25v. What is the **Eocell** for this reaction? A. +1.12V B. -2.62V C. -1.12v D. +2.26v
13. The correct **cell notation** for the balanced reaction : Fe(s) + Cu+2(aq)→ Fe+3(aq) + Cu(s) A. Cu(s)/Cu+2(aq) // Fe+2(aq)/Fe(s) B. Fe(s)/Fe+2(aq)// Cu+2(aq)(s)/Cu(s)

C.Fe+2(aq)/Fe (s)// Cu/Cu+2(aq) D. Fe(s)/Fe+2(aq) //Cu(s)/Cu+2(aq)

1. What makes a Galvanic cell different from an electrolytic cell? In a Galvanic cell:-
2. The cell reaction is spontaneous. .
3. The transformation of electrical energy into chemical energy takes place.
4. External source of battery is needed.
5. The reaction is non-redox reaction
6. Which one of the following is not correct about voltaic cells? A. anode is negative B. cathode is positive C. oxidation takes place at the anode D. redox reaction produce electricity in the cell
7. Which of the following is not the industrial application of electrolysis? A. Production of metals and non-metals B. Production of electricity C. Purification of metals D. Electroplating of metals
8. The charge carriers in metallic (electronic) conductors are A. freely moving ions B. anions only C. delocalized electrons D. Cations and anions
9. What amount of electric current is needed to deposit 2.7g of aluminum metal from a solution of Al3+ in a period of 9650 sec? A.0.308A B. 1.9A C.3A D. 0.003A
10. What will happen during the electrolysis of aqueous solution of CuSO4 in the presence of Cu electrodes?

A. Hydrogen gas will evolve at cathode. B. sulphate will deposit at anode

C. Oxygen gas will be released at anode. D. Copper will deposit at anode.

1. Using the data given below, E0 Cr2O72-/Cr3+ = 1.33V, E0 Cl2/Cl- = 1.36V, E0MnO4- / Mn2+= 1.51V, E0 Cr3+/ Cr, **=** -0.74v**,** Which one of the following substances is the strongest reducing agent? A.Cr3+ B. Cl- C. Mn2+ D. Cr
2. Which of the following is **not** the function of salt bridge in the galvanic cell?
3. It allows the electrical contacts in the cell.
4. It allows the electrical neutrality in the process.
5. It prevents the mixing of two solutions.
6. It allows the hydrolysis reaction to occur.
7. Which one of the following statements is **not** true about the cell notation,

 Mg / Mg2+ // Cu2+ / Cu ? (E0Cu2+/ Cu> E0Mg2+/ Mg )

1. The spontaneous cell reaction is: Mg+ Cu2+$\rightarrow $ Cu + Mg2+
2. The non-spontaneous cell reaction is: Cu + Mg2+$\rightarrow $Mg+ Cu2+
3. Copper acts as cathode in cell notation
4. The copper acts as cathode in electrolytic cell.
5. When the net ionic equations: Fe**2**+ + Cr2O7**2**-→ Cr**3**+ + Fe**3**+isbalanced by ion electromethodin acidic medium **,** the coefficient of : Fe**2+,,**Cr**3+,**Fe**3+**become respectively A.6**,**1**,** 2**,** 6 B.3**,**1**,**2**,**3 C.5**,**1**,**2**,**5 D. 1**,** 1**,** 2**,** 1
6. What will happen during the electrolysis of aqueous solution of CuSO4 in the presence of Cu electrodes?
7. Hydrogen gas will evolve at cathode. C. Copper will dissolve at anode
8. Oxygen gas will be released at anode. D. Copper will deposit at anode.
9. Which of the following is the strongest reducing agent? A. Al B. Cu C. Zn D. Mg
10. In the electrolysis of dilute K2SO4, what is formed at the cathode? A. O2 gas B. H2 gas C. K2SO4 D. H2SO4
11. In the electrolysis of molten ZnCl2, using carbon electrode, the anodic half reaction is A. Zn 🡺 Zn+2 +2e- B. Zn+2 + 2e- 🡺 Zn C. 2Cl- 🡺 Cl2 + 2e- D. Cl2 + 2e- 🡺 2Cl-
12. What are the substances formed at the anode and cathode during the electrolysis of molten brine (NaCl)? A. O2 & H2 B. Na & Cl2 C. Cl2 & H2 D. Cl2 & Na
13. In the electrolysis of molten NaI, which is true?

