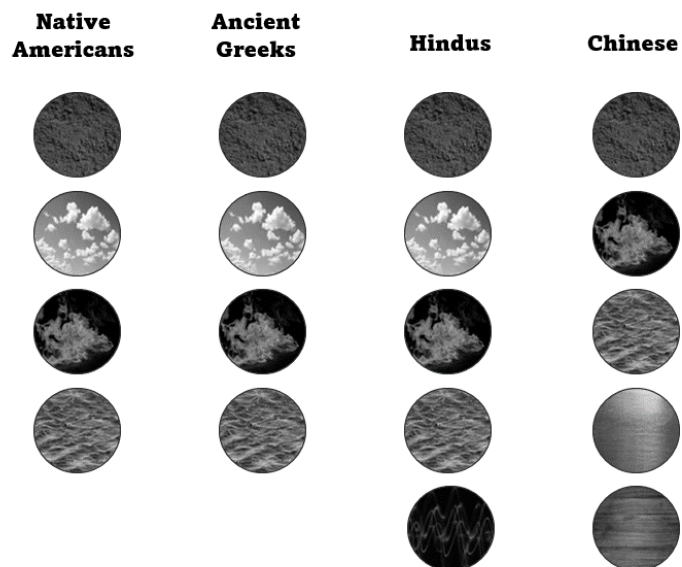


## 1.1 Atoms and elements

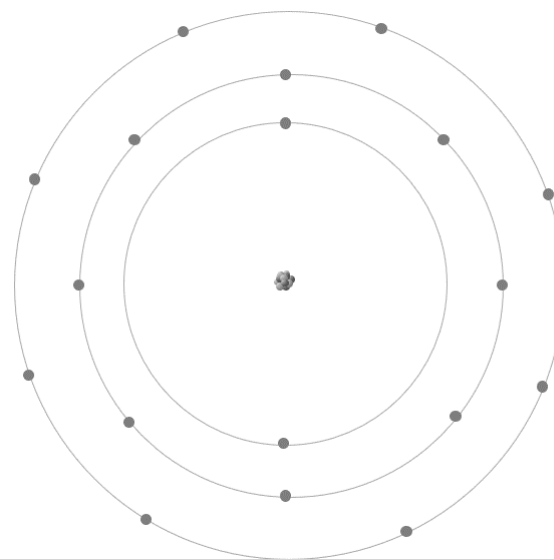
- The ideas of atoms and elements is very ancient and occurred in many cultures
- Elements are the simplest substances
- Atoms are the smallest parts
- John Dalton combined the idea of elements and atoms in the early 1800's
- Radioactivity showed Dalton's assumptions that atoms were permanent, unchanging and indivisible were wrong



*Many cultures have thought that everything is made by combining a small number of simple substances called elements*

## 1.2 Structure and scale of the atom

- Atoms are made of a positive nucleus surrounded by negative electrons
- The nucleus is tiny compare to the rest of the atom
- The nucleus is made from protons and neutrons
- Most of an atom is empty space, and there is empty space between atoms

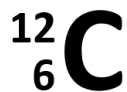
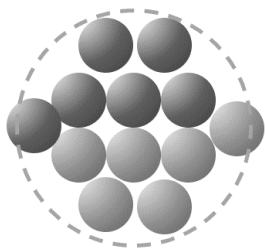


*This is a very simplified model of the atom to show the basic arrangement of nucleus and electrons*

### 1.3 Atomic number, mass number, and isotopes

- An element is defined by the number of protons in the nucleus of one of its atoms
- This is called its atomic number (or proton number, or nuclear charge)
- The total number of protons and neutrons is called the mass number (or nucleon number)
- Different atoms of the same element can have different numbers of neutrons
- We use the word 'isotope' to describe which flavour of an atom we're talking about
- Isotopes are defined by their mass number, for example carbon-12

#### Carbon-12



#### Carbon-14

