

### CHJM 112: General Inorganic Chemistry

- 1: The maximum number of electrons that can be accommodated by p orbital is?  
a: 2  
b: 6  
c: 10  
d: 14
- 2: An element has 18 electrons, and 20 neutrons. Its charge is -2. What is its mass number?  
a: 38  
b: 39  
c: 40  
d: 42
- 3: Which one of the following species has the same electronic configuration as the  $\text{Al}^{3+}$  cation?  
a:  $\text{F}^-$   
b:  $\text{Cl}^-$   
c:  $\text{S}^{2-}$   
d:  $\text{O}^-$
- 4: How many electrons are there in the valence shell of the  $\text{O}^{2-}$  ion?  
a: 2  
b: 8  
c: 10  
d: 16
- 5: Which statement about chromium is incorrect?  
a: chromium is a transition metal  
b: the electronic configuration of chromium atoms is  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$   
c: the electronic configuration of chromium atoms is  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$   
d: chromium has an atomic number of 24
- 6: Electrons enter the 4s sub-level before the 3d sub-level because...  
a: there is only one 4s orbital and there are 5 3d orbitals  
b: the 4s orbital is spherical  
c: the 4s orbital has a lower energy  
d: the 3d orbitals have a lower energy
- 7: Which of the following statements about s orbital is incorrect?  
a: They are found in all principal energy levels  
b: They are spherical in shape  
c: They can hold only one electron  
d: The maximum number of s orbital in any principal level is 1
- 8: The Aufbau principle states that ....  
a: Only two electrons can occupy an orbital  
b: Electrons enter the lowest available energy level  
c: Electrons remain unpaired if possible  
d: Orbitals are regions in space where one is likely to find an electron
- 9: Which one of the following statements is correct?  
a: The 3d sub level is filled before the 4s sub level  
b: The 3rd principal energy level only contains 8 electrons  
c: The principal energy levels get closer together as they get further from the nucleus  
d: Orbitals are always filled in numerical order
- 10: Hund's rule states that....  
a: You must not sit next to another person on a bus  
b: Electrons enter the lowest available energy level  
c: An orbital can hold up to two electrons  
d: Electrons in similar energy orbitals remain unpaired as far as possible
- 11: Which of the following sub shell is not possible?  
a: 2s  
b: 4f  
c: 1p  
d: 3d

12: Which one of the following statements about d orbitals is incorrect?  
a: They are not found in the first two principal energy levels  
b: They are associated with transition elements  
c: There are 5 types of d orbital  
d: d orbitals are filled before p orbitals in the same principal energy level

18: The order of filling orbitals is \_\_\_\_

a: 1s, 2s, 2p, 3s, 3p, 3d, 4s, 4p

b: 1s, 2s, 2p, 3s, 3p, 3d, 4p, 3d

c: 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p

d: 4p, 4s, 3d, 3p, 3s, 2p, 2s, 1s

13: Electronic configuration is the arrangement of electrons in

a: nucleus

b: shells

c: both A and B

d: sub-shells

20: After filling 3s sub-shell, you begin to fill \_\_\_\_

a: 3p

b: 3d

c: 3f

d: none of above

21: The lowest energy orbital among the following is

a: 2s

b: 2p

c: 3s

d: 3p

22: How many orbitals are in a 3d subshell?

a: 10

b: 2

c: 6

d: 5

23: What values of  $\ell$  are permitted for an electron with  $n = 4$ ?

a: 1, 2, 3

b: 1, 2, 3, 4

c: 0, 1, 2, 3

d: 0, 1, 2, 3, 4

25: In the periodic table the element that has the last 3d electron is \_\_\_\_

a: Ar

b: Na

c: Zn

d: K

26: What is the number of unpaired electrons in an atom of nitrogen?

a: 3

b: 0

c: 4

d: 2

27: What is the maximum number of unpaired electrons in a p subshell?

a: 1

b: 3

c: 2

d: d

28: What values of  $m$  are permitted for an electron with  $\ell = 3$ ?

