

Iron in Chemistry Questions with Solutions

Q1. The atomic number of iron is:

- a.) 25
- b.) 26
- c.) 27
- d.) 28

Correct Answer– (b.) 26

Q2. The symbol of iron is:

- a.) I
- b.) Fe
- c.) Ir
- d.) Fr

Correct Answer– (b.) Fe

Q3. Iron is a-

- a.) Metal
- b.) Non-metal
- c.) Metalloid
- d.) All of the above

Correct Answer– (a.) Metal

Q4. The purest form of iron is:

- a.) Pig iron
- b.) Wrought iron
- c.) Steel
- d.) Cast iron

Correct Answer– (b.) Wrought iron

Q5. The oxidation state of iron is/are:

- a.) +2
- b.) +3

- c.) +5
- d.) All of the above

Correct Answer– (a.) +2 and 9b.) +3

Q6. What type of element is Iron?

Answer. Iron is a transition metal with the atomic number 26 and the chemical symbol Fe.

Q7. What is the position of Iron in the periodic table?

Answer. Iron (Fe) has an atomic number 26, which indicates that it is placed in the fourth period and the 8th group.

Q8. Write the electronic configuration of Iron.

Answer. The electronic configuration of Iron is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$.

Q9. Define rusting of iron.

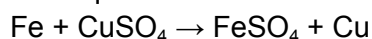
Answer. The eating of iron metal by its oxides due to the exposure of iron to oxygen or moisture is called rusting. The oxidation of the metal results in the formation of rust on it. Rust is a red-brown flaky substance covered on the surface of the metal due to corrosion.

This phenomenon is a great example of the corrosion of metals, where the surfaces of metals are degraded into more chemically stable oxides. However, the term 'rusting' is generally used to refer to the corrosion of objects made of iron or iron alloys.

Q10. What happens when iron nails are dipped in a copper sulphate solution.

Answer. When iron nails are dipped in a blue colour copper sulphate solution, then iron being more reactive than copper displaces copper from its solution. A brown coating of copper is formed on the surface of the iron whereas the colour of the copper sulphate solution changes from blue to pale green.

The equation for the reaction is as follows:



Q11. List some foods that contain iron.

Answer. Some of the foods that contain are as follows:

- Spinach
- Broccoli
- Peas
- Kale
- Lamb
- Chicken

- Tuna
- Oysters

Q12. List the physical properties of iron.

Answer. The physical properties of iron are as follows:

- i.) It is a heavy metal with a density of 7.9 g/cc.
- ii.) It is a lustrous metal, greyish white in colour.
- iii.) It has highly malleable and ductile.
- iv.) It is a good conductor of heat and electricity.
- v.) It can be magnetised.

Q13. What are the applications of Iron?

Answer. Some of the applications of iron are as follows:

- Iron is one of the most useful metals, and its alloys are used in a variety of applications such as bridges, electricity pylons, bicycle chains, cutting tools, and rifle barrels.
- Cast iron is used to make pipes, valves, pumps, stoves, and other similar items.
- Iron and its alloys and compounds can be used to make magnets.
- Stainless steel is a popular iron alloy that is highly corrosion resistant. It can be found in architecture, bearings, cutlery, surgical instruments, and jewellery. Nickel steel is used in the manufacture of cables, automobiles, and aircraft parts. Chrome steels are used in the production of cutting tools and crushing machines.

Q14. What is Wrought Iron?

Answer. Wrought iron, is an iron alloy with a very low carbon content (less than 0.08 %). It is a semi-fused iron mass with fibrous slag particles (up to 2% by weight), giving it a "grain" resembling wood that is visible when etched, rusted, or bent to the point of failure. Wrought iron is tough, malleable, ductile, corrosion-resistant, and easily forge welded, but electrical welding is more difficult in it.

Q15. Explain the process of extraction of iron.

