

## 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  $[\text{sup}12][\text{sub}6]\text{C}$  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