 A. I- migrates to anode and gain electrons B. I- migrates to anode and lose electrons

 C. Na+ migrates to anode and lose electrons D. Na+ migrates to cathode and gain electrons

1. When the cations Cu+2, Cd+2 and Zn+2 are listed from strongest to weakest oxidizing agent, the order is A. Cd+2, CU+2, Zn+2  B. CU+2,Cd+2, Zn+2 C. Zn+2 , Cd+2, CU+2 D. CU+2, Zn+2 , Cd+2
2. The product of the electrolysis of concentrated MgCl2 using inert electrode are

A. H2 & O2 B. Mg & O2 C. H2 & Cl2 D. Mg & Cl2

1. Which of the following reactions show the overall cell reaction?

 A. 2Ag + Cu+2 🡺 Cu + 2Ag+ B. 2Ag + Cu 🡺 Cu+2 + 2Ag+

C. 2Ag+ + Cu+2 🡺 Cu + 2Ag D. 2Ag+ + Cu 🡺 Cu+2 + 2Ag

1. Which of the followings are produced at the anode and cathode respectively during the electrolysis of aqueous Na2SO4 using carbon electrode?

A. Na & O2 B. H2 & O2 C. O2 & H2 D. S & Na

1. Which half-cell reaction correctly represents reduction (cathodic reaction)? A. Zn 🡺 Zn+2 + 2e- B. Zn+2 🡺 Zn + 2e- C. Zn+ 2e- 🡺 Zn+2 D. Zn+2 + 2e- 🡺 Zn
2. What are the expected products of the electrolysis of an aqueous solution of molten CaCl2? A. Ca & H2 are deposited at cathode and Cl2 and O2 are deposited at anode B. Ca is deposited at cathode and Cl2 at anode

C. Ca and H2 are deposited at cathode and only Cl2 is at anode

 D. Ca is deposited at cathode and Cl2 and O2 at anode

1. Which of the following is an active electrode?

A. Pt B. graphite C. Gold D. Zinc

1. The best oxidizing agent among the following is

 A. K+ B. Ba+2 C. Pb+2 D. Cd+2

1. Which of the following represents the same cell reaction with the electrolysis of aqueous H2SO4? A. electrolysis of concentrated HCl B. electrolysis of dilute NaCl

C. electrolysis of brine solution D. electrolysis of molten NaCl

1. Given the reaction: Fe2O3 + 3CO 🡺 2Fe + 3CO2, which is the reducing agent in this reaction?

 A. Fe B. CO C. CO2 D. Fe2O3

1. If NO2 acts as a reducing agent, a possible product formed is

 A. NO B. N2O C. N2O4 D. N2O5

1. Which of the following can act as an oxidizing agent but not as a reducing agent?

 A. Cr B. Cl- C. Cu+1 D. Na+

1. The strongest oxidizing agent among the following is A. Na B. Al C. S D. Cl
2. Which of the following molecule is easily reduced? A. Br2 B. Cl2 C. F2 D. I2
3. Which of the following is more difficult to reduce than H+ ion?

A. Cl2 B. Ag+ C. Zn+2 D. Cu+2

1. The best oxidizing agent among the followings is

 A. Na+ B. Al+3 C. Ag+ D. Cu+2

1. If NO2 undergo reduction, which one may be formed?

A. NO B. N2O4 C. N2O5 D. HNO3

1. Which of these processes is **NOT** spontaneous?
2. The cooling of a block of hot metal to the temperature of its surroundings.
3. The expansion of a gas into a vacuum.
4. The boiling of water in an open pot at a very hot day.
5. The flow of viscous oil out of an overturned bottle.
6. Use these given data

**Reaction**   **E0 (V)**

O2 + 2H2O + 4e- 4OH- +0.4

H2O2 + 2H3O+ +2e-  4H2O +1.77

PbSO4 + 2e- Pb + SO42- -0.356

2H2O + 2e- H2 + 2OH- -0.827

The correct order of the substance in increasing ability of functioning as oxidizing agent is:

1. H2O2<O2 <PbSO4<H2O C. PbSO4<H2O<H2O2<O2

 B. H2O<PbSO4<O2<H2O2 D. O2<H2O <PbSO4<H2O2

1. If Cl2 and Br2 are added into an electrolytic cell contains an aqueous solution of Cl-1 and Br-1, what amount of potential will be produced by the cell?

Given: Cl2 + 2e- 2Cl-,Eo= +1.36V

Br2 + 2e- 2Br-,Eo= +1.08V

1. -0.28V B. 0.28V C. 2.44V D. -2.44V
2. What amount of electric current is needed to deposit 0.52g of chromium metal from a solution of Cr3+ in a period of 965 sec?
3. 0.408A B. 7.9AV C. 3A D. 0.79A
4. Which one of the following reaction represent the following cell notation?

