

1. Four. Earth, water, air and fire.
2. Democritus. Atoms
3. Indivisible
4. Alchemists
5. To find out how to turn other elements into gold and to find a substance that would give them eternal life.
6. Sir Francis Bacon
7. Robert Boyle
8. A pure substance that cannot be chemically broken down into simpler substances.
9. All matter is made of tiny particles called atoms.
Atoms cannot be created, destroyed, or divided into smaller particles.
All atoms of the same element are identical in mass and size, but they are different in mass and size from atoms of other elements.
Compounds are created when atoms of different elements link together in definite proportions.
10. The Billiard Ball Model
11. The Plum Pudding Model
12. Thomson discovered that atoms contain electrons, negative charges that could be removed from the atom. He also proposed that the rest of the atom was positively charged and this positive charge cancelled out the negative charges of the electrons, making the atom neutral. His model had negatively charged “plums” in a positively charged “pudding”.
13. Empty space
14. It has a dense nucleus which contains all the mass of the atom. The nucleus has all the positive charge as well as some other particles. The electrons (negative charges) occupy the space between the nucleus and the outside edge of the atom.
15. Marble, football stadium.
16. The nucleus contained protons and neutrons. Electrons occupy special positions around the nucleus called orbits or shells. Electrons went around the nucleus like planets around the sun.
17. First orbital can hold 2 electrons, the second and third orbitals can hold 8 electrons.
18. Dmitri Mendeleev. According to atomic mass.
19. According to atomic number.
20. J.J. Thomson
21. Ernest Rutherford
22. James Chadwick
23. Atomic mass units (amu)
24. Electrons are located outside the nucleus, they have a charge of -1 and a mass which is so small that it is considered to be zero.
25. Protons are located inside the nucleus, they have a charge of +1 and a mass of one amu.
26. Neutrons are located inside the nucleus, they have no charge and a mass of one amu.
27. The element.
28. Add together the number of protons and the number of neutrons.
29. Equations
30. See Chemistry assignment #2.
31. See your periodic table on pg. 562 or R-15 in your agenda. You will need the agenda for your test. If you do not have the agenda for the test you will not be borrowed one. If you have lost your agenda you must go to the office and have the required page photocopied for your test.
32. See periodic table. Ex. Calcium is in period 4, group 2.
33. A period is a horizontal row across the periodic table.
34. A group is a vertical column on the periodic table. It is also called a family. Elements in the same family have similar characteristics.
35. Groups are numbered based on the number of electrons in their outermost orbital (the valence shell) using the Bohr model from I-VIII. They are also numbered from 1-18 from left to right.

36. Groups are referred to as families because elements in a group have similar characteristics.
37. Hydrogen does not have similar characteristics to any other elements.
38. One. They lose one electron when they react.
39. Two. They lose two electrons when they react.
40. Six. They gain two electrons when they react.
41. Seven. They gain one electron when they react.
42. Eight (except helium, it has two). They are stable because they have a full valence shell (full outer orbital). They do not need to gain or lose electrons.
43. They all want to get full outer orbitals.
44. Metals, metalloids, and non-metals.
45. See notes, properties of materials: Properties of metals.
46. They are the opposite
47. Used in electronics for components and microchips
48. A chemical reaction
49. A chemical reaction where the metal gives its outer shell electron(s) to the non-metal. So, the metal loses electrons and the non-metal gains electrons. This is called ionic bonding.
50. A chemical reaction where electrons are shared between the two non-metals. This is called covalent bonding.
51. No. Sodium is a highly reactive metal which reacts dangerously with water. Chlorine is a poisonous gas. When combined they make table salt, which we eat daily. So, sodium metal and chlorine gas are both deadly (one is a silvery metal solid the other is a yellow gas) and table salt (sodium chloride) is a white crystal that we need in our diet.
52. Element: The simplest form of a substance.
Atom: The smallest particle of an element.
Compound: The simplest form of any material containing **two or more** elements.
Molecule: Two or more atoms joined together chemically – also, the smallest particle of a compound.
Note: Molecules can contain two atoms of the same element or atoms of different elements. All that matters is that there is more than one atom.
53. $3\text{Na}_2\text{SO}_4$
3 elements; Sodium, Sulfur, Oxygen; 6 sodium, 3 sulfur, 12 oxygen; 21 total atoms.

 $2\text{Co}(\text{OH})_6$
3 elements; Cobalt, Oxygen, Hydrogen; 2 Cobalt, 12 Oxygen, 12 Hydrogen; 26 total atoms.
54. Isotopes are forms of the same element that have different numbers of neutrons. For example, Hydrogen has three isotopes, one with 0 neutrons, one with 1 neutron, and one with 2 neutrons.
55. An ion is an atom that has either gained or lost electrons. In our body we have sodium ions (they have lost one electron) and chloride ions (they have gained one electron) from table salt.
56. Ex. if given Iron: Locate it on the periodic table as Fe, with an atomic number of 26. Therefore, it has 26 protons, 26 electrons. It's mass number is 56 so it has $56-26=30$ neutrons.