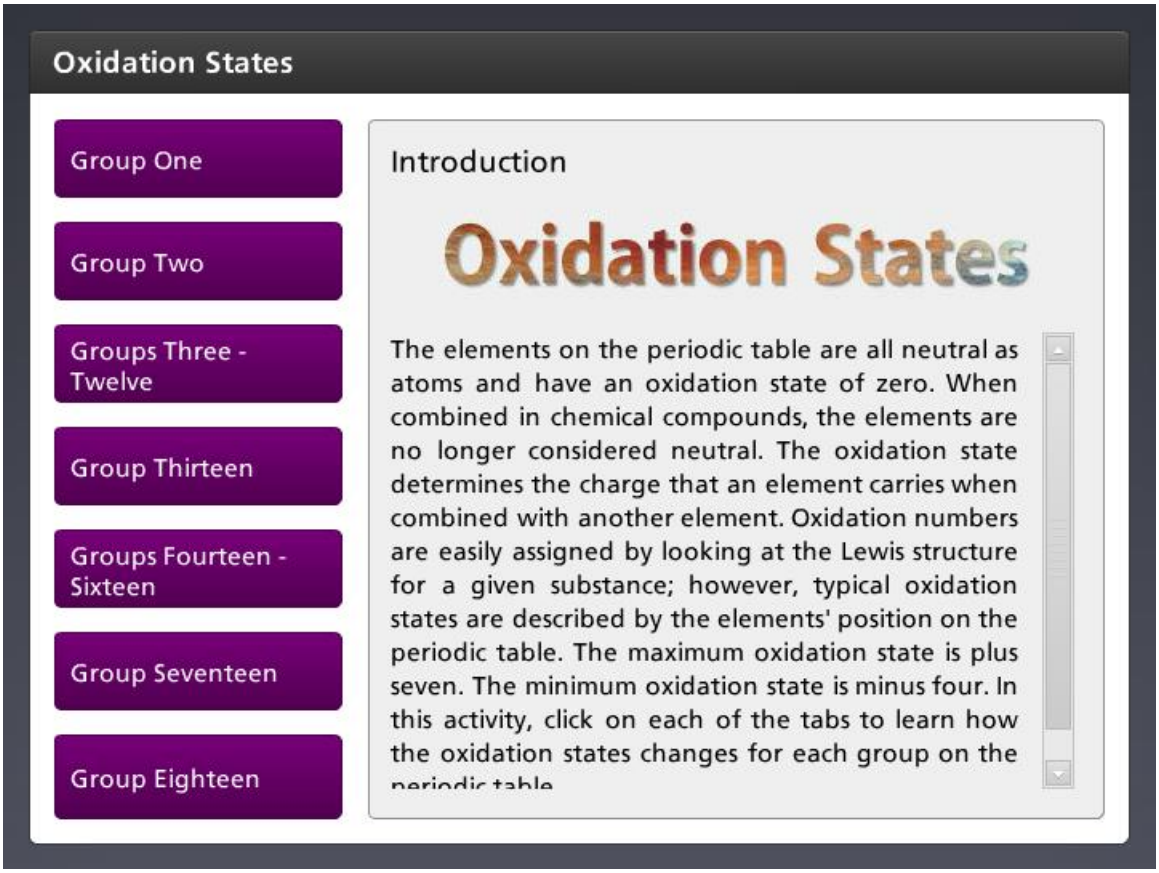
Module 11: Acid/Bases, Neutralization, and Redox Reactions

