

20.2

OXIDATION NUMBERS

Section Review

Objectives

- Determine the oxidation number of an atom of any element in a pure substance
- Define *oxidation* and *reduction* in terms of a change in oxidation number, and identify atoms being oxidized or reduced in redox reactions

Vocabulary

- oxidation number

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The oxidation number of an element in an uncombined state is 1. The oxidation number of a monatomic ion is the same in magnitude and 2 as its ionic 3. The sum of the oxidation numbers of the elements in a neutral compound is 4. In a polyatomic ion, however, the sum is equal to the 5. Oxidation numbers help you keep track of 6 – transfer in redox reactions. An oxidation number increase is 7, while a 8 is reduction.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ 9. Oxygen is more electronegative than chlorine.

_____ 10. The oxidation number of each oxygen atom in most compounds is -2 .

_____ 11. The oxidation number of Cl in KClO_3 is -1 .

_____ 12. The oxidation number of each hydrogen atom in most compounds is -1 .

_____ 13. The oxidation number for copper in a copper penny is $+2$.

- _____ 14. In the reaction $C + H_2O \rightarrow CO + H_2$, the oxidation number of the hydrogen doesn't change.
- _____ 15. In the reaction $C + H_2O \rightarrow CO + H_2$, the oxidation number of the carbon increases.
- _____ 16. An increase in the oxidation number of an atom indicates oxidation.

Part C Matching

Match the oxidation number of nitrogen in each formula in Column B to the correct oxidation number in Column A.

Column A	Column B
_____ 17. -3	a. N_2
_____ 18. -2	b. HNO_3
_____ 19. -1	c. NO
_____ 20. 0	d. NH_2OH
_____ 21. +1	e. NH_3
_____ 22. +2	f. N_2O_3
_____ 23. +3	g. N_2O
_____ 24. +4	h. N_2H_4
_____ 25. +5	i. NO_2

Part D Questions and Problems

Answer the following in the space provided.

26. Define *oxidation* and *reduction* in terms of a change in oxidation number.

27. Use the change in oxidation number to determine which elements are oxidized and which are reduced in these reactions. (Note: It is not necessary to use balanced equations.)

