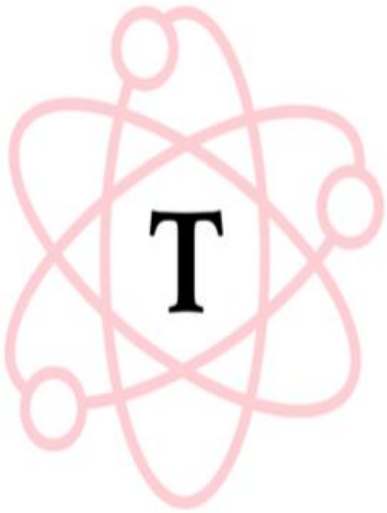
F



T

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Teaching by Design

Category 1 Chemistry

Roger Gomez M.Ed.

Reporting Category 1:
Matter and Energy

The student will demonstrate an understanding of the properties of matter and energy and their interactions.

STUDENT EXPECTATION: **8.5A describe the structure of atoms, including the masses, electrical charges and locations, of protons and neutrons in the nucleus and electrons in the electron cloud**

UNDERSTANDING: **Matter is composed of atoms and has chemical and physical properties.**

CONTENT

SE ASSESSED: Descriptions, Calculations, and Diagrams

Which of the following best describes an elec[tron]?

A It has no charge and about the same mass as a [pro]ton.

B It has a negative charge and [a] ss mas[s] than a proton.

C It has a positive charge and muc[h] more [mass] than a neutron.

D It has a negative ch[arge] and about [the] same mass as a neutron.

Description and location of subatomic particles in atom

What is the [mass] number of [a] potassium (K) atom that has 20 neutrons?

A 18

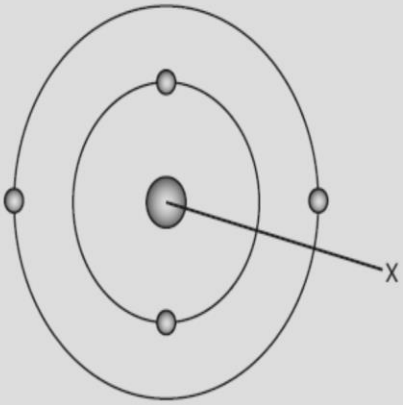
B 19

C 20

D 39

Calculation of Atomic Mass with Protons and Neutrons

(all images referenced from TEA STAAR released TESTS)



Which of these best describes one of the subatomic particles that could be found at locatio
in the model of an atom shown above?

A It has mass but no charge.

B It has no mass and a positive charge.

C It has a large mass and a negative charge.

D It has no mass and an equal number of positive and negativ harg

Description and location of sub tomic articles in atom

A model of a beryllium atom is shown ow

What types of particles are found in the cloud surrounding the atom's nucleus?

A Positively charged particles and negatively charged particles

B Negatively charged particles only

C Neutral particles and positively charged particles

D Positively charged particles only

Description and location of subatomic particles in atom

(all images referenced from TEA STAAR released TESTS)

An atom of a certain element has 36 protons, 36 electrons, and a mass number of 84. At room temperature this element is a very stable gas. How many neutrons are in this atom?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

Calculation of Neutrons from Atomic Mass and Protons

In the early 1900s many scientists thought that an atom consisted of a positive substance with negative charges scattered throughout the substance. Then Ernest Rutherford completed an experiment that changed the concept of an atom. His discovery led to the understanding that an atom consists mostly of empty space with —

A protons orbiting a dense nucleus made of electrons and neutrons

B electrons orbiting a dense nucleus made of protons and neutrons

C neutrons and protons orbiting a cloud of electrons

D electrons and protons orbiting a cloud of neutrons

Description and location of subatomic particles in atom

What is the difference between the number of electrons in an atom of selenium, Se, and the number of electrons in an atom of aluminum, Al?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

Calculation of Electrons from Protons or Atomic #

(all images referenced from TEA STAAR released TESTS)

How many protons, neutrons, and electrons are present in an atom of hafnium, Hf, with a mass number of 178?