Topic 5 Content: Oxidation States Notes

Introduction



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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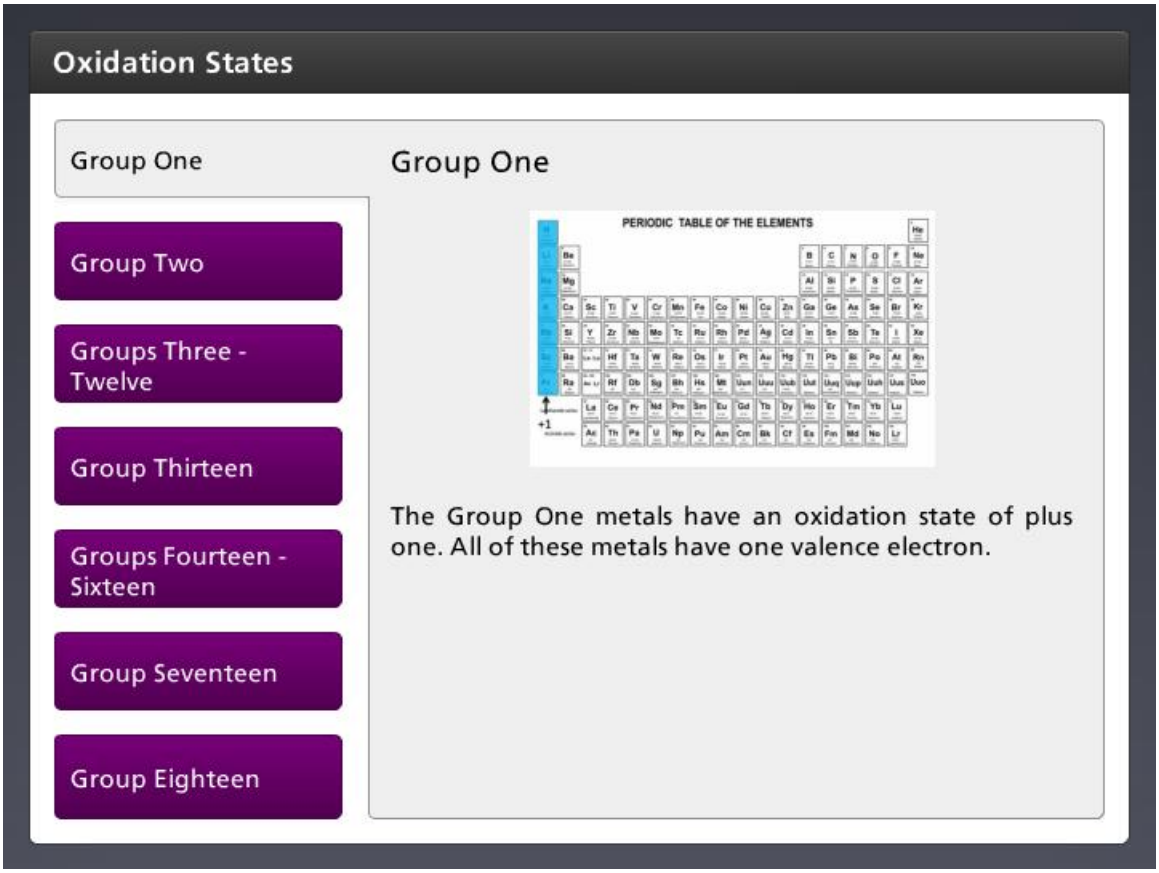
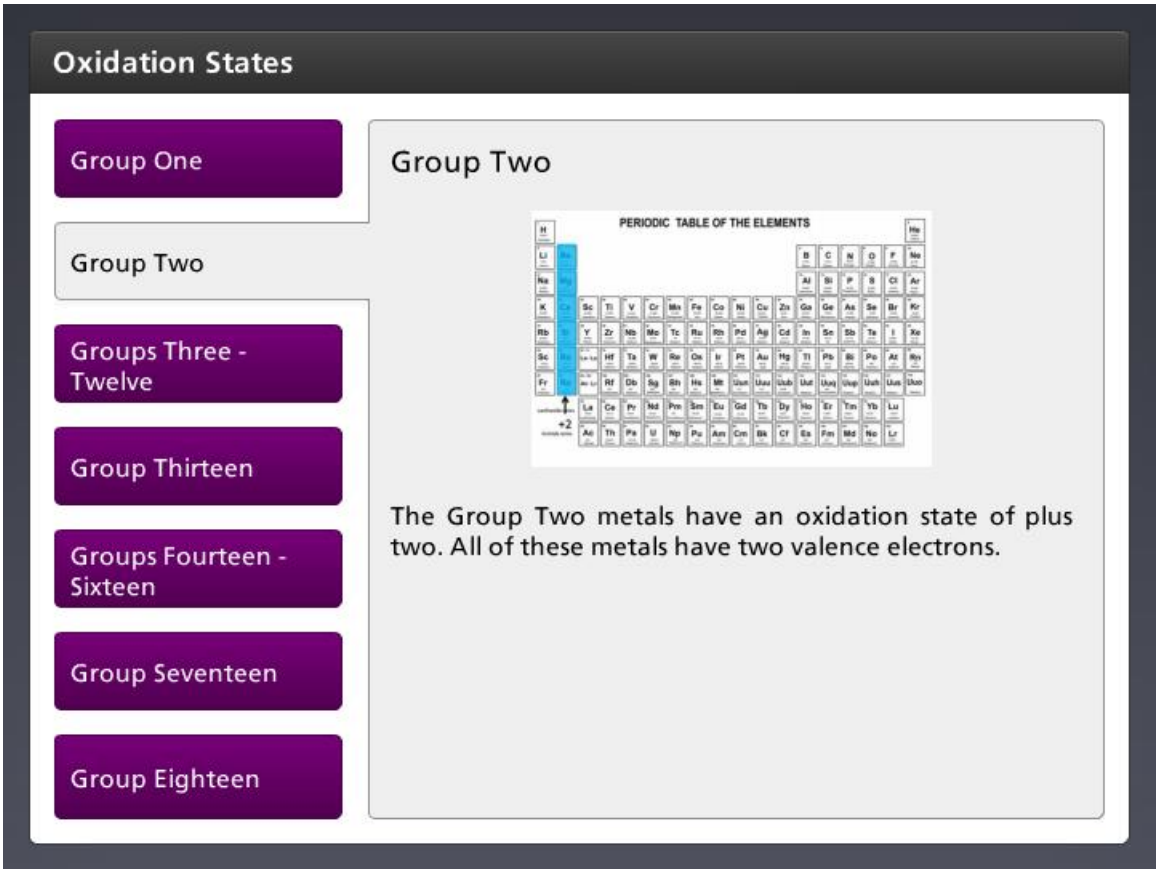
Group One



