31.1 Atoms and Energy

Chemistry

Summarize main points from each video.

Video Title / topic _____

Video Title / topic _____

Video Title / topic _____

Topic Introduction

Summarize your understanding of each paragraph.

Energy levels inside an atom are the specific energies that electrons have when occupying specific orbitals. Electrons can be excited to higher energy levels by absorbing energy from the surroundings.

Light is emitted when an electron relaxes from a high energy state to a lower one.

The energy of an electron in an atom is not continuous, but quantized. The energies corresponding to each of the allowed orbitals are called energy levels.

An electron can't have an energy value half way between two energy levels in an atom.

https://study.com/

Read/Summarize Text

1. **Read the passage.**
2. **Underline key expressions in each sentence.**
3. **Re-write each word (or expression) you underlined.**
4. **Summarize the passage.**

Atoms.

1

2

Atoms are submicroscopic particles that make up the matter we see around us. Some 92 kinds of atoms exist in nature, such as hydrogen, oxygen, iron, gold, etc. That is, gold is made of gold atoms, and iron of iron atoms. Other substances are made of fixed combinations of atoms, called molecules. For example, water is made of two hydrogen atoms linked to an oxygen atom, hence its chemical formula, H2O. Atoms are themselves made up of even smaller particles. Each atom consists of a core, or more technically a nucleus around which yet smaller particles called electrons orbit. The nucleus is itself composed of smaller particles called protons and neutrons. Protons, neutrons, and electrons differ in several ways.

www.astro.umass.edu

Re-write words you underlined

3

_____ _____ _____

_____ _____ _____

Using a complete sentence, summarize or rephrase the passage

4

Read Text for Comprehension

Read this article for deeper understanding. No summary is required, although you may want to circle, underline, or mark key ideas and words.

Energy level

Electrons in atoms and molecules can change (make transitions in) energy levels by emitting or absorbing a photon (of electromagnetic radiation), whose energy must be exactly equal to the energy difference between the two levels.

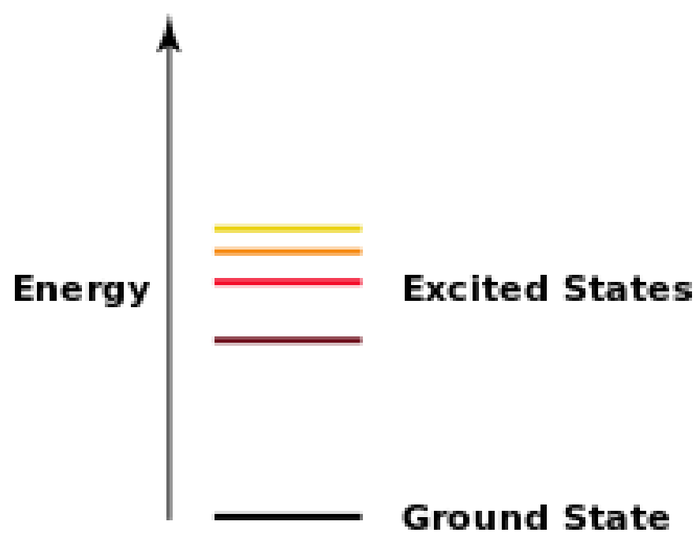
Electrons can also be completely removed from a chemical species such as an atom, molecule, or ion. Complete removal of an electron from an atom can be a form of ionization, which is effectively moving the electron out to an orbital with an infinite principal quantum number, in effect so far away so as to have practically no more effect on the remaining atom (ion).

For various types of atoms, there are 1st, 2nd, 3rd, etc. ionization energies for removing the 1st, then the 2nd, then the 3rd, etc. of the highest energy electrons, respectively, from the atom originally in the ground state. Energy in corresponding opposite quantities can also be released, sometimes in the form of photon energy, when electrons are added to positively charged ions or sometimes atoms.

Molecules can also undergo transitions in their vibrational or rotational energy levels. Energy level transitions can also be nonradiative, meaning emission or absorption of a photon is not involved.

If an atom, ion, or molecule is at the lowest possible energy level, it and its electrons are said to be in the ground state. If it is at a higher energy level, it is said to be excited, or any electrons that have higher energy than the ground state are excited. Such a species can be excited to a higher energy level by absorbing a photon whose energy is equal to the energy difference between the levels. Conversely, an excited species can go to a lower energy level by spontaneously emitting a photon equal to the energy difference.