A 72 protons, 178 neutrons, 106 electrons

B 72 protons, 106 neutrons, 72 electrons

C 178 protons, 250 neutrons, 72 electrons

D 106 protons, 72 neutrons, 106 electrons

Calculation of Protons/Electrons from Atomic # and Neutrons from Atomic Mass

Which statement correctly describes the location and charge of the electrons in an atom?

F The electrons are inside the nucleus and have a charge.

G The electrons are outside the nucleus and have no charge.

H The electrons are inside the nucleus and have a negative charge.

J The electrons are outside the nucleus and have a negative charge.

Description and location of subatomic particles in atom

What is the total number of protons, neutrons, and electrons in a cadmium, Cd, atom that has a mass number of 112?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

Calculation of Neutrons, Electrons, and Protons from Atomic Mass

(all images referenced from TEA STAAR released TESTS)

Which statement accurately describes the atoms of a specific element?

F An indium, In, atom contains 115 protons inside the nucleus and 49 neutrons outside the nucleus.

G A scandium, Sc, atom contains 45 electrons outside the nucleus and 21 neutrons inside the nucleus.

H An aluminum, Al, atom contains 27 electrons and 27 protons inside the nucleus.

J A zinc, Zn, atom contains 30 protons inside the nucleus and 30 electrons outside the nucleus.

Identification of protons from atomic # and location in the atom with calculation of neutrons and location in the atom.

The atomic number of krypton is 36. If the mass number of a krypton atom is 84, which table shows the number of subatomic particles inside and outside the nucleus of the krypton atom?

A

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
36	36

B

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
36	48

C

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus

D

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
84	48

Identification of total # of subatomic particles in the nucleus and total # of subatomic particles outside the nucleus based on Atomic #

(all images referenced from TEA STAAR released TESTS)

INSIGHTS: Structure of Atoms and Subatomic Particles

GENERAL STRUCTURE OF ATOMS

- Structure of Atoms 1. Nucleus 2. Electron Cloud / Electron Shells / Electron Orbital

CHARACTERISTICS AND LOCATION OF SUBATOMIC PARTICLES

- Subatomic Particles 1. Proton 2. Neutron 3. Electron
- Subatomic Particles Mass, Charge, and Location

1. Proton	1 amu	Positive Charge (+)	Located in the Nucleus of atom
2. Neutron	1 amu	Neutral Charge (o)	Located in the Nucleus of atom
3. Electron	0 amu	Negative Charge (-)	Located in the Electron Cloud

IDENTIFICATION AND CALCULATION OF ATOMIC MASS

- Identify and calculate the Atomic mass of an Atom from Bohr model Atomic Mass = protons + neutrons
- Identify and calculate the Atomic mass of an atom from Periods Table

IDENTIFICATION AND CALCULATION OF NEUTRONS IN AN ATOM

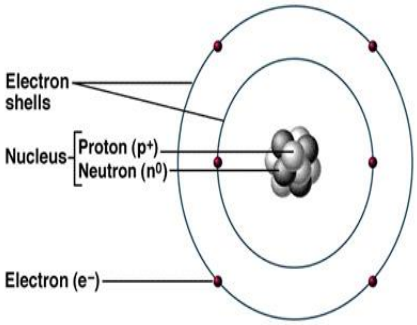
- Identify and calculate the # of Neutrons in an Atom # of Neutrons = Atomic mass -- # of Protons
- In a neutral atom Atomic Mass - Atomic Number (#protons) = # of Neutrons

