Could Covid-19 Be a Microorganism Carrying Carbon Monoxide?

Abdul L. Bhuiyan[1]

[1] Box 13, Head Post Office, Comilla, Bangladesh

Correspondence: Abdul L. Bhuiyan, Box 13, Head Post Office, Comilla-3500, Bangladesh. E-mail: ananda.computers@yahoo.com

Abstract

It is speculated that a microorganism can take carbon monoxide from the surrounding atmospheric air through the process of adsorption. When this microorganism is exposed to sunlight / near uv light, the adsorbed carbon monoxide may transform into carbonyl diradical which together with the (polycarbonyl) polymer can cause harmful biological effects similar to those observed in COVID-19. For this, it can act as a virus identical with COVID-19. One important property of the speculated virus (SV) is that it can undergo mutation by inserting the associated carbonyl diradical at the C-H, C-O, and C-N bonds in DNA/RNA and their precursors which form its core.

Keywords: effects of atmospheric CO in humans, result of accumulation of CO in atmospheric air, mutation by inserted CO, effects of pressure on oxygenation / deoxygenation of myoglobins, effects of microorganisms carrying CO on humans

1. Introduction

The measure of accumulation of carbon dioxide gas in earth's atmosphere through human activities based on the use of energy generated by burning carbon-containing fuels is usually considered as an indicator to the progress of civilization. But when a carbon-containing fuel burns in scant supply of air, carbon monoxide may also be produced as a concomitant product. For example, a fuel may burn in an internal combustion engine in presence of a scant supply of atmospheric air producing both carbon dioxide and carbon monoxide according to equation (1).

$$3CH_4 + 5O_2 \rightarrow CO_2 + 2CO + 6H_2O \quad .... \tag{1}$$

The equation (1) shows that the sources of carbon dioxide may be considered as the sources of carbon monoxide also. We have described below some important sources of both the oxides where various types of combustion processes involved in human activities release these gases into the earth's atmosphere.
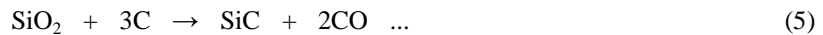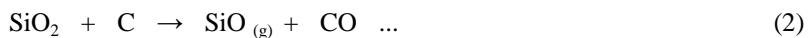
1) Guns, bombs, missiles, rockets, etc. and other materials used in causing explosions.

2) Natural gas, coal, oil and wood.

3) Forest and structural fires.

4) Vehicles including sea-going vessels, aircraft and railways which use such fuels as gasoline and diesel oil.

5) Incineration and open burning of coal refuse and agricultural wastes.

6) Various industrial establishments, such as iron foundries, petroleum refineries, blast furnace, sintering plants, etc.

7) Densely populated areas, such as towns and cities where large number of vehicles use gasoline and diesel oil as fuels and the residentials use natural gas for cooking purposes and natural gas, wood and coal for heating homes, especially during winter.

However, there are events where the gaseous product is solely carbon monoxide. For example, carbon monoxide is the sole carbon-containing gaseous product in the process of ablation through aerodynamic heating during the following events.

8) Re-entry of missiles or satellites into the earth's atmosphere.

9) Missiles and spacecraft during ascent through earth's atmosphere.

10) Entry of spacecraft into planetary atmosphere.

11) Blast shields which deflect or channel the exhaust of rocket-engines during launch.

12) Rocket-motor components in contact with the hot combustion products.

13) Research aircraft during hypersonic flight.

The chemical changes that occur during these events may briefly be summarized as follows (Strauss, 1978).

$$SiO_2 + C \rightarrow SiO_{(g)} + CO \quad ... \tag{2}$$

$$SiO_{(g)} + 2C \rightarrow SiC + CO \quad ... \tag{3}$$

$$SiO_2 + 2C \rightarrow Si_{(l)} + 2CO \quad ... \tag{4}$$

$$SiO_2 + 3C \rightarrow SiC + 2CO \quad ... \tag{5}$$

The above review shows that the accumulation of carbon monoxide gas in the earth's atmosphere from the beginning of civilization dominates over that of carbon dioxide gas released in the air through the burning of fuels. As carbon monoxide is toxic and carbon dioxide is nontoxic, we select the former as one of the major air pollutants to show that the effects of COVID-19 in biological systems may be related to the presence of carbon monoxide in some form in this virus. This we discuss in the following section 2.

