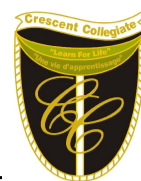
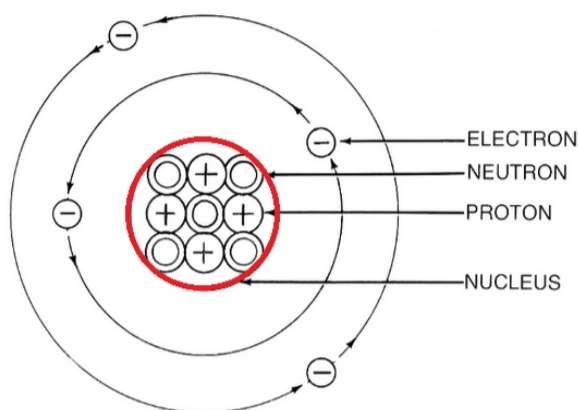


Science 9
Unit 2: Chemical Reactions
Worksheet 5: Atomic Structure



Atoms: The building blocks of matter. It is the smallest particle of an element that retains the properties of the element.

Subatomic particles: Refers to three kinds of smaller particles that makeup the atoms (“sub-” means below).



1) Electron (-):

- Negatively charged particles
- Electrons occupy special regions called energy levels, or shells, which surround the nucleus.

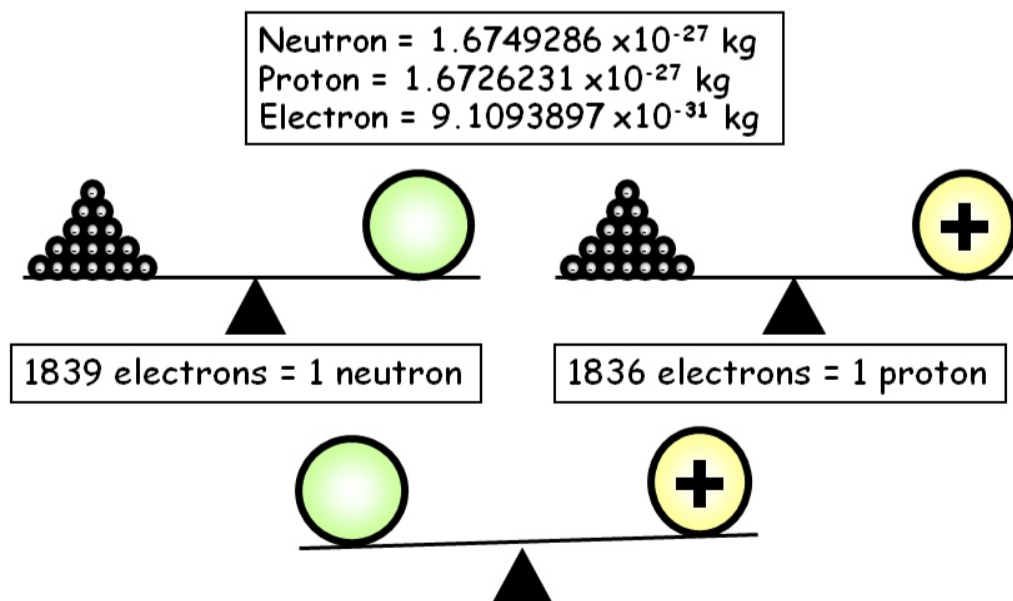
2) Proton(+):

- Positively charged particles
- Help make up the nucleus of the atom

3) Neutron:

- Neutral particles; have no electric charge
- Help make up the nucleus of the atom
- Most massive sub-atomic particle

Mass Comparison of the Sub-Atomic Particles:



The Electric Charge of an Atom:

- Electric charge comes in two types: positive and negative.
- Protons have a positive charge, and electrons have a negative charge.
- Each proton counts as +1, and each electron counts as -1.
- All atoms have an equal number of protons and electrons. This means that the charges add up to zero, making the atom uncharged or neutral

The Nucleus of an Atom:

