Carbon Monoxide Chemistry Questions with Solutions

Q-1: Water gas is the mixture of $CO+H_2$ in the ratio of

a) 2:1
b) 1:1
c) 1:2
d) 2:2

Answer: b) 1:1

Explanation: Steam is passed over a red-hot carbon fuel like coke to produce gas:

$C(s)+ H_2O(g) \rightarrow CO(g) + H_2(g)$

Q-2: Match the column I with column II

Column I	**Column II**
A) $CO+ N_2$	i) Semi water gas
B) $CH_4 + H_2+ CO$	ii) Neutral gas
C) $CO+ N_2 + H_2$	iii) SynGas
D) CO	iv)Producer gas
E) $CO + H_2$	v)Coal gas

Answer: A)-iv, B)-v), C)-i) ,D)-ii), E)-iii)

Q-3: Carbon monoxide poisoning is treated with which type of therapy?

a) Chemotherapy
b) Physiotherapy
c) Hyperbaric oxygen therapy
d) Radiation Therapy

Answer: c) Hyperbaric oxygen therapy

Explanation: Hyperbaric oxygen therapy (HBOT) is a method of treatment for carbon monoxide poisoning, non-healing wounds, and infections caused by a lack of oxygen in the tissues. It aids in the protection of heart and brain tissue, which are especially vulnerable to carbon monoxide poisoning.

Q-4: What are the most prevalent symptoms of CO poisoning?

Answer: Carbon monoxide poisoning can happen suddenly or gradually. CO poisoning begins with flu-like symptoms, such as headaches, nausea, and exhaustion. The effects get more severe as the exposure time or CO concentration increases, manifesting as tiredness and confusion. Brain damage and death can result from prolonged exposure.

Q-5: Carbon monoxide is used in the preparation of

a) Ethyl alcohol
b) Methyl alcohol
c) Propyl alcohol
d) Propane

Answer: b) Methyl alcohol

Explanation: Synthetically, methanol can be made by heating carbon monoxide and hydrogen gases under pressure in the presence of a catalyst. The reaction is

$CO(g)+2H_2(g) \rightarrow CH_3OH(l)$

ZnO and Cr_2O_3 are used as catalysts in this process, which yields methanol with a high selectivity.

Q-6: Carbon monoxide reacts with haemoglobin to form

a) Carb Haemoglobin
b) Carbaminohaemoglobin
c) Carboxyhaemoglobin
d) Deoxy Haemoglobin

Answer: c) Carboxyhemoglobin

Explanation: CO binds to blood haemoglobin and lowers blood oxygen transport efficiency. When CO reacts with haemoglobin, carboxyhaemoglobin(COHb) is generated.

Q-7: Fill in the blanks

a) Carbon monoxide has a _____fold affinity for haemoglobin compared to oxygen.

b) _____blood contains less than 1 % COHb, while _____blood contains up to 10%.

c) A high concentration of CO in blood causes tissue _____.

d) _____ gases contain between 4% and 7% CO.

e) COHb has a_____ colour.

Answer: a) 200-300

b) normal, smokers

c) anoxia

d) Car exhaust

e) Cherry red

Q-8: The hybridisation of carbon in CO and molecular geometry of CO is

a) sp^2, linear
b) sp^2, trigonal planar
c) sp, linear
d) sp, non linear

Answer: c) sp, linear

Explanation: - The steric number of a particular atom can be used to determine the hybridisation of that atom in a molecule.

We can write, SN = (number of electron lone pairs) + (number of sigma bonds formed by the atom)

The structure of carbon monoxide molecule is:

From the structure it can be concluded that,

- Number of electron pairs on carbon =1
- Number of sigma bonds formed by carbon = 1

SN of carbon atom = 1+1=2

According to VSEPR theory, a steric number equal to 2 corresponds to hybridisation “sp” and the molecular geometry of the molecule as linear.

Q-9: Does carbon monoxide produce long term ecological damage?

Answer: Carbon monoxide is not bioaccumulative or persistent. Carbon monoxide, unlike ozone or sulphur dioxide, does not cause long-term environmental harm.

Q-10: Where should you put the CO detector in your home?

Answer: Carbon monoxide detectors can be fitted in homes to alert residents to dangerous CO levels. These detectors should be placed outside bedrooms in hallways so that they can be heard while people are sleeping. It is essential to exit the house as soon as the alarm sounds.

Q-11: What role does CO play in nickel refining?

Answer: Ni is purified by Mond’s process. Impure nickel is heated in a steam of carbon monoxide forming a volatile complex, nickel tetracarbonyl, which is decomposed when heated at 450K to give pure nickel metal.

The following reaction takes place:

Q-12: When zinc oxide is reduced by coke, what gas is produced?

a) Carbon dioxide
b) Carbon monoxide
c) Oxygen
d) Ozone

Answer: b) Carbon monoxide

Explanation: The following reaction takes place:

[latex]ZnO + CO\overset{coke,1673K}{\rightarrow}Zn + CO[/latex]

Q-13: Calculate the molar mass of Carbon monoxide.

Answer: A molecule's molar mass is the sum of the atomic masses of its constituent atoms.

Molar mass of carbon monoxide = Atomic mass of C + Atomic mass of O= (12+16) u = 28 u

Q-14: What is a ligand? Is CO a neutral ligand?

Answer: Ligands are the atoms, ions, and molecules that surround the core transition metal ion. They serve as a Lewis base, donating electron pairs to the transition metal ion, forming a dative link between the ligands and the transition metal ion.

Yes, Co is considered a neutral ligand.

Q-15: When designating coordination compounds according to IUPAC, what is the special term for CO?

a) Carboxyl
b) Carbonyl
c) Carbonic
d) Carboxylate

Answer: b) Carbonyl

Practise Questions on Carbon monoxide

Q-1: How can carbon monoxide impact pregnant women?

Answer: Increased CO levels in the blood may cause premature birth, spontaneous abortions, and malformed newborns in pregnant women who smoke.

Q-2: Humans are poisoned by carbon monoxide. How?

Answer: In the human body,it forms carboxyhaemoglobin with haemoglobin, which is 300 times more stable than the oxygen-haemoglobin combination. The oxygen carrying capacity of blood is considerably diminished when carboxyhaemoglobin concentrations reach around 3–4% in blood. This oxygen deficit causes headaches, blurred vision, anxiety, and cardiovascular problems. This is why it is recommended that people do not smoke.

Q-3: The bond order of CO gas is

a) 1
b) 2
c) 3
d) 2.5

Answer: c) 3

Explanation: The number of chemical bonds between two atoms is represented by the bond order.

A triple bond exists between carbon and oxygen atom($C \equiv O$) indicating a bond order of 3.

Q-4: What effect does CO have on the AQI?

Answer: The air quality index (AQI) is a daily reporting index for air quality. It's a metric for how air pollution impacts one's health over a short period of time. The AQI's objective is to inform individuals about how local air quality affects their health**.**

One of the most common air contaminants is carbon monoxide. It has an impact on AQI because of its toxicity and significant bulk in the atmosphere. It is produced in air by incomplete combustion of coal, firewood, gasoline, and other fuels. Over time, the number of automobiles has increased all over the

world. Because many vehicles are poorly maintained and have insufficient pollution control technology, more carbon monoxide and other damaging gases are released.

Q-5: Wrought iron is the purest form of iron. It is obtained when carbon gets oxidised to CO by

a) Haematite
b) Magnetite
c) Siderite
d) Limonite

Answer: a) Haematite

Explanation: The haematite(Fe_2O_3) oxidises carbon to carbon monoxide as:

$Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$