2. The Working Form of Carbon Monoxide.

It is observed (Stoker & Seager, 1972) that there are some microorganisms which can remove carbon monoxide from ambient atmospheric air but the authors did not elucidate the mechanism of capturing the gas and putting it to use by these organisms. We believe that the mechanism may be elucidated on the basis of the nature of structure of the gas, the ambient temperature and the composition of the outer surface of the microorganism. The following deductions may help understand the desired mechanism.

The compound $Fe_2(CO)_9$ (I) is one of the poly-nuclear, neutral, and unsubstituted metal carbonyls which is said to satisfy the Effective Atomic Number Rule; that is, there are eighteen electrons about each iron atom. Each of the three bridging carbonyl groups donates one electron to one iron atom, indicating that the bridging carbonyl group behaves as a diradical during its reaction with the iron atoms. The production and composition of this diradical may be deduced as follows. The electronic configurations of the outer valence shell of carbon and oxygen atoms (in the ground states) are given in the following equations (6) and (7), respectively.

$$C: 2s^2\ 2p_x^1\ 2p_y^1\ 2p_z^0 \quad ..... \tag{6}$$

$$O: 2s^2\ 2p_x^1\ 2p_y^1\ 2p_z^2 \quad ..... \tag{7}$$
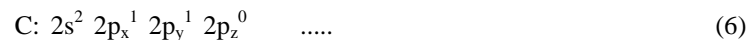
It may be noted that the p_x and p_y orbitals of both carbon and oxygen atoms lie in the XY-Plane. As carbon is regarded as the central atom, the oxygen atom forms the peripheral atom. According to one opinion (Figgis, 1966), for carbon in carbon monoxide, it is not possible to deal with chemical bonding excluding the s orbital. As the p_z orbital of carbon atom is empty, one may combine the s, p_x and p_y orbitals to obtain three hybridized orbitals φ_1, φ_2 and φ_3 for the ground state. The four electrons are distributed in these orbitals according to the following equation (8).

$$C:\ \varphi_1^2\ \varphi_2^1\ \varphi_3^1\ 2p_z^0 \quad ..... \tag{8}$$
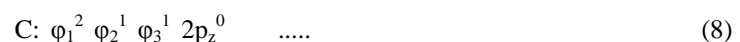
Similarly, the distribution of six electrons in three orbitals obtained by hybridization of s, p_x and p_y orbitals of oxygen atom is shown in the following equation (9).

$$O:\ \varphi_4^2\ \varphi_5^1\ \varphi_6^1\ 2p_z^2 \quad ..... \tag{9}$$

This type of hybridization is usually termed sp^2.

If the state in which the two unpaired electrons in φ_2 and φ_3 orbitals of carbon atom spin in the same direction, then this state forms the ground state with maximum multiplicity. Similarly, the state in which the two unpaired electrons in φ_5 and φ_6 orbitals of oxygen atom spin in the same direction forms the ground state. Let the carbon atom be situated at the center A of an equilateral triangle BCE (Figure 1).
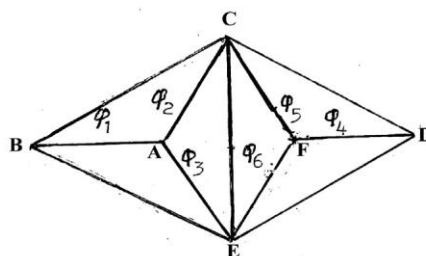
Figure 1. The sp^2 hybridization of the outermost valence orbitals of carbon and oxygen atoms to produce: C = O: molecule

Similarly, the oxygen atom is situated at the center F of the equilateral triangle DCE (Fig. 1) Both the triangles are joined together through the common side CE, suggesting that the corners C and E of the triangles are also common. The orbitals φ_1, φ_2, and φ_3 of carbon are aligned with BA, CA, and EA, respectively. These straight lines join the point A with the points B, C and E, respectively. The orbitals φ_4, φ_5 and φ_6 of oxygen are aligned with the straight lines FD, FC, and FE, respectively, implying that these straight lines join the point F with the points D, C and E, respectively. It is, therefore, evident from figure-1 that the unpaired electron in the orbital φ_2 of carbon may form a bond with the unpaired electron in the orbital φ_5 of oxygen, provided that they occupy the point C simultaneously and that they spin in exactly opposite directions.