- The nucleus is a tiny region at the centre of the atom.
- Has a positive charge because of its protons.
- It contains the protons and neutrons, it has the most mass
- Protons and neutrons are held in the nucleus and can not enter or leave it

Summary of the Atomic Structure

Name	Symbol	Relative Mass	Electric Charge	Location in Atom
Proton	p	1836	0	Nucleus
Neutron	n	1837	0	Nucleus
Electron	e	1	-	Surrounding the Nucleus

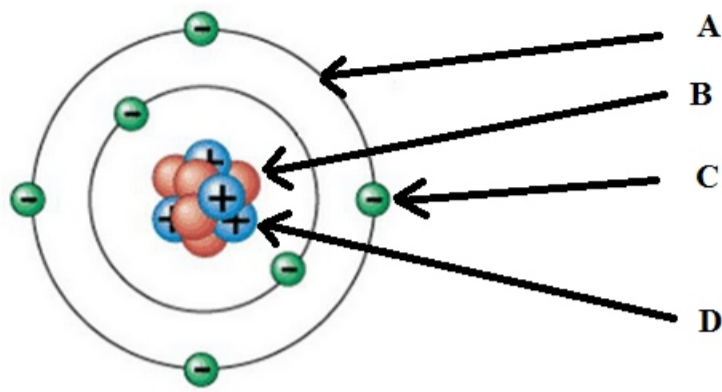
PART A: MULTIPLE CHOICE

[33]

Instructions: Shade the letter of the correct answer on the computer scorable answer sheet provided.

1. The smallest complete unit of an element is the _____.
(A) atom
(B) molecule
(C) element
(D) electron
2. What is the meaning of the word atom?
(A) dividable
(B) invisible
(C) hard particles
(D) not able to be divided
3. What three sub-atomic particles make up an atom?
(A) protons, electrons & neutrals
(B) positives, negatives & neutrals
(C) protons, electrons & neutrons
(D) chocolate chips, nuts & raisins
4. Which of the following is the smallest?
(A) Proton
(B) Neutron
(C) Electron
(D) Atom

Use the picture below to answer questions 5 to 8



5. Which of the following terms is used to describe A?
 - (A) Energy Level
 - (B) Orbital
 - (C) Shells
 - (D) All are correct

6. Which of the following is an electron?
 - (A) A
 - (B) B
 - (C) C
 - (D) D

7. Which of the following has no charge?
 - (A) A
 - (B) C
 - (C) B
 - (D) D

8. Which of the following is found in the nucleus?
 - (A) A
 - (B) B
 - (C) B and D
 - (D) C and D

9. A single proton has what electrical charge?
 - (A) no charge
 - (B) positive charge
 - (C) negative charge
 - (D) either a positive or negative charge

10. Compared to the charge and mass of a proton, an electron has
 - (A) the same charge and a smaller mass
 - (B) the same charge and the same mass
 - (C) an opposite charge and a smaller mass
 - (D) an opposite charge and the same mass

11. Protons are located in the nucleus of the atom. A proton has
 - (A) No charge
 - (B) A negative charge
 - (C) A positive and a negative charge
 - (D) A positive charge

12. Neutrons are in the nucleus of the atom. A neutron has
- (A) A positive charge
 - (B) No charge
 - (C) A negative charge
 - (D) Twice as much positive charge as a proton
13. An electron is in a region outside the nucleus. An electron
- (A) Is larger than a proton and has no charge
 - (B) Has less mass than a proton and has a negative charge
 - (C) Is smaller than a proton and has no charge
 - (D) Has a positive charge
14. Protons are located in the nucleus of the atom. A proton has
- (A) No charge
 - (B) A negative charge
 - (C) A positive and a negative charge
 - (D) A positive charge
15. Which atomic particle carries a negative charge?
- (A) proton
 - (B) nucleus
 - (C) neutron
 - (D) electron
16. A nuclear particle that has about the same mass as a proton, but with no electrical charge, is called a(n)
- (A) electron
 - (B) neutron.
 - (C) nucleus
 - (D) proton
17. An atom is
- (A) Protons and electrons grouped together in a random pattern.
 - (B) Protons and electrons grouped together in an alternating pattern.
 - (C) A core of protons and neutrons surrounded by electrons.
 - (D) A core of electrons and neutrons surrounded by protons.
18. Which statement is completely true?
- (A) Neutrons and protons are about the same size and electrons are much smaller
 - (B) Protons are bigger than neutrons and electrons are much smaller
 - (C) Neutrons are much bigger than protons and electrons are about the same size
 - (D) Neutrons, protons, and electrons are all about the same size.
19. Almost the entire mass of an atom is concentrated in the _____.
- (A) proton
 - (B) electrons
 - (C) nucleus
 - (D) neutrons

