



Answer the multiple-choice questions below then check your answers.

1. A dative covalent bond is formed when:

- a) Two atoms share a pair of electrons contributed equally by both atoms.
- b) One atom donates a lone pair of electrons to be shared by both atoms.
- c) Two atoms share a pair of electrons contributed by a third atom.
- d) None of the above.

2. The atom that donates the lone pair of electrons in a dative covalent bond is called the:

- a) Acceptor
- b) Donor
- c) Lewis acid
- d) Lewis base

3. Which of the following species cannot act as a donor in a dative covalent bond?

- a) NH_3
- b) H_2O
- c) H^+
- d) CO

4. A common example of a compound containing a dative covalent bond is:

- a) NaCl
- b) H_2O
- c) NH_4^+
- d) CO_2

5. In the formation of the ammonium ion (NH_4^+) from ammonia, how many dative covalent bonds are formed?

- a) 1 b) 2 c) 3 d) 4

6. Which of the following statements is true about dative covalent bonds?

- a) They are weaker than covalent bonds.
b) They are stronger than covalent bonds.
c) They have the same strength as covalent bonds.
d) The strength depends on the specific atoms involved.

7. A coordinate bond is another term for:

- a) Ionic bond b) Metallic bond c) Dative covalent bond
d) Hydrogen bond

8. The shape of the ammonium ion (NH_4^+) is:

- a) Linear b) Trigonal planar c) Tetrahedral d) Pyramidal

9. In the formation of a complex ion, such as $[\text{Cu}(\text{H}_2\text{O})_4]^{2+}$, which species acts as the electron donor?

- a) Cu^{2+} b) H_2O c) Both Cu^{2+} and H_2O d) Neither Cu^{2+} nor H_2O

10. Dative covalent bonds are essential in the formation of:

- a) Ionic compounds b) Complex ions c) Covalent molecules
d) Metallic structures

11. Which of the following statements about dative covalent bonds is true?

a) Both atoms contribute one electron each to the bond.

b) One atom provides both electrons for the bond.

b) The bond is always between two different elements.

d) The bond is stronger than a regular covalent bond.

12. In which of the following molecules is a dative covalent bond present?

a) H_2O b) NH_3 c) NH_4^+ d) CH_4

13. Which molecule can form a dative covalent bond with a proton (H^+)?

a) CH_4 b) NH_3 c) Cl_2 d) O_2

14. Which of the following is an example of a dative covalent bond?

a) Cl_2 b) $\text{H}_2\text{O} \rightarrow \text{H}^+$ c) NaCl d) CO_2

15. Which species acts as a Lewis base in the formation of a coordinate bond?

a) BF_3 b) AlCl_3 c) NH_3 d) H^+

16. In the complex ion $[\text{Cu}(\text{NH}_3)_4]^{2+}$, how many coordinate bonds are formed between copper and ammonia?

a) 2 b) 4 c) 6 d) 8

17. Which of the following statements correctly describes a coordinate bond?

a) It is a bond where electrons are equally shared between atoms.

b) It is a bond formed when an atom shares an electron pair with another atom that has a vacancy.

c) It involves the complete transfer of electrons.

d) It is a type of metallic bonding.

18. In the reaction between ammonia (NH_3) and boron trifluoride (BF_3) to form NH_3BF_3 , which atom donates the electron pair for the coordinate bond?

a) Nitrogen in NH_3

b) Boron in BF_3

c) Hydrogen in NH_3

d) Fluorine in BF_3

19. Which of the following complexes contains a central metal ion bonded to ligands through coordinate bonds?

a) $[\text{Fe}(\text{CN})_6]^{3-}$

b) NaCl

c) H_2SO_4

d) CH_4

Answers

1. *b*

2. *b*

3. *c*

4. *c*

5. *a*

6. *d*

7. *c*

8. *c*

9. *b*

10. *b*

11. *b*

12. *c*

13. *b*

14. *b*

15. *c*

16. *b*

17. *b*

18. *a*

19. *a*