Similarly, the unpaired electron in the orbital φ_3 of carbon may form a bond with the unpaired electron in the φ_6 orbital of oxygen at the point E. The nonbonding pair of electrons in the orbital φ_1 of carbon may be localized at the point B. while the nonbonding pair of electrons in the φ_4 orbital of oxygen may be localized at the point D. All this indicates that the ground state composition of carbon monoxide may be expressed by (:C : : O:) (II).

If the oxide (II) is exposed to sunlight / near uv light, then one electron from the φ_1 orbital of carbon is promoted to its empty p$_z$ orbital. The resulting hybridization of the orbitals of carbon and the distribution of electrons in these orbitals are given in the following equation (10).

$$C:\ \varphi_a^{\ 1}\ \varphi_b^{\ 1}\ \varphi_c^{\ 1}\ \varphi_d^{\ 1}\quad \ldots \tag{10}$$

The equation (10) also describes the tetrahedral hybridization of valence shell orbitals of the carbon atom.

Similarly, the electron distribution in tetrahedrally hybridized orbitals of oxygen atom is given in the following equation (11).

$$O:\ \varphi_f^{\ 2}\ \varphi_g^{\ 1}\ \varphi_h^{\ 1}\ \varphi_k^{\ 2}\quad \ldots \tag{11}$$

An oxygen atom has two unpaired electrons in each of two hybrid orbitals, φ_g and φ_h. It can share these electrons with two unpaired electrons of the carbon atom to produce two covalent bonds. This may be explained with the help of tetrahedral hybridization (Pauling, 1960) of outer valence orbitals of carbon and oxygen atoms as follows (Figure 2).
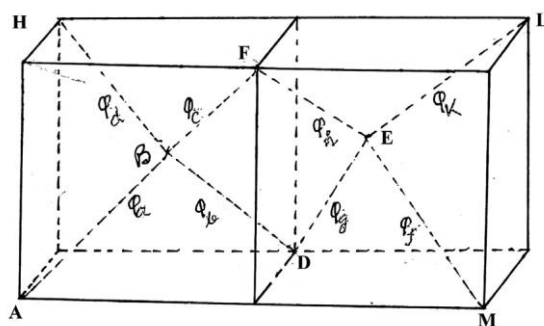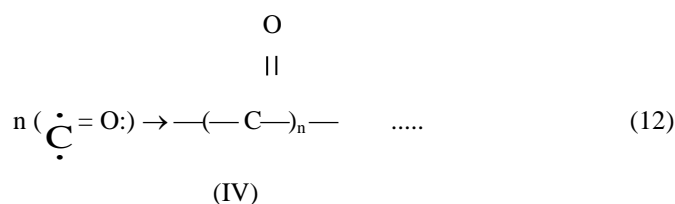

Figure 2. Tetrahedral hybridization of the outermost valence orbitals of carbon and oxygen atoms to produce the

carbonyl diradical ($\overset{\bullet}{\underset{\bullet}{C}}$ =O:) from carbon monoxide : C = O: in presence of sunlight

The carbon atom is situated at the center B of the tetrahedron ADFH, while the oxygen atom is situated simultaneously at the center E of the tetrahedron FLMD. Let the orbitals φ_a, φ_b, φ_c and φ_d of carbon atom be aligned on the straight lines BA, BD, BF, and BH, respectively, while the orbitals φ_f, φ_g, φ_h and φ_k of the oxygen atom are aligned with the straight lines EM, ED, EF, and EL, respectively. It is evident that the orbital φ_b of carbon atom overlaps obliquely the orbital φ_g of oxygen atom, for which a pair of electrons forms the covalent bond BDE. Similarly, the orbitals φ_c of carbon and φ_h of oxygen, each containing an unpaired electron, overlap to form another covalent bond BFE. Thus, a double bond is formed between the carbon atom and the oxygen atom. The bent nature of the bonds may be attributed to the oblique overlap of the bonding orbitals. The carbon atom in the tetrahedron ADFH has one unpaired nonbonded electron at the corner H and one unpaired nonbonded electron at the corner A. So, with two unpaired electrons on the carbon atom and a double bond between the carbon atom and the oxygen atom the carbon monoxide molecule with composition C= $\overset{\bullet}{\underset{\bullet}{C}}$ = O: may act as a diradical.