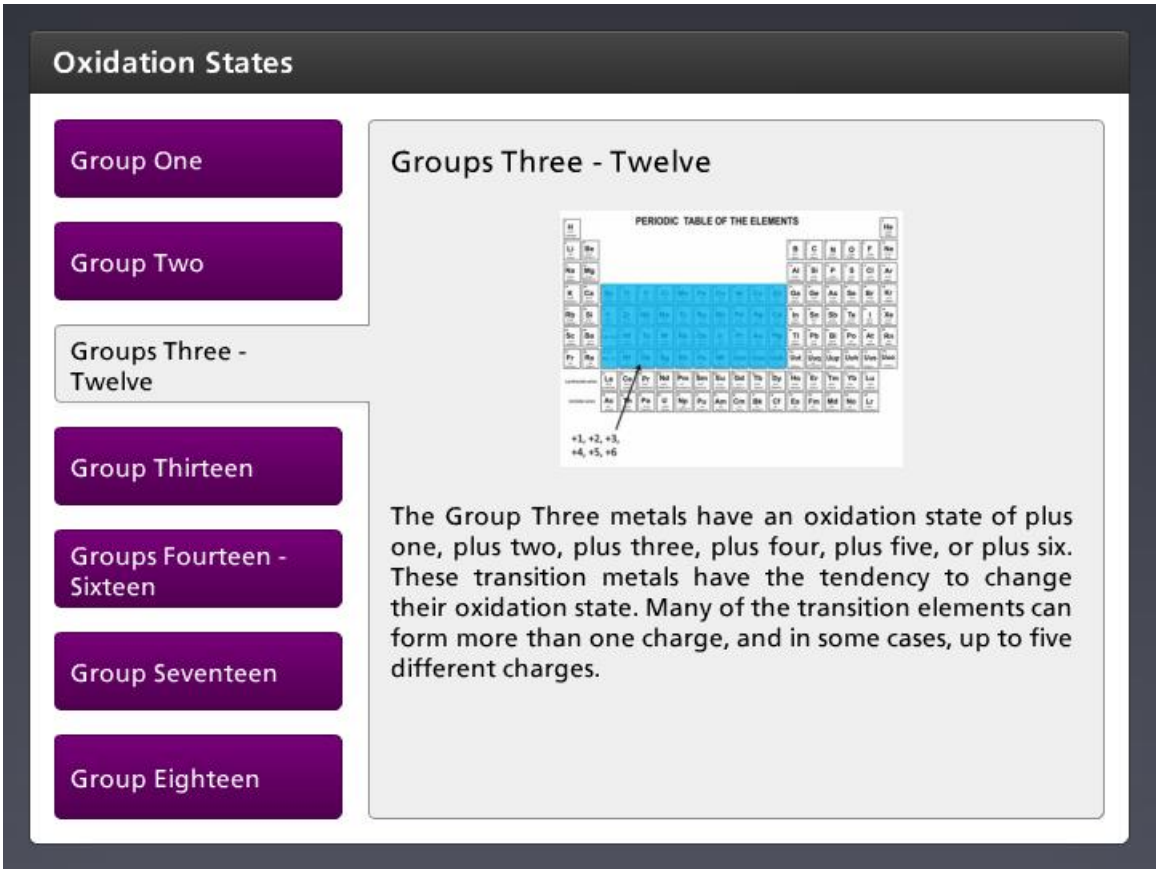
The Group One metals have an oxidation state of plus one. All of these metals have one valence electron.

