

Titanium Chemistry Questions with Solutions

Q1. What is the preferred oxidation state of titanium?

- a.) +2, +3
- b.) +3, +4
- c.) +2, +3, +4
- d.) -2, -3, -4

Correct Answer– (c.) +2, +3, +4

Q2. Titanium is known for its low _____ and _____ strength.

- a.) solubility, low
- b.) density, low
- c.) density, high
- d.) resistance, high

Correct Answer– (c.) density, high

Titanium is known for its low density and high strength, with the highest weight-to-strength ratio of any structural metal.

Q3. The symbol for Titanium is–

- a.) Tl
- b.) T
- c.) Ti
- d.) None of the above

Correct Answer– (c.) Ti

Q4. The atomic number of Titanium is–

- a.) 19
- b.) 20
- c.) 21
- d.) 22

Correct Answer– (d.) 22

Q5. What property is true about Titanium?

- a.) It is shiny and a lightweight metal.
- b.) It is shiny and strong metal.
- c.) It is not shiny and is a heavy metal.
- d.) It is shiny and light.

Correct Answer– (b.) It is shiny and strong metal.

Q6. Does Titanium have isotopes?

Answer. Naturally occurring titanium has five stable isotopes. ^{46}Ti , ^{47}Ti , ^{48}Ti , ^{49}Ti and ^{50}Ti .

Q7. What is the formula of titanium(II) oxide?

Answer. The oxidation state of titanium is +2 and that of oxygen is –2. Therefore, the formula of titanium (II) oxide is TiO .

Q8. State True or False.

Upon heat treatment, titanium can experience loss of ductility.

Answer. True.

One of the disadvantages of the titanium element is that when it undergoes heat treatment, it loses ductility if it is not properly controlled.

Q9. Fill in the blank.

Titanium metal is extracted from ____.

Answer. Titanium metal is extracted from Ilmenite.

Ilmenite is the most important ore of titanium, with the idealized formula FeTiO_3 .

Q10. What makes titanium so special?

Answer. Titanium metal is a very durable metal for engineering applications because it is corrosion-resistant, as well as strong and light. It is 40% lighter than steel but twice as strong as high-strength steel. As a result, titanium is used in a variety of industries, including aerospace.

Q11. What are the elements with which titanium can be alloyed?

Answer. Titanium can be alloyed with other elements such as iron, aluminium, vanadium, and molybdenum to create strong, lightweight alloys.

Q12. What is the oxidation state of titanium in TiH_4O_4 ?

Answer. Let the oxidation state of Ti be x.

Therefore, $x + 4 \times (+1) + 4 \times (-2) = 0$

$$x + 4 - 8 = 0$$

$$x = +4.$$

Hence, the oxidation state of titanium is +4.

Answer. Titanium has no known biological function. It is not a poisonous metal, and the human body can tolerate high doses of titanium.

The toxicity of elemental titanium and titanium dioxide is low. Excessive exposure in humans can cause minor changes in the lungs.

Q14. State some physical properties of Titanium.

Answer. Some of the physical properties of Titanium are-

- Titanium is ductile and has a metallic lustre.
- Titanium is distinguished by its low density and high mechanical strength.
- Titanium is resistant to corrosion and is unaffected by the atmosphere or seawater.
- Titanium is a key alloying element in steel and alloys.
- Titanium has poor thermal and electrical conductivity, which is comparable to or slightly lower than that of stainless steel.

Q15. State some applications of Titanium.

Answer. Some uses of Titanium include—

- Titanium is useful for alloying with other metals such as aluminium, molybdenum, iron, manganese, and others.
- Titanium alloys are used when lightweight strength and resistance to temperature extremes are required (e.g., aerospace applications).
- Titanium has the potential to be used in desalination plants.
- The metal is commonly used in components that must be exposed to seawater.
- To protect against cathodic corrosion caused by seawater, a titanium anode coated with platinum can be used.

Practise Questions on Titanium

Q1. Titanium is ___ in colour.

- a.) white
- b.) grey
- c.) red
- d.) silvery-white

Correct Answer— (d.) silvery-white

Q2. Titanium consists of about ____ of the earth's crust

- a.) 27.7%
- b.) 0.57%
- c.) 2.34%
- d.) 5%

Correct Answer– Titanium accounts for approximately 0.57 % of the earth's crust. It is the ninth most abundant material on the planet.

Q3. What is the formula of Titanium (III) oxide?

Answer. Since the oxidation state of titanium is given to be +3 and that of oxygen is –2. The formula of Titanium (III) oxide is Ti_2O_3 .

Q4. Calculate the oxidation state of Ti in the compound H_2TiO_4 .

Answer. Let the oxidation state of Ti be x.

Therefore, $2 \times (+1) + x + 4 \times (-2) = 0$.

$$+2 + x - 8 = 0$$

$$x = +6.$$

Hence, the oxidation state of Ti is +6.

Q5. What are the characteristics of titanium alloy?

Answer. Titanium alloys have very high tensile strength even at high temperatures, are light in weight, have high corrosion resistance, and can withstand extreme temperatures. Because of these properties, they are primarily used in aircraft, power plant pipes, armour plating, naval ships, spacecraft, and missiles.