

## What is the valency of Carbon Chemistry Questions with Solutions

**Q1.** What is the valency of carbon?

- (a) Three
- (b) Four
- (c) Both (a) and (b)
- (d) None of the above

**Answer:** (b) Four

**Explanation:** Carbon has four valence electrons in its outermost shell. Thus, its valency is four.

**Q2.** What is the valency of carbon in carbon dioxide (CO<sub>2</sub>)?

- (a) Two
- (b) Four
- (c) Both (a) and (b)
- (d) None of the above

**Answer:** (b) Four

**Calculation:** Let x be the valency of the carbon atom.

Valency of oxygen = - 2.

Thus, the valency of carbon will be

$$x + 2 \times (-2) = 0$$

$$x - 4 = 0$$

$$x = 4$$

Thus, the valency of carbon in carbon dioxide (CO<sub>2</sub>) is four.

**Q3.** What is the atomic number of carbon?

- (a) Four
- (b) Five
- (c) Six
- (d) None of the above

**Answer:** (c) Six

**Q4.** Why does carbon forms multiple compounds?

- (a) Tetravalency
- (b) Catenation
- (c) Shares multiple electrons to form a double or triple bond
- (d) All of the above

**Answer:** (d) All of the above

**Q5.** How many double bonds can a carbon atom form?

- (a) One
- (b) Two
- (c) Both (a) and (b)
- (d) None of the above

**Answer:** (b) Two

**Explanation:** Carbon has four valency. Thus, it can form at most two double bonds.

**Q6.** Why does carbon show four valency?

**Answer:** Valency is equivalent to the number of valence electrons for atoms having four or fewer valence electrons. For atoms with more than four valence electrons, valency equals 8 - the number of valence electrons. Carbon has four valence electrons in its outer shell. Thus, it shows four valency.

**Q7.** What is valency?

**Answer:** Valency is the combining capacity of an element, i.e. number of monovalent hydrogen atoms that can directly attach to it.

**Q8.** What is the meaning of four valency?

**Answer:** Four valency signifies that the element is tetravalent, i.e. it can combine with four univalent atoms. Carbon, silicon, germanium, tin and lead show four valency.

**Q9.** What is the valency of the first ten elements?

**Answer:**

S. No.	Element	Valency
1.	Hydrogen	1
2.	Helium	0
3.	Lithium	1
4.	Berelium	2
5.	Boron	3
6.	Carbon	4
7.	Nitrogen	3
8.	Oxygen	2
9.	Fluorine	1
10.	Neon	0

**Q10.** Is valency positive or negative?

**Answer:** Valency is neither positive nor negative but neutral.

**Q11.** What are allotropes? Name any three allotropes of carbon.

**Answer:** Allotropes refer to the different forms of the same element, where the atoms combine in different ways, so at the same temperature and pressure, they can exist in different forms.

Graphite, diamond and fullerene are the allotropes of carbon.

**Q12.** Does LPG contain carbon?

**Answer:** Yes, LPG contains carbon. It is a mixture of butane and isobutane (carbon compounds).

**Q13.** Why does carbon not form a  $C^{4+}$  cation?

**Answer:** Carbon does not form a  $C^{4+}$  cation because donating four electrons from a carbon atom requires significant energy, which is unavailable. Thus, it does not form a  $C^{4+}$  cation.

**Q14.** What are the three primary uses of carbon?

**Answer:** The three primary uses of carbon are as follows:

1. Carbon is used as a fuel (in the form of coal), which is predominantly carbon.
2. Graphite is used to make pencil tips, high-temperature crucibles, dry cells, electrodes, and lubricants, which is an allotrope of carbon.
3. Diamonds are used in jewellery and industry for cutting, drilling, grinding, and polishing due to their extreme hardness, which is also an allotrope of carbon.

**Q15.** Why does carbon not form a  $C^{4-}$  anion?

**Answer:** Carbon does not form a  $C^{4-}$  anion because carbon is tiny and contains six protons. It is ineligible to hold ten valence electrons. Thus, it does not form a  $C^{4-}$  anion.

## Practice Questions on What is the valency of Carbon

**Q1.** Why does carbon forms multiple compounds?

**Answer:** Carbon forms multiple compounds for the following reasons:

1. A carbon atom has tetra valency, i.e. carbon atom can form four covalent bonds with the other atoms.
2. It has catenation, i.e. two carbon atoms can readily form covalent bonds, which are relatively more stable.
3. It has varying bond order and hybridisation. That is, it can form double or triple bonds.
4. It shares multiple electrons to form a double or triple bond.

**Q2.** How do you calculate the valency of an atom?

**Answer:** The valency of an atom is equivalent to the number of valence electrons for atoms having four or less than four valence electrons. For atoms with more than four valence electrons, valency equals 8 - the number of valence electrons.

For example, carbon has four valence electrons in its outer shell. Thus, it shows four valency.

**Q3.** Why does carbon not form ionic bonds?

**Answer:** Atomic number of carbon is six. It means it has four electrons in its outermost shell and needs four more electrons to attain noble gas electronic configuration. It does not form a  $C^{4+}$  cation, as removing four valence electrons will require a lot of energy. The cation formed will have six protons and two electrons. It makes it highly unstable. Carbon is unable to form  $C^{4-}$  anion as its nucleus with six protons will not be able to hold ten electrons. Thus, carbon achieves noble gas electronic configuration by sharing its four electrons with other elements, i.e. it forms covalent compounds.

**Q4.** What is covalency? What is the covalency of carbon?

**Answer:** When an element shares electrons with other atoms of the same or different elements to acquire a stable electronic configuration, it is called covalency. If an atom shares 1 electron, its covalency is equal to 1. If it shares 2 electrons, its covalency is 2.

Covalency of Carbon – Carbon has four valence electrons. It can share four electrons with hydrogen to complete its octet to form  $CH_4$ . Therefore its covalency is four.

**Q5.** Why is carbon tetravalent?

**Answer:** Carbon is tetravalent because it has four valence electrons. To achieve noble gas configuration, carbon shares these electrons with four atoms of hydrogen.