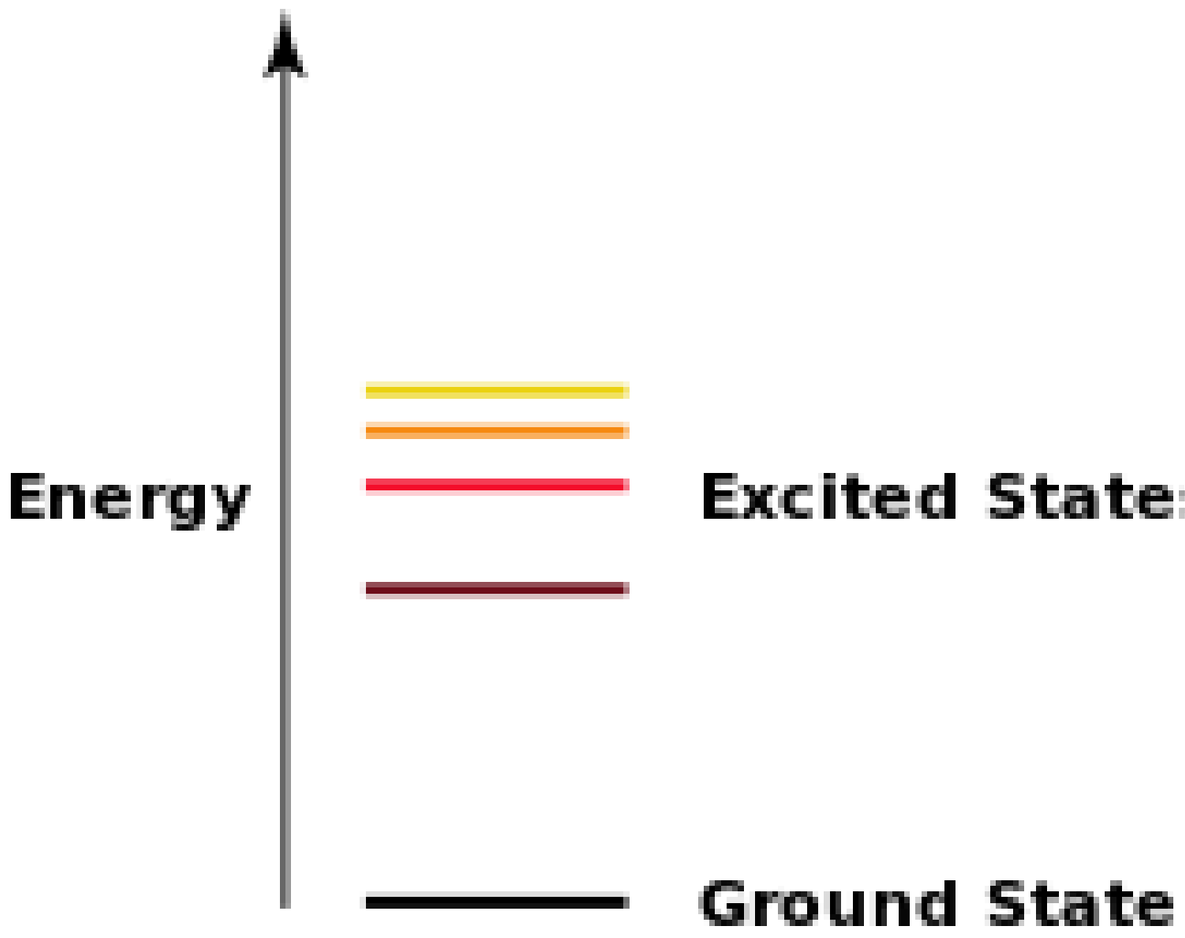
Energy levels for an electron in an atom: ground state and excited states. After absorbing energy, an electron may "jump" from the ground state to a higher energy excited state.



