What are Oxidation States?

Worksheet

Oxidation states are numbers assigned to atoms showing electrons lost (positive OS) or gained (negative OS) versus the neutral atom. Key rules: elements in elemental form are 0; oxygen is usually 2; hydrogen is usually +1; alkali metals are +1.

Questions

1. In HO, what is the OS of oxygen?

A) +2
B) 1
C) 2
D) 0

2. What is the OS of Mn in KMnO?

A) +7
B) +6
C) +5
D) +4

3. In Cl, each Cl atom has OS =

A) +1
B) 1
C) 0
D) +2

4. Which statement is true?

A) OS always equals ion charge
B) OS is used to track electron transfer
C) OS of H is always +1
D) OS in Cl is 1

5. What is the oxidation state of Cr in KCrO?

6. Find the OS of S in SO.

7. What is the OS of N in NO?

8. Define: What is an oxidation state?

9. Define: What is the OS of oxygen?

10. Define: What is the OS of an element in its elemental form?

Answer Key

1. C) 2 - Oxygen is 2 in most compounds; hydrogen is +1. Check: (+1)(2) + (2)(1) = 0.

2. A) +7 - K is +1, O is 2. (+1) + Mn + (4)(2) = 0 Mn = +7.

3. C) 0 - Elements in elemental form always have OS = 0.

4. B) OS is used to track electron transfer - Oxidation states help identify redox reactions and electron movement between atoms.

5. Let Cr OS = x. Potassium +1, oxygen 2. (2)(+1) + (2)(x) + (7)(2) = 0 2 + 2x 14 = 0 2x = 12 x = +6

6. Let S OS = x. Oxygen 2, charge 2. (x) + (4)(2) = 2 x 8 = 2 x = +6

7. Let N OS = x. Oxygen 2, charge 1. (x) + (3)(2) = 1 x 6 = 1 x = +5

8. A number assigned to an atom showing electrons lost (positive) or gained (negative) in a compound.

9. Usually 2 (except in peroxides where it is 1).

10. Always 0. E.g. O, N, Cl all have OS = 0.