3. Polymerization of Carbonyl Diradical

The Polymerization of the carbonyl diradical may occur according to the following equation (12).

$$n \left(\overset{\bullet}{\underset{\bullet}{C}} = O: \right) \rightarrow \quad \begin{matrix} O \\ || \\ -(- C -)_n - \end{matrix} \qquad ..... \qquad (12)$$

$$(IV)$$

If C_m and C_p be the concentrations (per mole/liter) of the monomer and polymer, respectively, in the atmospheric air over a certain location on earth, then the equilibrium constant of reaction (12) may be given by

$$k = C_p/C_m \quad ..... \qquad (13)$$

We now seek conditions under which we can convert the carbonyl diradical into carbonyl polymer as high yield as possible. These conditions may be obtained by evaluating the equilibrium constant of the polymerization reaction and its dependence on temperature. According to equation (12), the system passes from more disorderly state to less disorderly (or more orderly) state, suggesting that the entropy change is negative. The polycarbonyl polymer forms through carbon-carbon bond formation with the evolution of about 82kcal/mole per bond, indicating that ΔH is negative. Thus, the free energy change is a function which assesses both ΔS and ΔH simultaneously according to the following questions (14).

$$\Delta G = \Delta H - T\Delta S \quad .... \qquad (14)$$

But free energy is also related to temperature and equilibrium constant by the following equation (15).

$$\Delta G = - RT\ln k \quad .... \qquad (15)$$

Combining equations (14) and (15) and then rearranging, one obtains

$$\ln k = \Delta S/R - \Delta H /RT \quad ... \qquad (16)$$

If the difference in the heat capacities of reactants and products is zero or negligibly small, then ΔS is constant (independent of temperature). So, by differentiating equation (16) with respect to 1/T, one obtains

$$d(\ln K)/dT = \Delta H/RT^2 \quad .... \qquad (17)$$

Equation (17) shows that, for exothermic reactions, the equilibrium constant decreases as temperature increases. According to equation (13), the decrease of the equilibrium constant causes the yield of the carbonyl polymer to decrease. Since it is a reversible reaction, the formation of the polymer predominates at lower temperatures, while that of the monomer predominates at temperatures slightly higher than that of the polymer.

4. The Process of Adsorbing CO by a Microorganism From Ambient Air

It is deduced in section 2 above that the ground state composition of carbon monoxide is (II). In this oxide the carbon atom bears a substantial partial positive charge while the oxygen atom bears a substantial partial negative charge. This is shown in the following equation (18). The charge distribution is supposed to arise from two effects: (a) the inductive effect of the electronegative oxygen and (b) the resonance contribution.

$$: C = O \leftrightarrow : c^+ - o^- \quad .... \qquad (18)$$

We shall return to this equation later. Here we presume that the microorganism under speculation is supposed to possess DNA/RNA with an outer coating (capsid) of proteins/peptides. The capsid may be surrounded by a capsule of a sticky mass of polysaccharides. These substances contain polar groups. As soon as carbon monoxide comes in

contact with these substances, it is adsorbed on the surface of the microorganism through polar interactions. It is this trapped carbon monoxide in the form of diradical and polycarbonyl polymer with which the microorganism may cause harmful effects in the biological systems of a human body.

5. The Effects of Carbonyl Diradical and Its Polymer in Biological Systems

The carbonyl diradical and its polymer are, like carbon monoxide, supposed to be toxic. So, when a person inhales air containing the microorgainsm laden with these substances, he may develop sore throat, cough, running nose, bowel disorders, fever, etc. As soon as the inhaled air reaches the inside of the lungs, the diradical and its polymer are likely to interact chemically with proteins/ peptides of lungs and the Fe(II) atoms in the myoglobin units and DNA/RNA and their precursors such as nucleotides. For example, the diradical may react with protein components of lungs according to the following equation (19).