Co(s)/Sn4+(aq)//Co2+(aq)/Sn2+(aq)

1. Co2+ (aq ) + Sn2+(aq) Co(s) + Sn4+(aq)
2. Co2+(aq) + Sn4+(aq) Co(s) + Sn2+(aq)
3. Co (s) + Sn4+ (aq)  Co2+(aq) + Sn2+(aq)
4. B and C
5. Two cells (KNO3 & AlCl3) are connected in series. If 120g of Aluminum is deposited on one of the cell how much potassium is deposited on the other cell?[use mass of K=39, N=14, O=16,       Al=27 & Cl=35.5 ]A. 13.33g B. 0.075g C. 4.44g D. 0.225g E. None of the above
6. How many grams of copper are produced when 60 amperes of current are passed through copper (II) sulphate solution for 2 hours? A. 142.13g B. 284.27g C. 46g D. 126.4g E. None
7. The anode reaction is the same in all of the ff electrolytic cells except one:
8. Elctrolysis of brine solution
9. Electrolysis of fused lead chloride
10. Electrolysis of concentrated HCl solution D. Electrolysis of dilute NaCl solution
11. Which of the ff is not correct? A. Up on electrolysis of CuSO4 solution using copper electrodes, the solution remains unaffected B. The products formed at the anode from the electrolysis of acidified water or dilute H2SO4  are the same C. Active metals are prepared by electrolytic reduction of their salt solutions
12. Metals prepared by chemical reduction of their ores are purified using electrolysis method
13. Electrolytic cells convert electrical energy to chemical energy
14. During cathodic protection, the sacrificial anode
15. accepts electrons from the protected metal
16. reacts spontaneously with the protected metal
17. oxidizes more readily than the protected metal
18. causes the protected metal to become an anode
19. In order for an electrolytic cell to operate, it must have A. voltmeter B. salt bridge C. power supply D. an aqueous solution
20. For the reaction: Ni+2(aq) + Fe(s) 🡺 Ni(s) + Fe+2(aq), EoNi+2/Ni = -0.25V and EoFe+2/Fe = -0.44V. What is the value of EoCell? A. -0.19V B. 0.19V C. -0.69V D. 0.69V
21. If Eo Zn+2/Zn = -0.76V, E0Cu+2/Cu = 0.34V EoSn+2/Sn = -0.14V and E0Ni+2 = -0.25V which one is the most easily reduced? A. Zn+2 B. Cu+2 C. Ni+2 D. Sn+2
22. If EoAl+3/Al= -1.66V and EoCu+2/Cu = 0.34V, then Eocell is A. 1.32V B. 4.34v C. 2.0V D. 2.3V
23. Given the following reactions with reduction potentials as follows: EoAg+/Ag = 0.8V, EoPb+2/Pb = -0.126V and EoV+2/V = -1.18V. Which of the following reaction will occur spontaneously? A. V+2 \_ 2Ag 🡺 V + 2Ag+ B. Pb + V+2 🡺 Pb+2 + V C. Pb + 2Ag+ 🡺 Pb+2 + 2Ag D. 2Ag+ + Pb+2 🡺 2Ag + Pb
24. Consider the following half reaction

 Fe(OH)2 + 2e- 🡺 Fe + 2OH-, Eo = -0.88V

 NiO2 + 2H2O + 2e- 🡺 Ni(OH)2 + 2OH-, E0 = 0.49V. What is Eocell for the above reaction? A. -1.37V B. -0.39V C. 0.49V D. 1.37V

1. The reaction: Cu+2 + M 🡺 Cu + M+2 has Eocell = 0.75V. If Eored for Cu+2 is 0.34V, what is Eored for M+2? A. -1.09V B. -0.41V C. 0.41V D. 1.09V
2. A solution at 250C contains the metal ions Ni+2, Pt+2 and Pd+2 all at 1M concentrations. Consider the following standard reduction potentials EoNi+2/Ni = -0.25V, E0Pt+2/Pt = 1.2V and EoPd+2/Pd = 0.99V. Which metal(s) to be plated out first when the solution is electrolyzed? A. Ni B. Pd C. Pt D. Ni and Pd
3. Which metal can react spontaneously with Zn+2 ion at 25oC? A. Cu B. Ag C. Al D. Au E. Pb
4. Given the reaction: Al + 3Ag+ 🡺 Al+3 + 3Ag if EoAl+3/Al = -1.66V and EoAg+/Ag = 0.8V, then Eocell is A. 0.86V B. 1.78V C. 2.46V D. 3.38V
5. What is the standard cell potential for the reaction: 2Cr + 3Cu+2 🡺 2Cr+3 + 3Cu if EoCu/Cu = 0.34V and EoCr+3/Cr = -0.74V? A. -1.08V B. 0.4V C. 1.08V D. 2.5V
6. Which of the following metal ions can be reduced by Cd under standard conditions? A. Mg+2 B. Al+3 C. Ag+ D. K+
7. For the reaction: 2Au+3 + 3Ni 🡺 2Au + 3Ni+2, if EoAu+3/Au = 1.5 and EoNi+2/Ni = -.25V, what is Eocell? A. 3.75V B. 2.25V C. 1.75V D. 1.25V
8. What is the standard potential of the cell containing Fe+2/Fe and Br2/Br- couples if EoFe+2/Fe = -0.44V and EoBr2/Br- = 1.08V? A. -1.52V B. 2.34V C. 1.52V D. -2.34V
9. Consider the following standard voltaic cell: Fe, Fe+2 versus Au, Au+3. Which answer identifies the cathode and gives the Eocell for the reaction if Au+3/Au = 1.5V and Fe+2/Fe = -0.44V?