Group Two



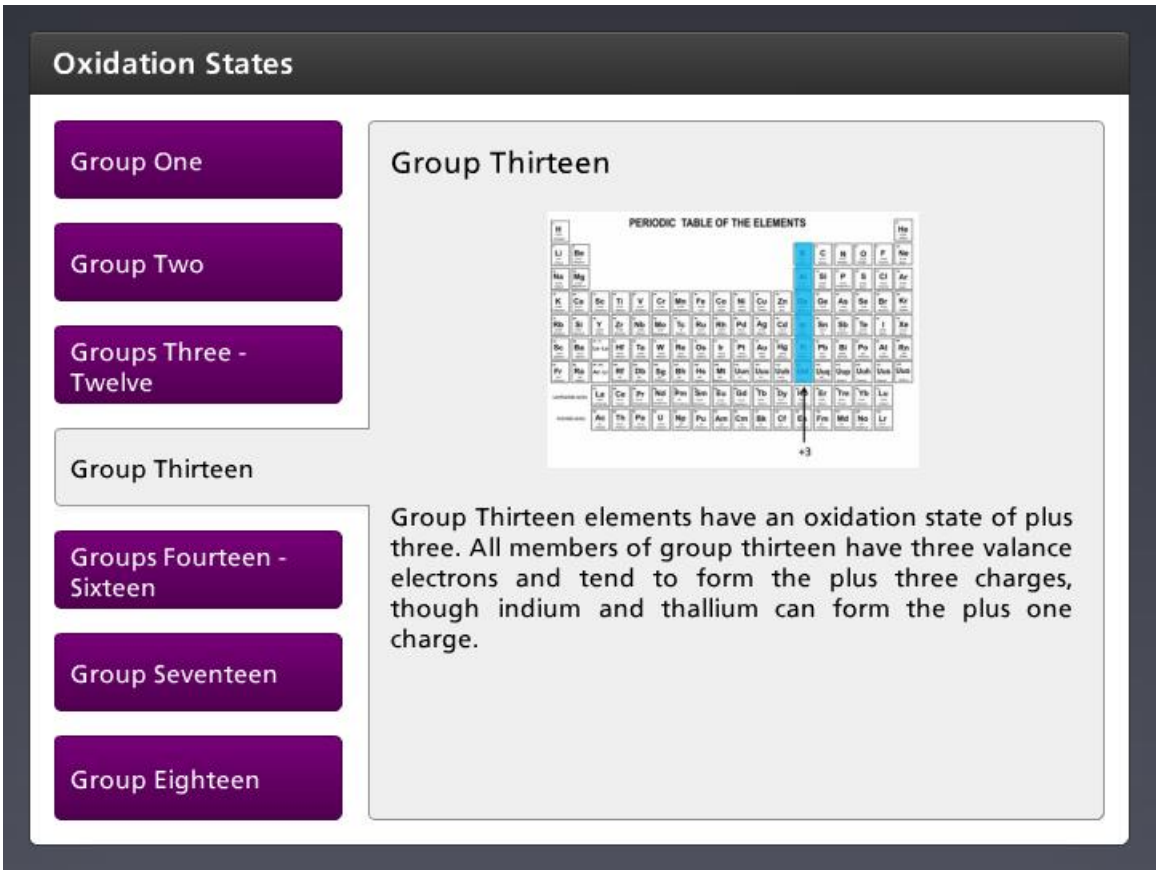
The Group Two metals have an oxidation state of plus two. All of these metals have two valence electrons.