$$
\begin{array}{cc}
O \quad\quad O & \quad\quad\quad O \quad\quad\quad O \\
\| \quad\quad \| & \quad\quad\quad \| \quad\quad\quad \| \\
\sim C - N - C - N\sim \; + \; \overset{\bullet}{\underset{\bullet}{C}} = O \; \rightarrow \; \sim C - \overset{\bullet}{\underset{\bullet}{N}} - C - \overset{\bullet}{\underset{\bullet}{N}} \sim \; + \; HCHO \; .... \quad (19) \\
| \quad\quad | \quad\quad\quad\quad\quad\quad\quad\quad\quad (V) \\
H \quad\quad H
\end{array}
$$

The product formaldehyde may also cause irritation and sore. However, as soon as the amide hydrogens are removed, the hydrogen bonds keeping the protein molecules together disappear and consequently, the structure of lungs becomes disrupted. The hemoglobin molecule is said to have a channel which is 2000 pm wide. This channel is lined with polar groups presumably of the kind of amide groups in proteins. The microorganism my also enter this channel and cause reactions similar to the ones given in equation (19) with the help of polymer diradical. As a result, the structure of the channel may become disrupted.

It is known that the hemoglobin molecule consists of four units of myoglobin molecule each of which contains one Fe(II) atom in the high spin state. The interaction of the microorganism with these iron atoms may be described as follows:

An Fe(II) atom which exists in the high-spin state has one electron in its d_z2 orbital which lies along the Z axis. The metal atom is believed to be pentacoordinate in square pyramidal structure containing four porphyrin nitrogen atoms situated in the basal positions and one imidazole-nitrogen atom of histidine F8 in the apical position. This structure excludes the sixth position along the Z axis. Since the sixth position is occupied by a water molecule (a ligand) which when included in the structure makes the Fe(II) atom hexacoordinate. In a nutshell, the Fe(II) atom in the high-spin state in a myoglobin molecule may be considered to be surrounded by six ligands occupying six octahedral d^2sp^3 hybrid orbitals. These orbitals lie along the x, y, and z axes of coordinates in plus and minus directions.

Carbon monoxide is a stronger ligand than the water molecule. Therefore, as soon as the inhaled air comes in contact with a hemoglobin molecule in the lungs, the carbonyl diradical replaces the water molecule at the sixth coordination position. Then one unpaired electron of the diradical forms a pair with the electron in the d_z2 orbital of an Fe(II) atom. Since two adjacent myoglobins act cooperatively, the two Fe(II) atoms in two adjacent myoglobins would also act cooperatively. This implies that the other unpaired electron of the diradical would form another pair with the lone electron of the d_z2 orbital of an Fe(II) atom of the adjacent myoglobin thus forming another covalent bond.

In this way, the carbonyl diradical would form a bridging carbonyl species (VI) between two Fe(II) atoms in two adjacent myoglobins. The reaction may be represented by the following equation (20).

$$
\begin{array}{c}
Fe. + .C. + . Fe \; \rightarrow \; Fe : C : Fe \quad\quad\quad .... \quad\quad (20) \\
\| \quad\quad\quad\quad\quad\quad \| \\
O \quad\quad\quad\quad\quad\quad O \\
(VI)
\end{array}
$$

The formation of the bridging carbonyl (VI) prevents the oxygenation of the Fe(II) atoms in the myoglobins. As a result, the victim starts to have breathing difficulty. However, there are two more Fe(II) atoms in the two remaining myoglobins which are adjacent to each other. Therefore, another product similar to (VI) would be formed with higher concentration of the diradical in the breathing air. The carbonylation of all the four Fe(II) atoms causes

death to the victim. A polycarbonyl thread having carbonyl radicals at both ends may also have the characteristics similar to those of the diradical.

6. Decarbonylation of the Carbonyl (VI)

Let us assume that a person is infected with our speculated virus (SV) through carbonylation of two Fe(II) atoms in two adjacent myoglobin molecules. Both the Fe(II) atoms exist in the high-spin state, for which they produce the carbonyl-bridging species (VI). Now in order to allow the victim to regain breathing capability, we need to decarbonylate the species (VI) and then oxygenate the freed Fe(II) atoms.