a: 0, 1, 2

b: -2, -1, 0, 1, 2

c: -3, -2, -1, 0, 1, 2, 3

d: -3, -2, -1, 1, 2, 3

29: For the hydrogen atom, which of the following orbitals has the lowest energy

- a:4s  
b:4p  
c:4d  
d:They all have the same energy
- 32: Which of the atom pairs both have only three unpaired electrons in their d orbitals?  
a:Ti and V  
b:Ti and Co  
c:V and Cr  
d:V and Co
- 33: Which of the following has the greatest number of unpaired electrons?  
a:Ti  
b:V  
c:Cr  
d:Mn
- 34: What values of  $\ell$  are permitted for an electron with  $n = 4$ ?  
a:1, 2, 3  
b:1, 2, 3, 4  
c:0, 1, 2, 3  
d:0, 1, 2, 3, 4
- 36: What is the maximum number of electrons in a given atom that can have the quantum numbers  $n = 3$ ,  $\ell = 1$ ?  
a:23  
b:18  
c:10  
d:28
- 39: Which of the following atoms has three unpaired electrons?  
a:B  
b:C  
c:O  
d:N
- 40: Which of the following atoms has the greatest number of unpaired electrons?  
a:Ti  
b:V  
c:Mg  
d:Cr
- 41: Which atom has the lowest number of unpaired electrons?  
a:Cr  
b:Co  
c:Sc  
d:Ti
- 42: \_\_\_\_\_ quantum number describes the shape of an orbital or a sub shell and type of orbital.  
a:principal quantum number  
b:electron spin quantum number  
c:azimuthal quantum number  
d:magnetic quantum number
- 44: Elements of D-block are mainly  
a:transitional elements  
b:metals  
c:alkali  
d:noble gases
- 45: Whenever there is no empty orbital available within a sub-shell, electrons are  
a:deflected  
b:reflected  
c:paired  
d:charged

46: How many electrons are there in the “p” orbitals of the **last** shell (principal energy level) of silicon, atomic number 14?

a:4

b:6

c:0

d:2

48:  $\uparrow\downarrow$   $\uparrow\downarrow$   $\uparrow\downarrow$   $\uparrow\downarrow$   $\uparrow$  this arrangement represents the electronic configuration of which of the following atoms?

a:Cl

b:Na

c:C

d:F

49: The atomic orbital illustrated below is of what type?

a:2p

b:3s

c:3p

d:3d



50: Two electrons occupying the same orbital with parallel spins ( $\uparrow\uparrow$  or  $\downarrow\downarrow$ ) are not allowed, why?

a: because they will different set of quantum numbers

b: because they will have the same set of quantum numbers

c: because they will have opposite spins

d: because the electrons will enter the lowest energy level

101: The first scientist to postulate atom was -----

a: Thomson

b: Moseley

c: Democritus d: Chadwick

102: How many elements were there in Newland's law of octave?

a: 23

b: 35

c: 40

d: 55

103: Modern periodic law states that periodic properties are a function of

a: atomic mass

b: atomic number

c: atomic structure

d: mass number

104: The nucleus of every atom contains

a: electron and neutron

b: electron and proton

c: electron, neutron and proton

d: neutron and proton

105: Which of these pairs contains elements that are liquid at room temperature?

a: Bromine and Mercury

b: Bromine and Iodine

c: Fluorine and Chlorine

d: Mercury and Zinc

106: Atomic size \_\_\_\_\_ across the periods and \_\_\_\_\_ down the groups.

a: decreases, decreases

b:decreases, increases

c:increases, decreases

d:increases, increases

108:\_\_\_\_\_ is the ability of an atom to attract electron.

a:electron affinity

b:electronegativity

c:electropositivity

d:ionization energy

109:Electrical and thermal conductivities \_\_\_\_\_ across the periods and \_\_\_\_\_ down the groups.

