

Study Guide for Intro to Chemistry

Classification of Matter

- Explain the difference between a pure substance and a mixture
- Explain the difference between an element and a compound, along how you can tell if a substance is an element or a compound and provide an example of each.
- Explain the difference between a homogeneous mixture and a heterogeneous mixture and provide an example of each.

Physical and Chemical Properties and Changes

- Explain the difference between a physical and a chemical change.
- List two examples of a chemical change.
- List two examples of a physical change.
- Explain why changes in states of matter of a substance is a physical change.

Chemical Reactions

- In the chemical reaction $H + 2O \rightarrow H_2O$, what are the reactants and what are the products.
- Explain the difference between an endothermic and an exothermic reaction.
- Explain the difference between an endergonic and an exergonic reaction.
- List five indications that a chemical reaction has taken place.

Electron Arrangement

- Explain what elements in the same row (period) on the periodic table have in common.
- Explain what elements in the same column (group) have in common.
- Explain what valence electrons are.
- How many valence electrons do alkali metals have?
- How many valence electrons do the alkaline earth metals have?
- How many valence electrons do boron group elements have?
- How many valence electrons do carbon group elements have?
- How many valence electrons do nitrogen group elements have?
- How many valence electrons do oxygen group elements have?
- How many valence electrons do halogens have?
- Except for helium, how many valence electrons do the noble gases have?

Chemical Bonding

- Which type of elements form ionic bonds?
- How are ionic bonds formed?
- Which type of elements form covalent bonds?
- How are covalent bonds formed?
- Which type of elements form metallic bonds?
- How are metallic bonds formed?
- Which type of elements form hydrogen bonds?
- How are hydrogen bonds formed?

Properties of Water

- What types of bonds form between the 2 hydrogen atoms and the oxygen atom within a water molecule?
- Explain what makes water a polar molecule.
- Explain how the hydrogen bonds form between different water molecules.
- Explain why water has cohesive properties.
- Explain why water has adhesive properties.
- Explain what capillary action is.
- Explain how and why water develops surface tension.
- Explain why water has a high heat capacity.
- Explain why water is less dense as a solid than as a liquid resulting in ice floating on liquid water.

Solids, Liquids, and Gases

- Explain the effect the addition of heat has on molecular motion.
- Describe how molecules behave within a solid.
- Describe how molecules behave within a liquid.
- Describe how molecules behave within a gas.

Changing States of Matter

- Explain the effect the addition of heat or removal of heat has on the motion of atoms.
- Describe the motion of atoms in a solid, liquid, and gas.
- Explain the difference between boiling and evaporation.
- Explain the effect the addition of anti-freeze or salt has on the freezing point of water.
- Describe what happens during freezing, sublimation, condensation, and deposition.

Acids and Bases

- What makes a solution an acid?
- What makes a solution a base?
- What pH range do acids fall within?
- Which is a stronger acid, a solution with a pH of 3 or a pH of 5?
- Which is a stronger base, a solution with a pH of 8 or a pH of 11?
- What pH range do bases fall within?
- What is the pH of a neutral solution?
- How do acids and bases affect litmus paper?