A. Au, 1.06V B. Fe, -0.44V C. Au, 1.94V D. Fe, 1.94V

1. If EoAl+3/Al = -1.66V, EoSn+2/Sn = -0.14V, EoZn+2/Zn = -0.76V and EoMg+2/Mg = -2.37V, the best reducing and oxidizing agents respectively are: A. Al, Mg+2 B. Zn, Sn+2 C. Sn, Mg+2 D. Mg, Sn+2
2. Given the potential reduction of Fe+2/Fe = -0.44V, Cu+2/Cu = 0.34V, Zn+2/Zn = -0.76V and Ni+2/Ni = -0.25V. Which metal is used as a sacrificial anode to prevent iron from rusting? A. Cu B. Ni C. Zn D. Cu & Zn
3. For the cell notation: **Al(s)/Al+3(aq)//Ag+(aq)/Ag(s),** the correct balanced equation is: A. Al+3(aq) +3Ag+(aq)→ Al(s) + 3Ag(s) B. Al+3(aq) + 3Ag(aq)→ Al(s) + 3Ag+(aq) C. Al(s) + Ag+(aq)→ Al+3(aq) + Ag(s) D. Al(s) +3 Ag+(aq)→ Al+3(aq) + 3Ag(s)
4. The correct **cell notation** for the balanced reaction : Fe(s) + Cu+2(aq)→ Fe+3 (aq) + Cu(s) A. Cu(s)/Cu+2(aq) // Fe+2(aq)/Fe(s) B. Fe(s)/Fe+2(aq)// Cu+2(aq)(s)/Cu(s) C.Fe+2(aq)/Fe (s)// Cu/Cu+2(aq) D. Fe(s)/Fe+2(aq) //Cu(s)/Cu+2 (aq)
5. Which element is used as a **reference** to measure the standard reduction potential of other the elements? A. Carbon B. phosphorous C. Oxygen D. hydrogen
6. For the reaction: Mg(s) + Ni+2(aq) → Ni(s) + Mg+2 (aq) E0Mg+2/Mg = -2.37V and EoNi+2/Ni = -0.25v. What is the **Eocell** for this reaction? A. +1.12V B. -2.62V C. -1.12v D. +2.26v
7. How many faradays are needed to produce 2.7g of aluminum? A. 0.1F B. 0.3F C. 1F D. 9F
8. The number of faraday`s required to produce 3.2g of oxygen is A. 0.025F B. 2.3F C. 2.5F D. 0.4F
9. How many grams of zinc will be deposited from a solution of ZnSO4 by a current of 4A flowing for 3hours? A. 2.5g B. 4.5g C. 3.8g D. 1.76g
10. For how long must a current of 2milliamper (2mA) be passed in electrolysis to form 0.3g of copper from Cu+2? A. 125.7hr B.235.4hr C. 623.56hr D. 123.7hr
11. How many moles of a trivalent metal (M) would be deposited at the cathode by the electrolysis of molten salt in a cell operated at 20A for 3hrs? A. 1.5 moles B. 2.3 moles C. 0.52 moles D. 0.75 moles
12. An aqueous solution of platinum salt is electrolyzed by passing a current of 2.5A for 2hrs. as a result 9.09g of metallic platinum are formed at the cathode. What is the charge on the platinum ion in the solution if the molar mass of platinum is 195g/mol? A. 1 B. 2 C. 3 D. 4
13. A current of 1.26A is passed through an electrolytic cell containing an aqueous solution of H2SO4 for 7.44hrs. What volume of the gas is generated at the anode at STP? ( use P= 1atm, T= 273K and R= 0.082L.atm/mol.k) A. 2.3L B. 1.96L C. 0.76L D. 4.76L
14. During the electrolysis of aqueous Cu(NO3)2, what would happen to the mass of Cu+2 if the current is doubled and time is halved of its initial? A. Stay the same B. doubled C. decreased by a factor of ½ D. increased by a factor of ½
15. A current of 15A flowing for 1hr deposits 12g of copper at the cathode. What is the equivalent mass of copper? A. 21.4g B. 0.05g C. 26.8g D. 5.63g
16. A lamp draws a current of 2A. What is the charge used by the lamp in 3 minutes? A. 6C B. 360C C. 3600C D. 7200C
17. When electricity is passed through aqueous solution of AlCl3, 20.23g of Al are deposited. What must be the number of Faraday`s required? A. 3.74F B. 0.56F C. 2.25F D. 4.76F
18. Two cells, Al(NO3)3 and CuCl2 are connected in series. If 27g of copper is deposited on one of the cell, how much of Al is deposited on the other cell? A. 6.43g B. 7.6g C. 13.7g D. 3.27g
19. Two cells are connected in series. One contains LiNO3 and the other contains MCl3. If 5g of Li was deposited in the cell containing LiNO3 whereas 6.43g of the unknown metal M was deposited in the cell containing MCl3, what is the molar mass of M? A. 9g B. 21g C. 54g D. 27g
20. The rate of a reaction is expressed by unit
21. Mol-L- B. Mol-L-S- C. MolL-S- D. MolLS-
22. For gaseous substances, Increase in pressure shifts the equilibrium position to the
23. Right B. Left C. Sometimes right and sometimes left D. no any effect
24. Catalysts have no any effect on the position of the Equilibrium. A.True B. False
25. Esterification is the reaction between