a:decrease, decrease

b:decrease, increase

c:increase, decrease

d:increase, increase

110:Group IIA elements are generally called the

a:Alkali earth metals

b:Alkali metals

c:Halogens

d:Noble gases

111:In the modern periodic table, elements are arranged into rows otherwise called ---  
----- and into columns otherwise called -----

a:periods, periods

b:periods, groups

c:groups, periods

d:groups, groups

112:The following elements belong to the first transition series EXCEPT

a:Titanium

b:Aluminium

c:Iron

d:Copper

113:The characteristics of transition elements include the following EXCEPT

a:Formation of coloured compounds

b:Variable oxidation state

c:Formation of complex ions

d:Formation of salt and water

114:Which of the following is NOT a periodic property?

a:Enthalpy change

b:Ionization energy

c:Electron affinity

d:Electronegativity

115:Group IIA elements are divalent because

a:they have two electrons

b:they react with cold water and steam to liberate hydrogen

c:they have two valence electrons

d:they are reducing agents

116:Moseley X-ray emission spectra vary with

a:atomic number

b:atomic mass

c:mass number

d:nucleon number

117:The unreactive nature of group 0 elements is due to their

a:boiling points

b:electronic configuration

c:mass number

d:ionization energy

118:The following elements are gases at room temperature EXCEPT

a:Iodine

b:Fluorine

c:Chlorine

d:Bromine

119:Atomic number equals

a:number of electrons

b:number of neutrons

c:number of protons

d:mass number

120:Which of the following elements can be found in group IV, period 3 in the periodic table?

a:Silicon

b:Fluorine

c:Carbon

d:Beryllium

125:Which of the following halogens is least electronegative?

a:Bromine

b:Chlorine

c:Fluorine

d:Iodine

126:Which of the following periodic table contains 63 elements only?

a:Dobereiner triads

b:Mendeleev and Meyer

c:Modern periodic table

d>Newland's law of octave

130:The following elements can be attracted and repelled by a magnetic force EXCEPT

a:aluminium

b:cobalt

c:iron

d:nickel

131:Which of the following pairs naturally exists as liquids at room temperature and pressure?

a:hydrogen, lithium

b:bromine and mercury

c:bromine and chlorine

d:mercury and silver

132:The following are general properties of metals EXCEPT

a:low melting and boiling point

b:reducing agents

c:ductility

d:high density

133:Hydrogen belongs to s-block as neon belongs to

a:s-block

b:p-block

c:d-block

d:f-block

134:The first member of lanthanide family is Lanthanum while the last member is

a:actinium

b:lawrencium

c:luthetium

d:uranium

135:Electron affinity \_\_\_\_\_ from left to right across the period and \_\_\_\_\_ down the group

a:decreases, decreases

b:decreases, increases

c:increases, increases

d:increases, decreases

136:Which of the following elements reacts vigorously with cold water to liberate hydrogen gas and form alkali?

a:calcium

b:lithium

c:magnesium

d:sodium

137:The elements in the list belongs to group IIA EXCEPT

a:beryllium

b:boron

c:calcium

d:magnesium

138:Which is NOT a characteristics of transition metals?

a:ability to form coloured ions

b:ability to form complex ions

c:low density

d:some of their compounds are used as catalysts

139:Actinides can be found in \_\_\_\_\_ in the periodic table.

a:period 6

b:period 7

c:group VIA

d:group VIIA

140:The following elements are natural magnets EXCEPT

a:beryllium

b:cobalt

c:iron

d:nickel

141:Arrange the elements Na, Al, Mg, Cl in order of increasing atomic size.

a:Al, Cl, Mg, Na

b:Na, Mg, Cl, Al

c:Na, Mg, Cl, Al

d:Na, Mg, Al, Cl

142:Which of the following elements is the most electronegative?

- a:Oxygen
- b:Chlorine
- c:Fluorine
- d:Neon

143:Oxygen is slightly soluble in water while sulphur is

- a:slightly soluble
- b:soluble
- c:insoluble
- d:slightly insoluble

144:The chemical combination between sodium atom and chlorine atom is

- a:covalent
- b:electrovalent
- c:dative
- d:hydrogen bonding

145:The shell electronic configuration of an element  $[\text{sup}12/\text{sup}][\text{sub}6/\text{sub}]\text{C}$  is

- a:2, 4
- b:2, 6
- c:2, 8
- d:2, 8, 2

146:Which is the odd-one out?