Let oxygen under high pressure (from a cylinder) be inhaled by a victim through the point A which is the sixth coordination position of the octahedral Fe(II) atom in a myoglobin unit (Figure 3).
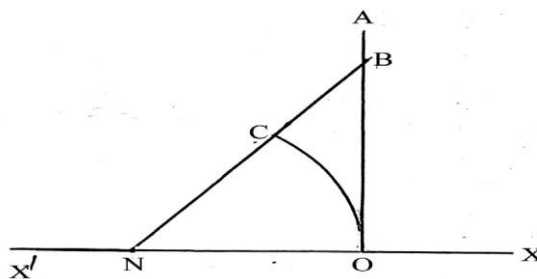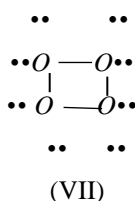

Figure 3. Effect of pressure on decarbonylation of the carbonylated Fe(II) atom and / or oxygenation of the Fe (II) atom via transformation of the high- spin state into the low-spin state

The carbonylated Fe(II) is situated at the point B. Both A and B lie on the Z axis. A is positioned above B and the latter is supposed to lie some 0.8Å. distance (along the perpendicular AO) from center, O, of the heme porphyrin hole bounded by four nitrogen atoms of the heme porphyrin. All the four nitrogen atoms lie in a plane. The point O forms the origin of coordinates also so that X'OX coincides with the X axis. The straight line BN represents the length of the bond between the Fe(II) atom and one of the four nitrogen atoms of heme porphyrin. The angle BON is a right angle so that BN also forms the hypotenuse of the right triangle. If the angle BNO is θ, then we have
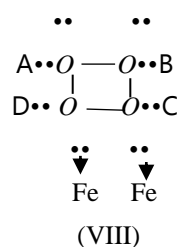
$$\cos\theta = ON/BN \quad .... \quad (21)$$

Incidentally, under high pressure, oxygen does not behave as an ordinary diatomic molecule; it behaves as a tetratomic molecule (VII) as shown below (Sienko et al., 1965).

$$\begin{array}{cc} \cdot\cdot & \cdot\cdot \\ \cdot\cdot O - O \cdot\cdot \\ | \quad | \\ \cdot\cdot\, O - O \cdot\cdot \\ \cdot\cdot & \cdot\cdot \end{array}$$

(VII)

So, as the tetratomic oxygen molecule approaches the sixth coordination position at A, the pressure pushes the Fe(II) atom at B down toward the point O. As a result, θ decreases and cosθ increases. Due to delocalization of the pi electrons in the pyrrole rings, the heme porphyrin system is fairly rigid, for which the distance ON remains fairly constant. So, the increase of cosθ causes the bond length BN to undergo compression. As soon as the Fe(II) atom reaches the point O, θ becomes zero or negligibly small and the bond length becomes approximately equal to ON. Thus the Fe(II) atom fits into the porphyrin hole. If a circle of radius equal to ON is drawn with its center at N, it intersects BN at the point C. AS CN= ON, the bond length BN undergoes compression of magnitude equal to BC.

Since there are four Fe(II)-N bonds, the total compression is proportional to 4BC. Let 4BC= V. If P be the pressure under which the oxygen is let in, then the total work done on the system in compression is given by PV which is stored in the system as increase in potential energy of bonds. As the four porphyrin nitrogen atoms, the imidazole-nitrogen atom of histidine and the approaching oxygen atoms are directed against the contracted e_g orbitals of the Fe(II) atom, the electrons in these orbitals will encounter strong repulsive interaction with the ligand electrons. As a result, the two e_g electrons are forced to move into the t_{2g} level. As the d_z2 electron involved in the covalent bond between the Fe(II) atom and the carbonyl carbon atom is no longer available, the said bond

undergoes scission and consequently, the bridging carbonyl group in (VI) is ejected as carbon monoxide. As the bonds are compressed, the imidazole nitrogen atom of histidine at the apical position moves out, for which the structure becomes square planar. The resulting d electron configuration of the Fe(II) atom is now $e_g t^6_{2g}$ which represents the low-spin state of the iron atom. As soon as the d_z2 orbital is empty, an atom of tetratomic oxygen molecule donates a pair of nonbonding electrons to this orbital and forms a dative covalent bond. Simultaneously, another atom of the tetratomic oxygen molecule donates a pair of nonbonding electrons to the empty d_z2 orbital of the other decarbonylated Fe(II) atom of (VI) and forms a dative bond. The resulting oxygenated species has the following composition (VIII).