Groups Three - Twelve



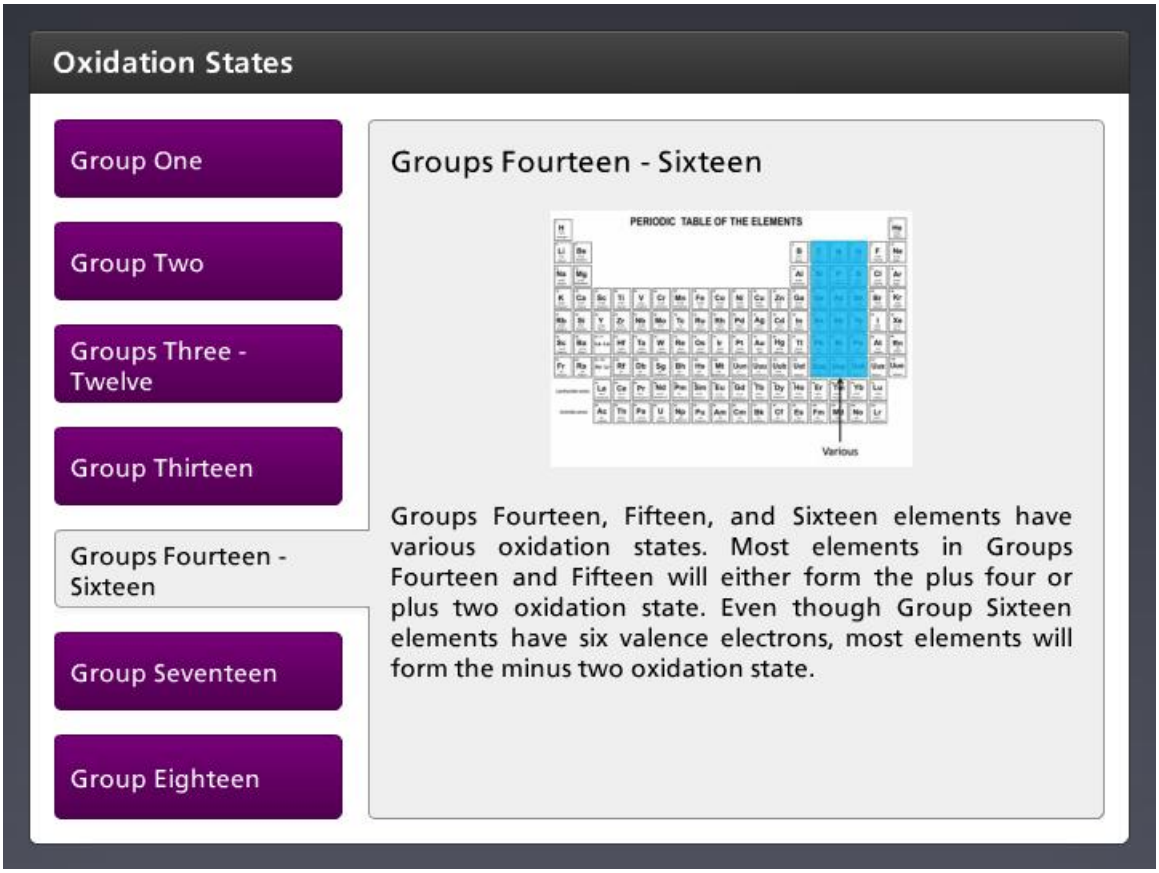
The Group Three metals have an oxidation state of plus one, plus two, plus three, plus four, plus five, or plus six. These transition metals have the tendency to change their oxidation state. Many of the transition elements can form more than one charge, and in some cases, up to five different charges.