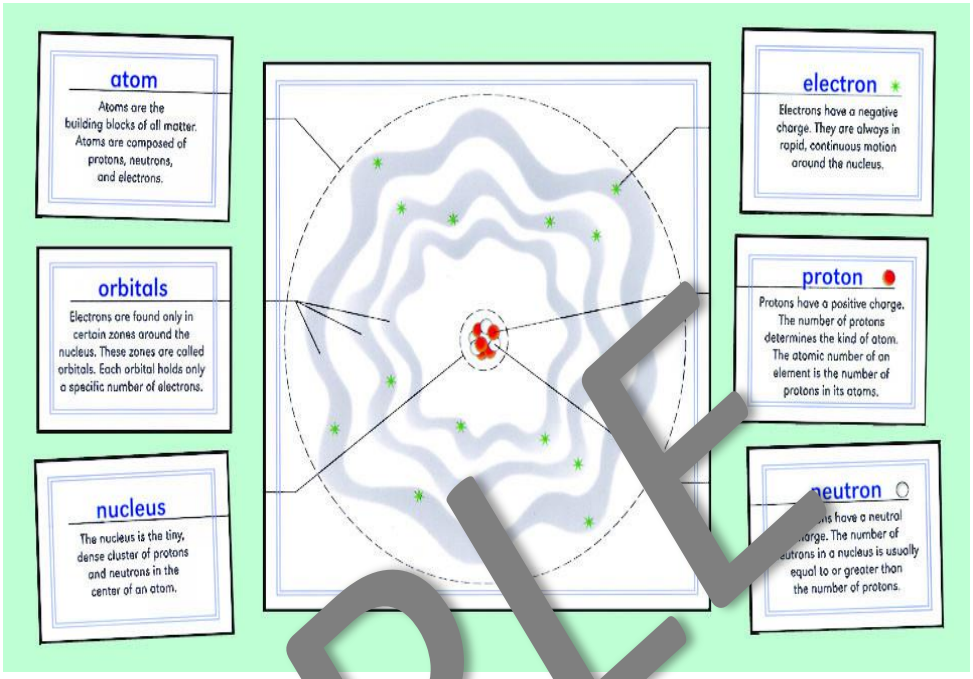
IDENTIFICATION AND CALCULATION OF TOTAL # OF SUBATOMIC PARTICLES INSIDE AND OUTSIDE THE NUCLEUS

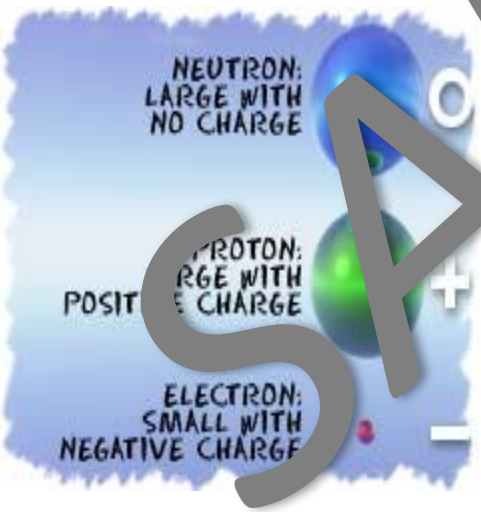
- In a neutral atom, the total number of Protons and Neutrons in the nucleus is the atomic mass.
- In a neutral atom, the total number of Electrons is the total number of Protons or Atomic #

THE CHARGE OF AN ENTIRE ATOM

- In a neutral atom, the number of Protons = the number of Electrons (Atomic # = Protons = Electrons)
- Identify and describe the charge of the parts of the Atom: Nucleus +charge Electron Cloud - charge

