## **States of Matter** An enormous variety of biological, chemical and physical phenomena can be explained by changes in the arrangement and motion of atoms and molecules. Chemical Reactions A system usually has some properties that are different from those of its parts but appear because of the interaction of those parts. Macro & micro properties Atoms & Molecules Chemical Reactions In solids, the atoms or molecules are Atoms and molecules are clearly locked in position and can only perpetually in motion. vibrate. In liquids, they have higher Increased temperature means energy, are more loosely connected and greater available energy of Atoms may stick together in wellcan slide past one another; some motion, so most substances defined molecules, or may be molecules may get enough energy to expand when heated. packed together in large arrays. escape into a gas. In gases, the atoms Movement of particles Different arrangements of atoms or molecules have still more energy and Particle theory into groups compose all are free of one another except during Chemical Reactions substances. occasional collisions. Chemical reactions Movement of particles i) Particle theoryAtoms & Molecules Particle theory Physical & chemical change Energy appears in different forms. Heat energy is in the Chemical Reactions Conservation of Matter disorderly motion of Flow of Matter S Flow of Energy molecules. Most substances can All matter is made up of exist as a solid, liquid or gas depending on atoms, which are far too small to see directly temperature. through a microscope. Problems with (i) Particle theory(ii) Atoms & Molecules classification **Chemical Reactions** Conservation of Matter Collections of pieces Heating and cooling cause (powders, marbles, changes in the properties of sugar cubes, or wooden materials. Melting & dissolving blocks) may have properties that the ① Natural & processed materials individual pieces do not. When liquid water disappears, it turns into a gas (vapour) in the air and can reappear as a liquid when cooled, or a solid if cooled below the freezing point of water. A gas is matter Air is a substance that surrounds Conservation of Matter us and takes up space. A gas is matter Atoms & Molecules Conservation of Matter Flow of Matter Things can be done to materials to change some of their properties but not all materials respond the same way to what is done to them. Natural & processed materials Water can be a liquid or a solid Chemical Reactions and can go back and forth from Conservation of Matter one form to the other. If water is turned into ice and then the ice is allowed to melt, the amount of Water left in an open container water is the same as it was disappears but water in a closed before freezing. container does not disappear. Conservation of Matter Conservation of Matter heat energy changes of state emergent properties