Group Thirteen



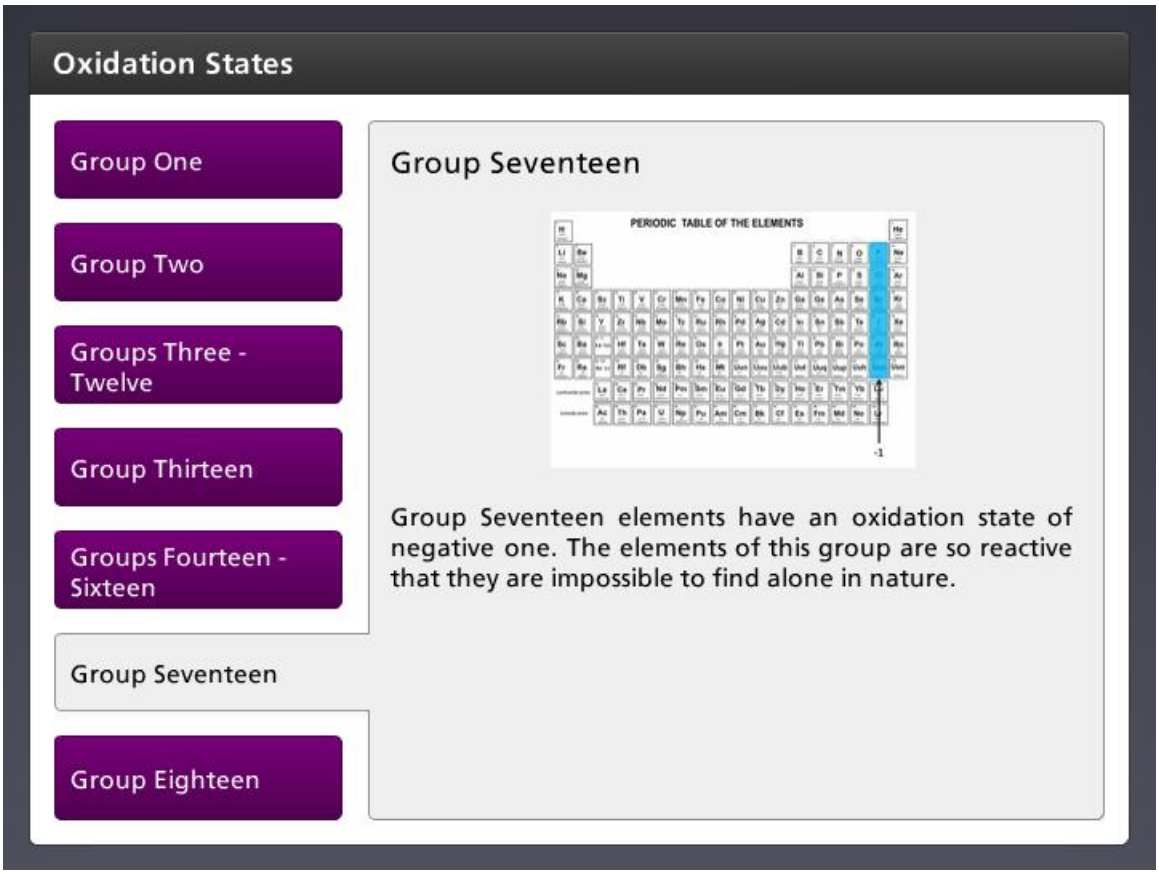
Group Thirteen elements have an oxidation state of plus three. All members of group thirteen have three valance electrons and tend to form the plus three charges, though indium and thallium can form the plus one charge.