- a:bronze
- b:brass
- c:steel
- d:iron

147:In the industrial manufacturing process of ammonia, which of the following is used as catalyst?

- a:Vanadium oxide
- b:Finely divided iron
- c:Charcoal
- d:Silicon oxide

148:Most actinides are

- a:electronegative
- b:oxidative
- c:radioactive
- d:metalloids

149:Which of the following scientists discovered the atomic number, Z via the X-ray emission spectra?

- a:Moseley
- b:Rutherford
- c:Thomson
- d:Priestley

150:The elements below are metalloids EXCEPT

- a:Silicon
- b:Germanium
- c:Aluminium
- d:Antimony

151: When atoms approach one another to form a chemical bond, their nuclei and electrons interact and tends to distribute themselves in such a way that

- a: Total energies of the group of atoms is less than the sum of the energies of the component atoms



b: Total energies of the group of atoms is greater than the sum of the energies of the component atoms

c: Total energies of the group of atoms is equal to the sum of the energies of the component atoms

d: Energy will not involve in bond formation

152: Which of the following is correct?

a: Multiple bond has 2 electrons

b: Multiple bond has either 4 or 8 electrons

c: Multiple bond has 4 electrons

d: Multiple bond has either 4 or 6 electrons

153: Which of the following atoms does not involve in chemical bonding?

a: Silicon

b: Sulphur

c: Neon

d: Carbon

155: Which of the following pairs of atoms have similar Lewis dot symbols?

a: Calcium and Magnesium

b: Boron and Helium

c: Sodium and Calcium

d: Oxygen and Nitrogen

156: Atom may attain a stable electronic configuration through the following ways except

a: By losing electron

b: By gaining electron

c: By sharing electron

d: By exciting electron

157: The type of bond between two electronegative elements is \_\_\_\_

a: Ionic

b: Covalent

c: Metallic

d: None of the above

158: The number of valence electron in potassium is \_\_\_\_

a: 2

b: 3

c: 4

d: None of the above

160: Which of the following could be formed through dative bonding?

a: Hydrogen molecule

b: Water molecule

c: Ammonium ion

d: F<sub>2</sub>

161: The electronegativity of polar covalent bond is within the range

a: 0.4 – 1.7

b: 1.5 – 1.7

c: 0- 0.4

d:  $< 0.3$

163: Predict the nature of the bond between Hydrogen and Chlorine. [Take electronegativity of H = 2.2; Cl = 3.16]

a: Non-polar covalent

b: Polar covalent

c: Ionic

d: None of the above

164: Double bond consists of \_\_\_\_

a: two sigma and one pi bonds

b: one sigma and one pi bonds

c: two sigma and two pi bonds

d: one sigma and two pi bonds

165: Which of the following statements is TRUE about VSEPR-theory?

a: It predicts the chemical composition of mixture

b: It shows the image of element

c: It predicts the molecular shape and geometry

d: It predicts the bond length

166: The tendency of electron-electron repulsion between electron pairs [lone pair (LP) and bond pair (BP)] is \_\_\_\_

a:  $LP-BP > LP-LP > BP-BP$

b:  $BP-LP > BP-BP > LP-BP$

c:  $LP-LP > LP-BP > BP-BP$

d: None of the above

167: The steric number of  $CO_2$  molecule is \_\_\_\_

a: 2

b: 3

c: 4

d: 5

168: The shape of  $BF_3$  molecule is \_\_\_\_

a: Tetrahedral

b: Octahedral

c: Linear

d: Trigonal planar

169: The steric number of  $SF_6$  molecule is \_\_\_\_

a: 3

b: 6

c: 7

d: 5

170: What is the formal charge of Sulphur in  $SO_2$

a: 6

b: 0

c: 4

d: -1

171: How many lone pairs of electrons are located on Oxygen in the Lewis structure of  $H_2O$ ?

