1. **S 253 States of Matter**: Different physical forms in which a substance can exist.

 Defining Features

* 1. Solid:
		1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Liquid:
		1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Gas:
		1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1. 3 Things About Matter
	1. All matter is made of particles called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Particles attract each other; the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the attraction, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the particles get.
	3. Particles are constantly in motion and bumping into each other.
		1. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a substance is related to the speed at which its particles move.
		2. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a substance depends on how fast its particles move and how strong the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is between properties.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Solid | Liquid | Gas |
| Describe vibration or particle movement |  |  |  |
| Describe forces between particles |  |  |  |
| Diagram of particles |  |  |  |

1. **S 253: Changing States of Matter**
	1. Melting: from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		1. Melting Point is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. Cause of melting:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Freezing: from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		1. Freezing Point is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. Cause of freezing:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Vaporization: from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		1. Boiling Point is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. Cause of vaporization/boiling: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. Condensation: from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		1. Condensation Point: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. Cause of condensation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. **S 255: Atoms**
	1. Atom is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		1. All matter is made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & all elements are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are considered the building blocks of matter.
3. **S 256: Atomic Structure**
	1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ center area of an atom where these two particles are found:
		1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			1. Positively charged particle
			2. An atom of an element is identified by the number of protons in its nucleus
				1. Example: at atom with 1 proton is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
				2. Example: at atom with 8 protons is \_\_\_\_\_\_\_\_\_\_\_\_\_\_
			3. **All atoms of the same element have the same number of protons.**
		2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			1. No charge--electrically neutral
			2. All are identical.
			3. Some atoms have different numbers of neutrons.
				1. Atoms of the same element with different number of neutrons are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Electron Clouds
		1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are found outside the nucleus
			1. Negatively charged particle
			2. The number and arrangement of electrons determine its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Electrons travel around the nucleus in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ paths in areas called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ determine the electron’s average distance from the nucleus
	5. The charge of an electron is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in size but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in sign from a proton.
	6. Electrons and protons exert \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrical forces on one another.
		1. These forces hold electrons to the atom.
4. **S257 Atomic Size**
	1. Protons and neutrons have about the same mass.
		1. Most of the mass of an atom is in the nucleus
	2. Electrons have a much smaller mass; about 1/2000 the mass of a proton or neutron
5. **S258 Evolution of Atomic Theory**
	1. **Democritus**: Greek philosopher proposed existence in **440 B.C.**
	2. **John Dalton, early 1800s**
		1. Proposed all substances were made of \_\_\_\_\_\_\_\_\_\_\_\_
		2. Small, hard, dense spheres that could not be created, destroyed, or changed.
	3. **J.J. Thomson, 1898**
		1. Proposed that atoms were made of smaller particles
		2. Discovered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ charged particles
			1. Theorized these were spread \_\_\_\_\_\_\_\_\_\_\_\_\_\_ throughout positively charged material
			2. “Plum-Pudding” model
	4. **Ernest Rutherford, 1911**
		1. Proposed that atoms had a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, positively charged \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ surrounded by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	5. **Neils Bohr, 1913**
		1. Electrons revolved around the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in circular paths called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
		2. Electrons could only exist in certain \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_.
	6. **Current Model 1920: Electron Cloud Model**
		1. Electrons surround the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		2. Electrons do not travel in specific paths but in regions of various thicknesses called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***Make and label a sketch of each type of model.***