A. alcohols and ketones B. Carboxylic acids and aldehydes

C. Aldehydes and alcohols D. Alcohols and carboxylic acids

1. Which of the following is not a precondition for a reaction to occur?

A. Activation energy B. Proper orientation C. Concentration D. Effective collision

1. Reduction of esters can produce

A. aldehydes B. Carboxylic acids C. primary alcohols D. Ketones

1. **Quick vinegar fermentation process** is the industrial preparation method for
2. Ethanol B. Acetic acid C. Propanol D. butanoic acid
3. In which of the following orders of reactions, the rate of half-life reaction is **independent** on the concentration of reactants?
4. First order B. Second order C. Third order D. Zero order
5. The decomposition of AB to A and B (AB → A + B) is first order reaction with rate constant of 2x10-7sec-1. What is the half-life of this reaction at the same temperature?

 A. 2.9 x107sec B. 4.7 x106 sec C. 3.8 x105 sec D. 3.5 x106 sec

1. For the reaction: 2A + 3B → 4D + 5E**,** the rate of the reaction in terms of

 Δ [D] would be written as: A. **+** 4 Δ[D] **/**ΔtB. **+**1**/**4 Δ[D] **/**Δt C. **-**1**/**4 Δ[D] **/**Δ D. **+** Δ[D] **/**Δt

1. A mixture of NaCl in water is
2. Abivariant system C. a monovariant system
3. invariant system D. a one phase system
4. Consider the equilibrium reaction: Cl2(g) + 2NO(g) 2NOCl(g), Kc= 4. At Equilibrium [Cl2]= 1.0 M and [NO]= 2.0M. What is the [NOCl] at equilibrium A. 16M B. 8.0M C. 4.0M D. 2.0M
5. For the reaction X🡺 Y if we double the concentration of X, the rate is quadrupled (increase

four times), then the reaction is A. Zero order B. first order C. third order D. Second order

1. Which of the following is **not** a characteristic of a chemical equilibrium?
2. The concentration of reactants and products are generally equal
3. The reaction takes place in a closed vessel
4. The macroscopic properties do not change with time
5. The rate of forward reaction is equal to the rate of backward reaction
6. For the reaction:- 2C(s) + O2(g) $⇌$2CO (g), the Kc expression is
7. $\frac{2\left[CO\right]\begin{array}{c}\\\end{array}^{}}{2 \left[C\right]\left[O\_{2}\right]}$ B.$\frac{\left[CO\right]\begin{array}{c} 2\\\end{array}^{}}{\left[C\right]^{2}\left[O\_{2}\right]}$ C. $\frac{2\left[CO\right]\begin{array}{c} 2\\\end{array}^{}}{\left[O\_{2}\right]}$ D. $\frac{\left[CO\right]\begin{array}{c} 2\\\end{array}^{}}{\left[O\_{2}\right]}$
8. The reaction 2A→ B is a second order reaction in A with rate constant of 20$M^{-1}S^{-1}$.