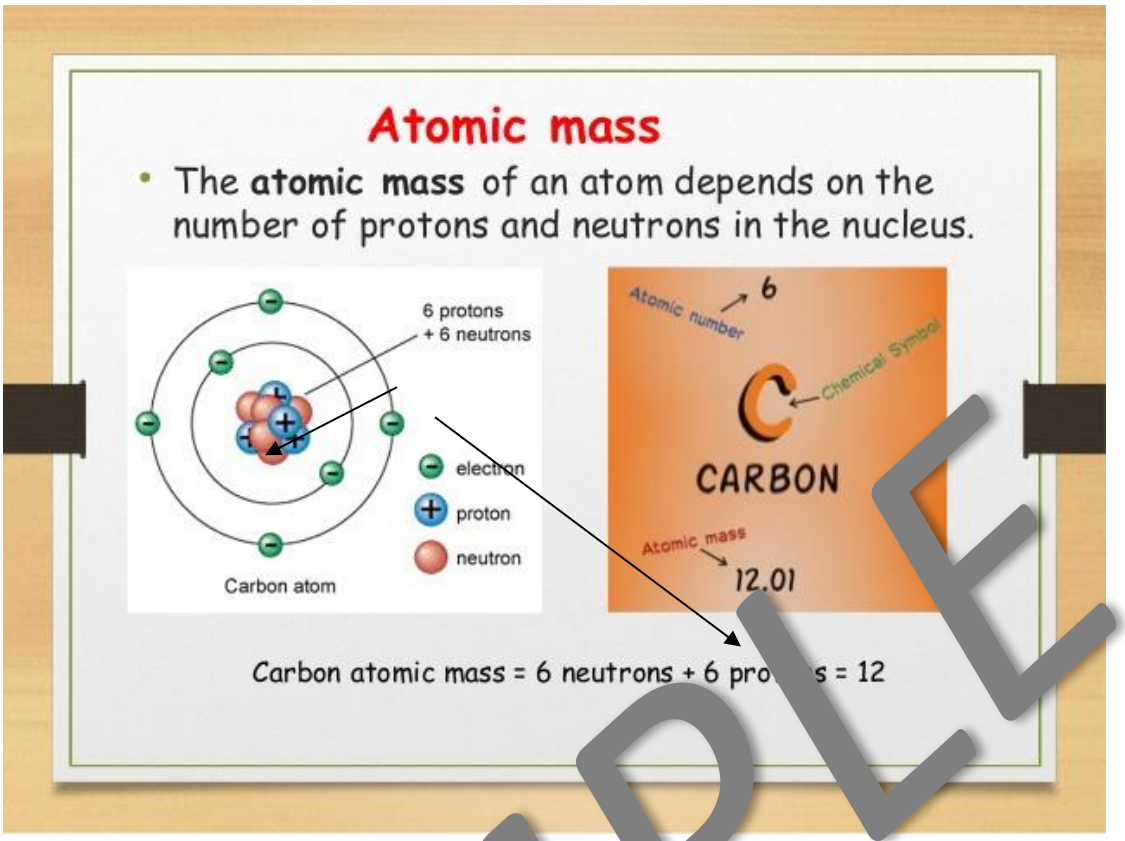


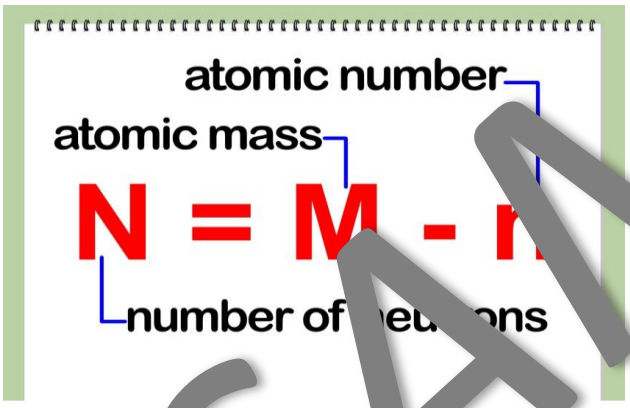


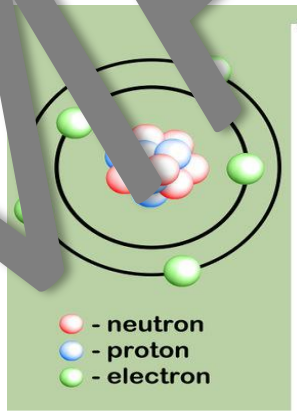


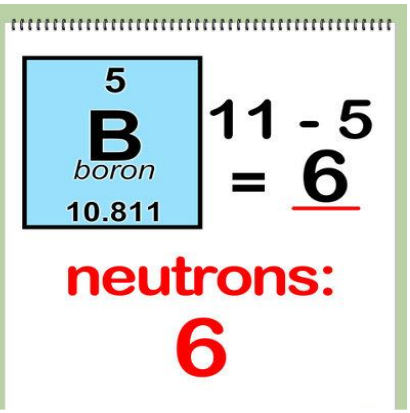
Subatomic Particle Properties

Particle	Symbol	Location	Charge	Relative Mass (amu)
electron	e^-	Electron cloud	–	1/1840 approx 0
proton	p^+	nucleus	+	1
neutron	n^0	nucleus	**0**	1









KEY VOCABULARY: Structure of Atoms and Subatomic Particles

Academic Vocabulary: Atom, Structure of Atom, Nucleus, Electron Cloud, Atomic Mass, Mass Number, Atomic charge, Subatomic Particles, Proton, Neutron, Electron, Electrical Charge, Positive Charge, Neutral Charge, Negative Charge

Nonacademic Vocabulary: describe, structure, location, model, dense, orbit, present

PEDAGOGY of INSTRUCTION

LEARNING SKILLS: **INTERPRET, EXPLAIN, PROVE**

PROCESS SKILLS for STAAR:

INVESTIGATION	COLLECT INFORMATION BY OBSERVING
	RECORD DATA and ORGANIZE INTO DATA TABLES or CHARTS
	ANALYZE DATA FROM OBSERVABLE AND INFERRED EVIDENCE
	CONCLUDE and COMMUNICATE RESULSTS IN WRITTEN OR VERBAL FORM

TASKS AND PRODUCTS: Structure of Atoms and Subatomic

TASKS	PROCESS SKILLS	PRODUCTS		
Anticipatory Set Guided Practice Independent Practice Closure	COLLECT INFORMATION / RECORD DATA/ ANALYZE DATA / INFER / DRAW CONCLUSIONS			

SCAFFOLDING FOCUS: Structure of Atoms and Subatomic Particles