https://en.wikipedia.org/wiki/Energy_level

Draw Illustration

Copy and Label the Illustration in the Space Provided



https://en.wikipedia.org/wiki/Energy_level#/media/File:Energy_levels.svg

Draw (Copy) the Illustration Here

Interpret a Graph

Write the title of the graph _____

Circle the type of chart this represents

Bar Chart *Line Chart* *Pie Chart* *Other*

If applicable,

What does the X-axis represent _____

What does the Y-axis imply _____

Summarize what this graph represents or conveys

_____

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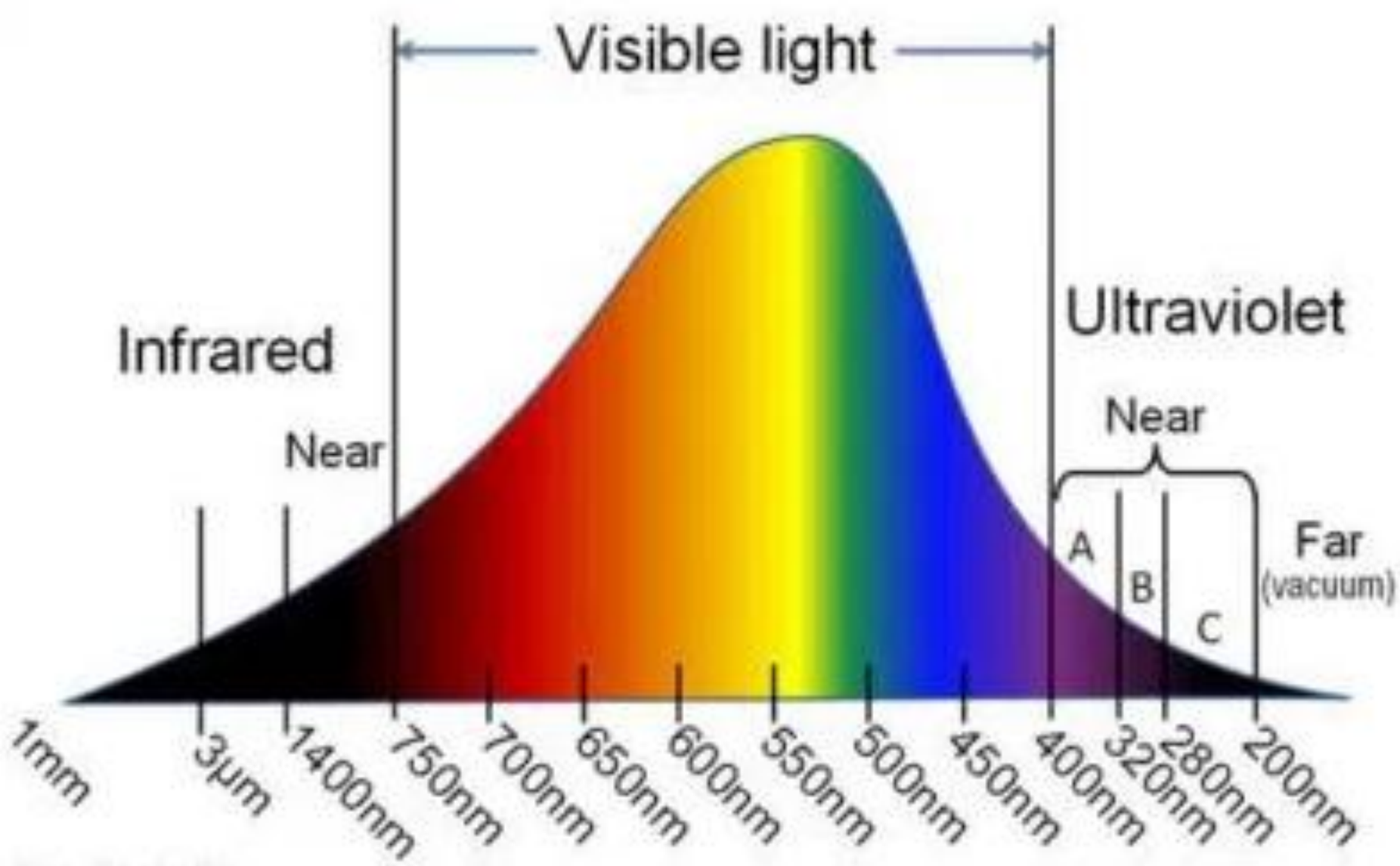

Show-Off Your Smarts!

Instructions

- Complete as an individual or small group.
- Discuss your ideas/answers/responses in a small group.
- Select one person to present your responses to the class.

Q1. How can this information be applied to a young-person's life?

Q2. How does this information apply to (or impact) communities?

Q3. When do scientists need to apply this information? How?

Q4. How would a person from 100 years ago view this information?

Q5. How does this topic connect to other science topics or math?

Write down at least three words introduced or covered by this topic.

1.
2.
3.
4.
5.
6.

Make a Poster

In the space provided here, create/draw a poster which conveys the concepts you have learned on this topic.