What is the half- life of this reaction if the initial concentration of A is 0.05M in a unit of second?

1. 8.3 B. 0.12 C. 4.2 D. 1.0
2. Consider the mechanism for a reaction given below, which of the following statement is **not** correct?

 Step-1: NO2+ F2→NO2F+F (slow)

 Step-2: NO2+F→NO2F (fast)

1. Step-1 is the rate determining step C. F is an intermediate
2. the overall equation (reaction) is 2NO2+ F2→2NO2F

 D. the molecularity of the overall reaction is bimolecular

1. How a catalyst does increase the rate for a given chemical reaction? It is by
2. lowering the activation energy C. Shifting the reaction to the right
3. Shifting the reaction to the left D. increasing the volume of the reactants and products
4. Consider the following reaction at equilibrium

 CH4(g) +H2O(g) $⇌$ CO(g) +3H2(g), $Δ$H= +260kJ.

 Which of the following is **not** the true effect on the reaction?

1. Increasing temperature favors the formation of products
2. Adding CO decreases the amount of H2
3. Removal of H2 decreases the amount of CO
4. Decreasing pressure increases the amount of CO
5. For the reaction, H2(g) + Br2(g) $⇋$ 2HBr(g), Kc = 4 x $10^{4}$ at 700 k. what is the value of

Kc for the reaction. 2HBr(g) $⇋$ H2(g)+ Br2 (g) at the same temperature

1. 1.4 x $10^{-6}$ B. 5.04 x $10^{9}$ C. 1.6 x $10^{-5}$ D. 2.5 x $10^{-5}$
2. For the reaction:- C(s)+CO2(g)$ ⇌$ 2 CO(g), if the partial pressure of CO2 and CO are 2 atm & 4 atm respectively, what is the value of Kp at equilibrium for this reaction?
3. 8atm B. 4atm C. 0.5atm D. 32atm
4. Which of the following is likely to be happen when pressure is applied to the following reaction at equilibrium? A(s) $⇌$A(l)
5. More water will be formed C. water will evaporate
6. More ice will be formed D. no change occurs
7. Interms of temperature and pressure, solid state is characterized by
8. Low temperature and low pressure C. high temperature and high pressure
9. High temperature and low pressure D. low temperature and high pressure
10. The reaction between: NO and O2 [2NO(g)+O2(g)→2NO2(g)] is second order in NO and

first order in O2. What change occurs in the rate of the reaction if the concentration of NO is

tripled and concentration of O2 is doubled?

1. 5 times in creased B.8 times increased C.18 times increased D. 27 times increased
2. Nitrosyl bromide (NOBr) decomposes slowly to NO & Br2 as shown below

 2NOBr→2NO+Br2, Rate= k$\left[NOBr\right]^{2}$. The rate constant (k) is 0.6$M^{-1 }S^{-1}$. If the initial concentration of NOBr is 0.1M, what will be its concentration after 5 minutes?

1. 5.5 x $10^{-4}$M B. 2.3 x $10^{-4}$ M C. 7.69 x $10^{-2}$ D. 1.82 x$10^{-2}$M
2. For a one component system (C = 1), a system with three phases (P=3) is called A. Mono variant system B. bi-variant system

C. Invariant system D. Zero variant system

1. Which one of the following statement is **not correct**?

A. A mixture of CaCO3 and Nacl has two phases

B. A mixture of oil and water has two phases.

C. A mixture NaCl in water has two components.

D. Ice floating on water has two components

1. For the reaction, H2(g) + Br2(g) $⇋$ 2HBr(g), Kc = 7.1 x $10^{4}$ at 700 k. what is the value of Kc for the reaction. 2HBr(g) $⇋$ H2(g)+ Br2 (g) at the same temperature
2. 1.4 x $10^{-5}$ B. 5.04 x $10^{9}$ C. 1.4 x $10^{-3}$ D. 1.4 x $10^{-6}$
3. Which statement explains why the rate of a chemical reaction is increased when the temperature of the reactant is increased? Because this change increases
4. The concentration of the reactant C. The collision between the reacting particles
5. The activation energy of the reactant D. the average kinetic energy of the reactant
6. For the reaction:- C5H12(l)+8O2(g)→ 5 CO2(g) +6H2O(l), if the rate of appearance of CO2 is 2x $10^{-3}MS^{-1}$, what is the rate for the appearance of H2O and disappearance of O2 respectively?
7. 2.4 x $10^{-3}$& 3.2 x$10^{-3}$ C. 1.67 x $10^{-3}$& 1.25 x $10^{-3}$