- a: 2
- b: 3
- c: 4
- d: 0

174: All the following are types of intermolecular bond EXCEPT

- a: Dipole-dipole interaction
- b: Hydrogen bond
- c: London dispersion forces
- d: Ionic bond

176: The bond order of  $\text{H}_2$  is \_\_\_\_

- a: 7
- b: 1
- c: 0
- d: 2

177: Molecular orbital theory predicts  $\text{N}_2$  molecule to be \_\_\_\_

- a: Paramagnetic
- b: Triamagnetic
- c: Diamagnetic
- d: None of the above

178: Paramagnetic molecules have \_\_\_\_

- a: ONE unpaired electron
- b: AT LEAST ONE unpaired electrons
- c: TWO unpaired electrons
- d: NO unpaired electron

179: When two atomic orbitals overlap, they interact in two extreme ways to form two molecular orbitals known as

- a: Bonding & Antibonding molecular orbitals
- b: s & p molecular orbitals
- c: Sigma & Pi molecular orbitals
- d: Ionic & covalent molecular orbitals

180: Lone pairs of electrons are used by atoms for \_\_\_\_\_

- a: Coordinate covalent bonding
- b: Metallic bonding
- c: Ionic bonding
- d: London dispersion bonding

181: Lewis structure allows the prediction of many properties of molecules except

- a: formal charge
- b: molecular shape
- c: molecular stability
- d: electrolysis

183. The variation in geometry of molecules with the same steric number is described using \_\_\_\_

- a: Bent rule
- b: Molecular rule
- c: Hund's rule
- d: Charles principle

184: Chemical bonding enables atom to attain a stable electronic configuration

a: True

b: False

c: True and false

d: None of the above

185: pi-bond is present in the following molecules EXCEPT

a: Ethene

b: carbonmonoxide

c: carbondioxide

d: ammonia

186: Which of the following molecules have the lowest bond angle?

a: water

b: ammonia

c: methane

d: Carbondioxide

188: The best Lewis structure for a molecule is arranged with formal charge of each atom .....

a: greater than one as possible

b: less than zero as possible

c: close to zero as possible

d: greater than two as possible

190: How many orbitals are involved in the mixing of  $sp^2$  hybridized orbitals?

a: 5

b: 4

c: 3

d: 2

192: The electronegativity of H-F bond is 1.9. What is the nature of the bond?

a: ionic

b: Metallic

c: polar covalent

d: non-polar covalent

193: Hydrogen bonding could be found in the following molecules EXCEPT

a: HCl

b: water

c: HF

d: butane

194: The higher the bond order is

a: the less stable is the bond

b: the less stable is the electron

c: the more stable is the bond

d: The more stable is the electron

195: Which of the following statement is TRUE?

a:  $\pi$ -bond is formed from overlapping of s and p orbitals

b:  $\pi$ -bond is formed from overlapping of s and sp orbitals

c:  $\pi$ -bond is formed from mixing of p and p orbitals

d:  $\pi$ -bond is formed from overlapping of p and p orbitals

196: Which of the following statement is CORRECT?

a: Electrons are closer to highly electronegative element in polar covalent bond

b: Electrons are closer to highly electropositive element in polar covalent bond

c: Electrons are equally shared between atoms in polar covalent bond

d: Electron is transferred from one atom to another in polar covalent bond

197: Which of the following statement about *homonuclei diatomic molecules* is CORRECT?

a: They have polar covalent bond

b: They have non-polar covalent bond

c: The electronegativity of their bond is greater than 1.7

d: The electronegativity of their bond is greater than 1.9

198: The following molecules possess  $\pi$ -bond EXCEPT

a: propene

b: ethanoic acid

c: water

d: ethane

199: Ionic bond can be constituted between the following pair

a: group IV and group VI elements

b: group IA elements and group VIIA

c: Carbon and Sulphur

d: Hydrogen and halogens

200: Lewis dot Symbol is used to represents \_\_\_\_\_

a: the electronic configuration of an atom

b: the atomic structure of an atom

c: valence electron of an atom

d: the molecular orbital theory

201: Which of the following bond theories provides information on bond order?

a: Lewis theory

b: Molecular orbital theory

c: Valence bond theory

d: VSEPR theory