20. The mass of the atom is determined by_____.
- (A) neutrons
 - (B) neutron and proton
 - (C) electron
 - (D) electron and neutron
21. The proton is heavier than an electron by_____.
- (A) 1850 times
 - (B) 1840 times
 - (C) 1000 times
 - (D) 100 times
22. The charge and mass number of a proton are:
- (A) charge = +1, Mass number = 0
 - (B) charge = -1, Mass number = 0
 - (C) charge = 0, Mass number = 1
 - (D) charge = +1, Mass number = 1
23. Most of the mass of the atom can be found in the:
- (A) nucleus
 - (B) charges
 - (C) electron cloud
 - (D) electrons
24. The charge and mass number of a neutron are:
- (A) charge = +1, Mass number = 1
 - (B) charge = +1, Mass number = 0
 - (C) charge = -1, Mass number = 0
 - (D) charge = 0, Mass number = 1
25. An electrically neutral atom bears what trait?
- (A) It contains protons in its nucleus.
 - (B) It contains the same number of protons and neutrons.
 - (C) It contains the same number of electrons and protons.
 - (D) It contains electrons in its electron shells.
26. Which statement is false?
- (A) The nucleus occupies nearly all the volume of an atom.
 - (B) Atomic nuclei are very dense.
 - (C) Nuclei are positively charged.
 - (D) Electrons contribute only little to the mass of an atom.
27. Which particles have approximately the same size and mass as each other?
- (A) neutrons and electrons
 - (B) electrons and protons
 - (C) protons and neutrons
 - (D) none - they are all very different in size and mass

28. Which of the following correctly matches the parts of an atom with their charge?

	Proton	neutron	Electron
(A)	Positive	Negative	Neutral
(B)	Negative	Neutral	Positive
(C)	Positive	Neutral	Negative
(D)	Neutral	Positive	Negative

29. An atom is electrically neutral because

- (A) neutrons balance the protons and electrons.
- (B) nuclear forces stabilize the charges.
- (C) the numbers of protons and electrons are equal.
- (D) the numbers of protons and neutrons are equal.

30. The nucleus of an atom has all of the following characteristics EXCEPT that it

- (A) is positively charged.
- (B) contains nearly all of the atom's mass.
- (C) is very dense.
- (D) contains nearly all of the atom's volume.

31. The mass of a neutron is

- (A) about the same as that of a proton.
- (B) about the same as that of an electron..
- (C) double that of a proton.
- (D) double that of an electron

32. How would you describe the nucleus?

- (A) dense, positively charged
- (B) mostly empty space, positively charged
- (C) tiny, negatively charged
- (D) dense, negatively charged

33. Which of the following has the least mass in an atom?

- (A) nucleus
- (B) proton
- (C) neutron
- (D) electron

PART B: CONSTRUCTED RESPONSE.

1. For each of the following, decide which subatomic particle best fits the description. [8]

(a) has a positive charge

(b) is the most massive

(c) has a negative charge

(d) gives the nucleus its electric charge

(e) is in the region surrounding the nucleus

(f) has no electric charge

(g) has the least amount of mass

(h) is in the nucleus along with protons

3. Neutral atoms have no overall electric charge even though protons and electrons have an electric charge. Explain. [2]

4. In a typical atom, how does the size of the whole atom compare to the size of the nucleus? [2]