 B.1.5 x $10^{-3}\&$ 1.67 x$10^{-3}$ D. 1.33 x $10^{-3}$& 2.5 x $10^{-3}$

1. Which state of matter exists at very high temperature and small force of attraction between particles? A. the Liquid state B. the Gaseous state C**.** the solid state D. the Plasma state
2. Ammonia (NH3) can be prepared industrially by the Haber process according to the following reaction N2(g) +3H2(g) $⇋$ 2NH3 (g), $∆$H= -92.1 KJ/mol. What conditions are favoured to maximize the yield of Ammonia.
3. low temperature and high pressure C. high temperature and low pressure
4. high temperature and high pressure D. low temperature and low pressure
5. Which of the following rate expressions is valid for the gas reaction,

 N2O5→ 2NO2 + $^{1}/\_{2}$O2 ?

1. $\frac{∆ \left[N\_{2O\_{5}}\right]}{∆t}$ = -2 $\frac{∆\left[O\_{2}\right]}{∆t}$ C.$\frac{∆ \left[N\_{2O\_{5}}\right]}{∆t}$ = $\frac{1}{2}\frac{∆\left[O\_{2}\right]}{∆t}$
2. $\frac{∆ \left[NO\_{2}\right]}{∆t}$ = 4 $\frac{∆\left[O\_{2}\right]}{∆t}$ D. $\frac{∆ \left[O\_{2}\right]}{∆t}$ = 2 $\frac{∆\left[N\_{2O\_{5}}\right]}{∆t}$
3. The equilibrium constant (Kc) for the reaction:

 3H2(g) + CO(g) ↔ CH4(g) + H2O(g) is 2.5M-2. If [CO] = 2x10-3M, [H2] = 0.1M and [H2O] = 0.1M, what is the [CH4] at equilibrium?  A. 0.0421M B. 0.0452M C. 0.0481M D. 0.125M

1. For the rxn:- PCl5(g) ↔PCl3(g)+Cl2(g), ∆H = 92.5KJ at equilibrium. One can increase the yield of PCl3(g) and Cl2(g) by
2. Increase in temperature
3. Increasing in pressure
4. Decreasing the concentration of PCl5
5. Increasing the concentration of Cl2
6. The reaction: 2C + D 🡺 F was studied and the following data were obtained

|  |  |  |  |
| --- | --- | --- | --- |
| Experiments | [A] in M | [B] in M | (Rate)o |
| 1 | 4.0 | 4.0 | 1.8 |
| 2 | 4.0 | 2.0 | 0.9 |
| 3 | 2.0 | 2.0 | 0.45 |

 What is the proper rate equation expression?

1. Rate = K[C]2[D] B. Rate = K[C][D] C. Rate = K[C][D]2 D. Rate = K[C]2[D]2 E. None
2. Which one is not a method of preparing carboxylic acids?

 A. Oxidation of primary alcohols B. Oxidation of aldehydes

 C. Oxidation of esters D. Oxidation of alkyl benzene

1. When carboxylic acids react with active metals, which one of the following gases is evolved? A. Chlorine B. Nitrogen C. Hydrogen D. Carbon dioxide
2. Compounds that can be used to make artificial flavors and perfumes are

A. Alcohols B. Esters C. Ethers D. Carboxylic acids

1. the basic difference between fats and oils is that fats are

A. Saturated B. solid or semi-solid at room temperature C. obtained from animals D. all

1. Which base is used to prepare soft soaps? A. NaOH B. KOH C. Ca(OH)2 C. Al(OH)3
2. Which one of the following is not the derivative of hydrocarbons?

A. Alcohols B. Aldehydes C. Ketones D. Alkynes

1. The reaction of acid chlorides with primary alcohols produce

A. Aldehydes B. Fats and oils C. Esters D. Ketones

1. Base hydrolysis of esters is called

A. hydrolysis B. esterification C. saponification D. Emulsification

1. The commonest method of preparing esters is

A. Hydrolysis B. reduction C. esterification D. saponification

1. Of the following organic compounds which one has dual functional groups?

A. Alcohols B. carboxylic acids C. Ketones D. Esters

1. Among the followings which one has a pleasant smell and flavor odor?

A. CH3CH2OH B. CH3CH2COOH C. CH3CH2COCH3 D. CH3CH2COOCH3

1. The chemical which is used in ants as a defensive mechanism is

A. Acetic acid B. Formic acid C. Butanoic acid D. Propanoic acid

1. When beverages like `tella` and `teji` are kept for a long periods, they become sour due to the formation of A. CH3CH3OH B. HCOOH C. CH3COOCH3 D. CH3COOH
2. Which one of the followings has the highest boiling points?