$$
\begin{array}{c}
\overset{\bullet\bullet}{} \qquad \overset{\bullet\bullet}{} \\
A\bullet\bullet O - O\bullet\bullet B \\
D\bullet\bullet\ O - O\bullet\bullet C \\
\underset{\bullet\bullet}{\underset{\downarrow}{}} \qquad \underset{\bullet\bullet}{\underset{\downarrow}{}} \\
Fe \quad Fe
\end{array}
$$

(VIII)

Since there are two Fe(II) atoms in two more myoglobin units in the hemoglobin molecule, two more iron-oxygen dative bonds would be formed with the remaining oxygen atoms, A and B, of the tetratomic oxygen molecule. In this way, the four myoglobin units in the molecule of hemoglobin will be oxygenated by one tetratomic molecule of oxygen. All these events occur during inhalation which we call the inhalation period. As inhalation is followed by exhalation, the pressure starts falling at the start of the latter period. The decrease of pressure causes the distance between an oxygen molecule and an iron atom to increase, for which the dative bond starts breaking due to increase of V under low pressure when the Fe(II) atom passes into the high-spin state.

In a nutshell, the following effects occur simultaneously during exhalation:

a) The contracted Fe(II)-N bonds stretch to the initial lengths. The Fe(II) atom returns to its initial position at B.

b) Two electrons from the t_{2g} level of the low-spin state move into the e_g level, for which the d electronic configuration of the Fe(II) atom may be represented by $e_g^2 t^4_{2g}$ which in turn represents the high-spin state of the iron atom.

c) The oxygenated myoglobin units arrive at the muscles, capillaries, etc.

d) Complete scission of the iron-oxygen dative bond allows the transport of the oxygen molecules to the muscles.

It is, therefore, evident that carbonylation, and deoxygenation of the heme Fe(II) atoms in myoglobin units occur in high-spin state under low pressure while decarbonylation and oxygenation occur in the low-spin state under high pressure. Such deductions on oxygenation are in agreement with the observation that oxygen binding capacity of myoglobin units increases with increasing pressure and decreases with decreasing pressure (Cotton & Wilkinson, 1972). Another way of keeping the heme Fe(II) atom free from carbonylation is to perform physical activity. A person doing physical activity uses the energy released from ATP through the process of contraction and expansion of muscles through which blood flows rapidly. This process of muscles is transmitted to the flow of blood; that is, the blood flow also undergoes contraction and expansion. As a result, the position of an Fe(II) atom becomes uncertain. For this, it becomes difficult, if not impossible, for a carbonyl radical to pinpoint the exact location in the d_z2 orbital for binding. This implies that the probability of interaction of the carbonyl radical with the Fe(II) to produce the species (VI) becomes zero or negligibly small. This may be one of the reasons for which the carpenters, blacksmiths, goldsmiths, day labors, farmers, and those who are engaged in physical activities should be least infected by our speculated virus (SV).

7. The Variant of SV

The variant of the speculated virus may occur through the process in which the genetic material of a person, an animal or a plant change in structure. The term genetic material may include such materials as DNA and RNA and their precursors such as nucleosides, nucleotides, heterocyclic bases, sugar ribose, etc. Returning to the carbonyl compound (VI), it may be noted that carbon monoxide is inserted between two Fe(II) atoms in the form of a diradical in a manner similar to the bridging carbonyl group in the compound (I). Carbon monoxide is said to undergo such insertion at the C-H, C-O, C-N, etc., bonds under suitable conditions (Cotton & Wilkinson, 1972). For example, acetic acid is manufactured by the insertion of carbon monoxide at the C-O bond in methanol in presence of a catalyst (Huheey, 1978). The reaction may be represented by the following equation (22).

$$(H_3C\text{-}OH) \rightarrow H_3C\text{-}C\text{-}OH \qquad\qquad (22)$$

$$+ \qquad\qquad \parallel$$

$$.C. \qquad\qquad O$$

$$\parallel$$

$$O$$

Let the speculated virus possess DNA/RNA. Their genetic materials contain carbon-hydrogen and carbon-oxygen bonds in the sugar units and carbon-nitrogen bonds in the side chains of the bases. For example, a sugar unit has a C-H bond at position-1 and the insertion of a carbonyl diradical at this bond may occur according to the following equation (23).

