

# Module 11: Acid/Bases, Neutralization, and Redox Reactions

## Topic 5 Content: Oxidation States Notes

### Introduction

The screenshot shows a digital interface for an educational module. At the top, the title 'Oxidation States' is displayed in a dark header. Below the header, there is a vertical list of seven purple buttons on the left side, each representing a different group of elements: 'Group One', 'Group Two', 'Groups Three - Twelve', 'Group Thirteen', 'Groups Fourteen - Sixteen', 'Group Seventeen', and 'Group Eighteen'. To the right of these buttons is a main content area with a light gray background. This area has a sub-header 'Introduction' and a large, stylized title 'Oxidation States' in orange and blue. Below the title is a paragraph of text explaining that elements are neutral as atoms but have oxidation states when combined in compounds. It mentions that oxidation states are determined by the charge an element carries and can be assigned by looking at Lewis structures or the periodic table. The text also states that the maximum oxidation state is +7 and the minimum is -4. A vertical scrollbar is visible on the right side of the text area.

The elements on the periodic table are all neutral as atoms and have an oxidation state of zero. When combined in chemical compounds, the elements are no longer considered neutral. The oxidation state determines the charge that an element carries when combined with another element. Oxidation numbers are easily assigned by looking at the Lewis structure for a given substance; however, typical oxidation states are described by the elements' position on the periodic table. The maximum oxidation state is plus seven. The minimum oxidation state is minus four. In this activity, click on each of the tabs to learn how the oxidation states changes for each group on the periodic table.

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## Topic 5 Content: Oxidation States Notes

### Group One

**Oxidation States**

Group One

Group One

Group Two

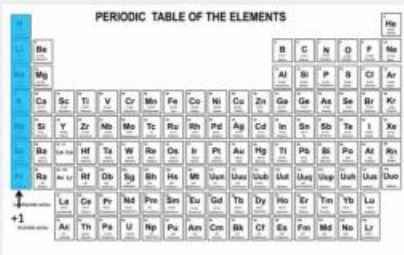
Groups Three - Twelve

Group Thirteen

Groups Fourteen - Sixteen

Group Seventeen

Group Eighteen



PERIODIC TABLE OF THE ELEMENTS

The Group One metals have an oxidation state of plus one. All of these metals have one valence electron.

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## Topic 5 Content: Oxidation States Notes

### Group Two

**Oxidation States**

Group One

Group Two

Groups Three - Twelve

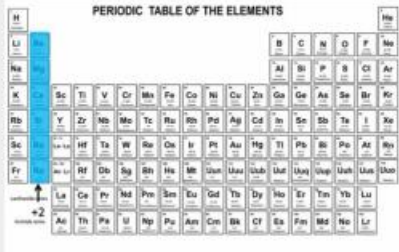
Group Thirteen

Groups Fourteen - Sixteen

Group Seventeen

Group Eighteen

**Group Two**



PERIODIC TABLE OF THE ELEMENTS

The Group Two metals have an oxidation state of plus two. All of these metals have two valence electrons.

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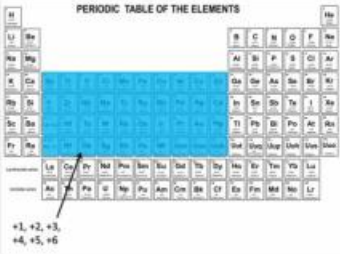
## Topic 5 Content: Oxidation States Notes

### Groups Three - Twelve

### Oxidation States

- Group One
- Group Two
- Groups Three - Twelve
- Group Thirteen
- Groups Fourteen - Sixteen
- Group Seventeen
- Group Eighteen

### Groups Three - Twelve



The Group Three metals have an oxidation state of plus one, plus two, plus three, plus four, plus five, or plus six. These transition metals have the tendency to change their oxidation state. Many of the transition elements can form more than one charge, and in some cases, up to five different charges.

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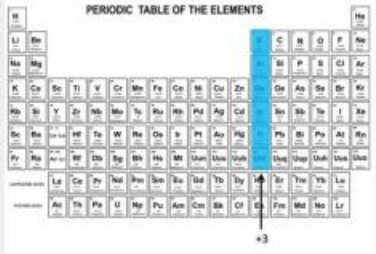
## Topic 5 Content: Oxidation States Notes

### Group Thirteen

### Oxidation States

- Group One
- Group Two
- Groups Three - Twelve
- Group Thirteen**
- Groups Fourteen - Sixteen
- Group Seventeen
- Group Eighteen

### Group Thirteen



Group Thirteen elements have an oxidation state of plus three. All members of group thirteen have three valance electrons and tend to form the plus three charges, though indium and thallium can form the plus one charge.

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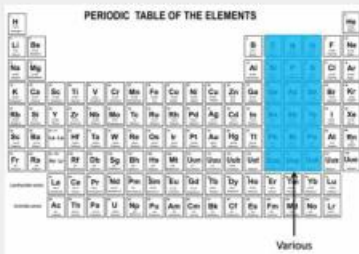
## Topic 5 Content: Oxidation States Notes

### Groups Fourteen - Sixteen

### Oxidation States

- Group One
- Group Two
- Groups Three - Twelve
- Group Thirteen
- Groups Fourteen - Sixteen
- Group Seventeen
- Group Eighteen

### Groups Fourteen - Sixteen



PERIODIC TABLE OF THE ELEMENTS

Groups Fourteen, Fifteen, and Sixteen elements have various oxidation states. Most elements in Groups Fourteen and Fifteen will either form the plus four or plus two oxidation state. Even though Group Sixteen elements have six valence electrons, most elements will form the minus two oxidation state.

Groups Fourteen, Fifteen, and Sixteen elements have various oxidation states. Most elements in Groups Fourteen and Fifteen will either form the plus four or plus two oxidation state. Even though Group Sixteen elements have six valence electrons, most elements will form the minus two oxidation state.

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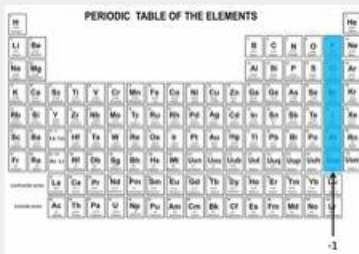
## Topic 5 Content: Oxidation States Notes

### Group Seventeen

### Oxidation States

- Group One
- Group Two
- Groups Three - Twelve
- Group Thirteen
- Groups Fourteen - Sixteen
- Group Seventeen
- Group Eighteen

### Group Seventeen



PERIODIC TABLE OF THE ELEMENTS

Group Seventeen elements have an oxidation state of negative one. The elements of this group are so reactive that they are impossible to find alone in nature.

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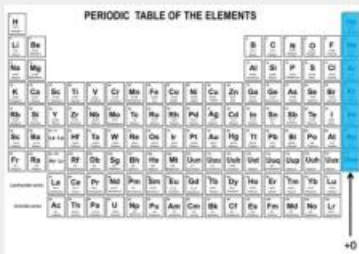
## Topic 5 Content: Oxidation States Notes

### Group Eighteen

### Oxidation States

- Group One
- Group Two
- Groups Three - Twelve
- Group Thirteen
- Groups Fourteen - Sixteen
- Group Seventeen
- Group Eighteen**

### Group Eighteen



PERIODIC TABLE OF THE ELEMENTS

Group Eighteen elements are known as the noble gases. The elements in this group are found alone. Since these elements have no need to form or react, they do not form ions. The oxidation state for Group Eighteen is zero.

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