A. CH3(CH)2CH3 B. CH3(CH2)2CHO C. CH3(CH2)2OH D. CH3(CH2)2COOH

1. The volume of a certain confined gas is doubled while the pressure is held constant. What will happen to the temperature of this gas?
2. It will decrease by half C. It will increase by four factor
3. It will be doubled D. It will remain the same
4. The average kinetic energy of gas molecules is **directly proportional** to

A. The total pressure of the gas

 B. The volume occupied by the gas

 C. The absolute temperature of the gas

 D. The number of molecule of the gas

1. The type of physical state which occur at high temperature and low pressure

 A. Solid state B. Liquid state C. Gaseous state D. Plasma state

1. If a sample of 10 litres volume of gas is heated from -73oC to 127oC at constant pressure, the new volume is A. 5L B. 20L C. 15L D. 10L
2. Oxygen gas (O2) diffuses 2 times an **unknown** gas. What is the molar mass of the **unknown** gas? A. 128 B. 64 C. 22.6 D. 8
3. Equal volume of different gasses at constant temperature and pressure have equal number

 of molecules. This is the law of stated by

 A. Boyle’s B. Charle’s C. Lussac’s D. Avogadro`s

1. A 10 litres of gas exerts a pressure of 40 atm at constant temperature. What is the new

 volume of the gas if the pressure is changed to 80 atm at constant temperature?

 A. 5L B. 20L C. 2.5L D. 10L

1. The volume of 64g of methane gas (CH4) at 27oc and 4atm is

 A. 11.2L B. 49.2L C. 24.6L D. 2.214L

1. The amount of heat released when one mole of liquid is converted in to a solid is called

 A. the amount of heat released C. molar heat of crystallization

 B. Molar heat of fusion D. Molar heat of sublimation

1. which of the following is not related correctly with its method of preparation
2. Ammonia 🡺 Haber process C. sodium carbonate 🡺 Bosch process
3. B. sulfuric acid 🡺 contact process D. nitric acid 🡺 Ostwald process
4. The raw material used in the industrial preparation of nitric acid is
5. NO B. N2O5  C. NH3 D. NO2
6. A method of preparing sodium hydroxide (NaOH) by the electrolysis of brine solution is
7. Castner-kellner process C. Loewig`s process
8. Nelson diaphragm cell process D. Reacting sodium oxide with water
9. A mixture of Na2SiO3 and CaSiO3 is used to make
10. Cement B. Ceramics C. Glass D. Pulp and paper
11. A method of preserving foods by keeping the original shape, taste and flavor is
12. Freezing B. Irradiation C. Vacuum packing D. Freeze-drying
13. In the preparatory stage of tannery industry, the step where the missed hair and fat are removed using dull knife is A. Curing B. Scudding C. deliming D. soaking
14. Chemicals used to digest trees in the sulphite process of making pulp and paper are
15. NaOH and Na2S C. H2SO4 and HNO3
16. NaHSO4 and MgHSO4 D. Na2CO3 and NH3
17. Which of the following process is responsible for causing rain?
18. Evaporation B. Condensation C. Evaporation and condensation D. Filtration
19. Acid rain is mainly due to
20. presence of dust in air C.presence of water vapor in air
21. presence of carbon dioxide in air D.presence of oxides of sulfur and nitrogen in air
22. What happens to the soil after prolonged application of fertilizers and pesticides?
23. The soil retains its fertility C. The soil become alkaline
24. B. The soil becomes acidic D. The soil becomes barren of life forms
25. In the electroplating process, an external voltage is applied across a pair of electrodes causing
26. A current to flow through an electrolyte
27. An electroplate to form on an electrolyte
28. An alternating voltage in a magnetic chemical
29. A chemical to produce a negative voltage on a positive electrode
30. Chemists permit secondary cell to be rechargeable by
31. Reversing the polarity of the discharged cell
32. Alternating the electrodes with a primary cell at the same type
33. Replacing the lost chemicals in the electrolyte
34. Reversing the current flow using another energy source
35. Which of the following are characteristics of thermosetting polymers?
36. Heavily branched three dimensional cross-linked polymers.
37. Linear slightly branched long-chain molecules.
38. Become fusible on moulding so can be re -used.
39. Soften on heating and harden on cooling and hence can be re-used.
40. The synthesis of which of the following polymers necessitates the loss of tiny molecules like water on a regular basis?
41. Polythene B. Nylon-6,6 C. polyvinyl chloride D. Teflon
42. Which of the following criteria does not apply to the classification of polymers?
43. Source B. Structure C. Method of preparation **D.** Number of monomers
44. Which of the following is not a thermoplastic example?
45. Polyvinyl chloride B. Bakelite C. Polyesters D. Nylon