1. STRUCTURE OF ATOM
2. CHARGE OF PARTS OF THE ATOM
3. CHARACTERISTICS AND LOCATION OF SUBATOMIC PARTICLES
4. IDENTIFICATION AND CALUCLATION OF ATOMIC MASS AND NEUTRONS
5. IDENTIFICATION AND CALCULATION OF TOTAL # OF SUBATOMIC PARTICLES INSIDE AND OUTSIDE NUCLEUS
6. IDENTIFICATION OF AN ELEMENT WITH ITS SUBATOMIC PARTICLES AND ITS ATOMIC MASS

SE VERB: **DESCRIBE** -- give an account in words of (something), including all the relevant characteristics, qualities, or events

LEARNING FOCUS: Structure of Atoms and Subatomic Particles

SE: **DESCRIBE:** **Structure of atoms and Subatomic particles (protons, neutrons, electrons) masses, electrical charges and locations in the atom.**

SE VERB: **DESCRIBE -- give an account in words of (something), including all the relevant characteristics, qualities, or events**

ASSESSED: **DESCRIPTIONS, CALCULATIONS, AND DIAGRAMS**

TEACHING IDEA: **The student receives 6 puzzle pieces of an atom, the nucleus and electron cloud and subatomic particles (proton, neutron, and electron). The student puts the atom together along with its subatomic particles and describes the atom using the key vocabulary. The student then creates a pop up trifold with the parts of the atom and the subatomic particles located with the nucleus and electron cloud.**