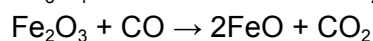
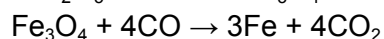
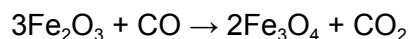
Answer. The process of extraction of iron are:

- i.) Concentration– The ore is crushed in jaw crushers and broken down into small 1 inch pieces. The crushed ore is concentrated using gravity separation and washed with water to remove clay, sand, and other impurities.
- ii.) Calcination– In a reverberatory furnace, the concentrated ore is calcined (highly heated in the presence of a limited supply of air). The following changes occur during this process:
 - Moisture is extracted.
 - Impurities such as sulphur, phosphorus, and arsenic are converted to volatile gaseous oxides and escape.

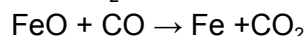
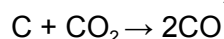
iii.) Smelting– The calcined ore is reduced with carbon, or smelted, in a blast furnace. A blast furnace is a gigantic, steel stack lined with refractory brick where the concentrated iron ore, coke, and limestone are dumped from the top, and a blast of hot air is blown into the bottom. All the three ingredients are crushed into small round pieces and mixed and put on a hopper which controls the input.

Hot air is blown from the bottom and coke is burned to yield temperatures up to about 2200K. Burning coke provides the majority of the heat required for this process. At such high temperatures, Coke reacts with the oxygen in the hot air to form Carbon Monoxide (CO). The CO and heat now move upwards and meet the raw material running down from the top. The temperature in the upper parts of the Blast Furnace is considerably lower than the 2200K at the bottom. In this part, Haematite (Fe_2O_3) and Magnetite (Fe_3O_4) are reduced to Ferrous Oxide (FeO).

Reactions in the Blast furnace at 500 – 800 K, In the upper parts with lower temperatures,



At 900 – 1500 K, In the lower sections of the furnace,



The limestone also decomposes to CaO which removes the silicate impurity of the ore in the form of Slag. It can be easily separated out of molten iron. The iron manufactured in Blast Furnaces contains about 3 – 4 % of Carbon and smaller quantities of many other impurities such as sulphur, Silicon, etc. This is called Pig Iron. It is a hard but brittle metal and the impurities severely hamper its strength. Carbon seems to play a significant role in influencing the brittleness and hardness balance in iron. To further reduce the carbon content of pig iron, it is melted again with scraps of iron and coke and subjected to the blast of hot air. This kind of iron is called Cast Iron and has a slightly lower carbon content 2 – 3 %. This is even harder than pig iron.

Practise Questions on Iron

Q1. Out of the given options, choose the one which is not an iron ore?

- a.) Magnetite
- b.) Hematite
- c.) Pyrrhotite
- d.) Siderite

Correct Answer– (c.) Pyrrhotite

Q2. Iron is:

- a.) More reactive than lead

- b.) Less reactive than copper
- c.) More reactive than Calcium
- d.) Less reactive than mercury

Correct Answer– (a.) More reactive than lead

Q3. The deficiency of iron in food causes which disease?

Answer. Iron deficiency causes anemia which is a condition in which the body has insufficient red blood cells due to a lack of iron.

Iron is used by the body to create red blood cells, which transport oxygen throughout the body. Without enough iron, there may be insufficient healthy red blood cells to carry enough oxygen to meet the body's needs.

Q4. List the common ores of iron.

Answer. Some of the common ores of iron are as follows:

- Haematite (Fe_2O_3)
- Magnetite (Fe_3O_4)
- Limonite ($\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$)
- Iron pyrites (FeS_2)
- Siderite (FeCO_3)

Q5. What are the chemical properties of Iron?

Answer. The chemical properties of iron are as follows:

- It is mostly found in the +2 and +3 oxidation states.
- Iron (II) compounds are referred to as ferrous, whereas iron (III) compounds are referred to as ferric.
- Iron (II) compounds are light green, whereas iron (III) compounds are orange/brown.
- It can also be found in the compound potassium ferrate in a higher oxidation state of +6. (K_2FeO_4).
- In the open air, it easily oxidizes.
- Iron (I, II) oxide is formed when red hot iron reacts with steam.
- When iron reacts with acids, it produces salts and hydrogen gas.