Groups Fourteen - Sixteen



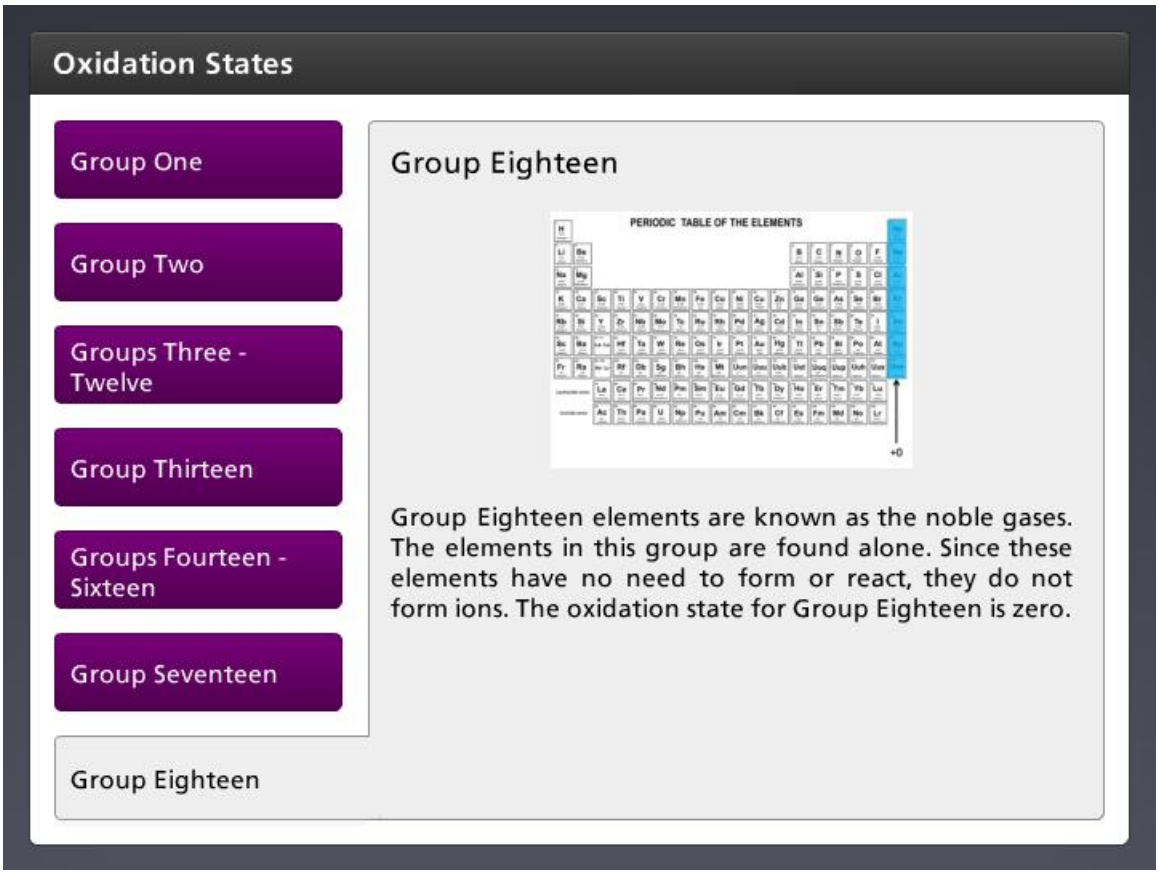
Groups Fourteen, Fifteen, and Sixteen elements have various oxidation states. Most elements in Groups Fourteen and Fifteen will either form the plus four or plus two oxidation state. Even though Group Sixteen elements have six valence electrons, most elements will form the minus two oxidation state.

Group Seventeen



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.

Group Eighteen



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.