$$\text{base} \qquad\qquad\qquad \text{base}$$

$$| \qquad\qquad\qquad\qquad |$$

$$\text{----- } C_1 - H \; + \; .C. \quad \longrightarrow \; \sim C_1 - C \; - H \qquad .... \qquad (23)$$

$$| \qquad\qquad\qquad \parallel \qquad\qquad | \;\; \parallel$$

$$O \qquad\qquad\qquad O$$

$$(IX)$$

Thus, the hydrogen of the C-H bond at position-1 of the sugar unit is replaced by an aldehyde group. In consequence, the product (IX) may be termed mutant of the original genetic material. In order to cause the insertion reaction to occur, the carbonyl diradical is brought inside from the surface overcoat by the microorganism. This causes the population of the diradical in the overcoat to decrease which in turn may cause the intensity of infection by the mutant virus to decrease. This process of mutation would continue till the amount of diradical on the surface of the virus is almost completely exhausted.

8. Conclusions

The speculated virus is a microorganism that is laden with carbon monoxide from atmospheric air. It can transform the intaken carbon monoxide into carbonyl diradical in presence of sunlight/near uv light and cause following predicted biological effects in human body with the help of the diradical produced.

i) Infections in throat and nasal systems. ii) Disruption in the structure of lungs.

iii) Partial or complete prevention of oxygenation of the myoglobin units through carbonylation of the Fe(II) atoms in adjacent myoglobin units. As a result, the victim starts to have breathing difficulty. The breathing-in process may be restored by using oxygen under high pressure for inhalation. The pressure would transform the high-spin Fe(II) atom into the low-spin state. As a result, the d_z2 orbital becomes empty, for which the carbonyl carbon-Fe(II) bond undergoes scission. In consequence, the carbonyl diradical is ejected as carbon monoxide. Simultaneously, an oxygen atom of tetratomic oxygen molecule donates a lone pair of nonbonded electrons to the vacant d_z2 orbital and forms a dative bond. In this way, a carbonylated Fe(II) atom is decarbonylated and oxygenation of myoglobin units starts.

(iv). Mutation of genetic materials such as DNA and RNA and their precursors may occur through insertion of the carbonyl diradical at the C-H, C-O, and C-N bonds in them.

(v). The generation of the SV virus would occur largely in those locations where the sources of carbon monoxide are present in plenty. For example, the start and rapid spread of the disease would be observed in towns and cities where the sources are plenty but in rural areas where the sources are scarce the appearance of the disease would be negligibly small.

(vi). Since the two ends of the carbonyl polymer thread have unpaired electrons, it may also behave as a diradical, for which it may cause biological effects similar to those which are caused by the monomer diradical. But the formation of a polymer thread is an exothermic process, indicating that the extent of infection caused by the SV virus would be greater in the colder than in the warmer regions of the earth.

(vii). The presence of the bridging carbonyl group in the product (VI) may be recognized from the infrared frequency in the range of 1750-1850cm^{-1}.

(viii). Due to the presence of unpaired electrons on the nitrogen atoms, the thread (V) may undergo cross-linking polymerization to produce a sheet-like product that may form a covering on the inside surface of the lungs. As a result, the oxygenation of the Fe(II) atoms of the myoglobin units may partially or wholly be stopped.

(ix). Oxygenation of myoglobins occurs under high pressure (low-spin state), while deoxygenation occurs under low pressure (high-spin state).

(x). As the predicted biological effects of the SV virus are similar to most of those which are caused by COVID-19, the former may be considered to be identical with the latter.

(xi) This paper is intended to show that carbon monoxide accumulated in the earth's atmospheric air through human activities can be taken by microorganisms and that the resulting system could act as a virus identical with COVID-19. In order to stop the development of such virus, the emission of CO from different sources must be stopped, which is not at present possible because of absence of fuel sources that could produce no gaseous pollutants including CO.

(xii) Since the polymerization of the carbonyl diradical is an exothermic process, the accumulation of carbon monoxide in the atmospheric air may contribute to the increase of the temperature of the earth's atmosphere.

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