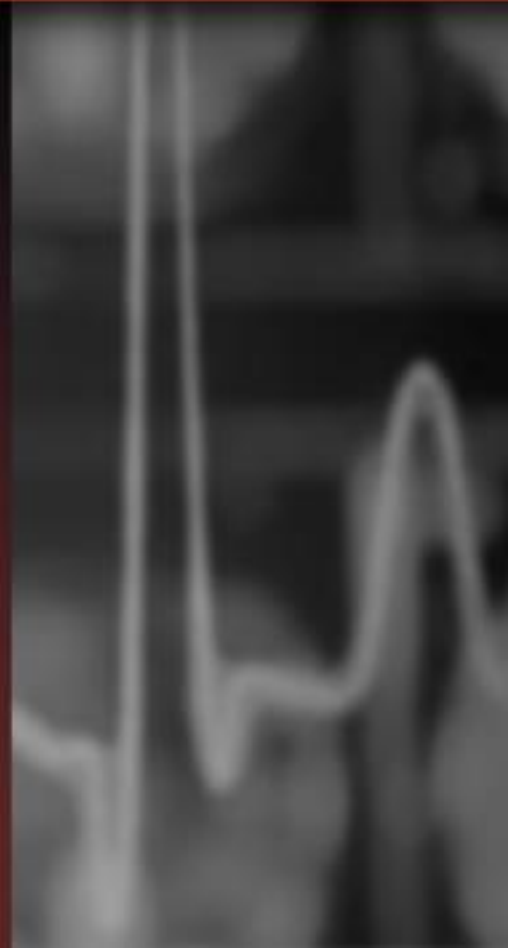


# Investigating Matter



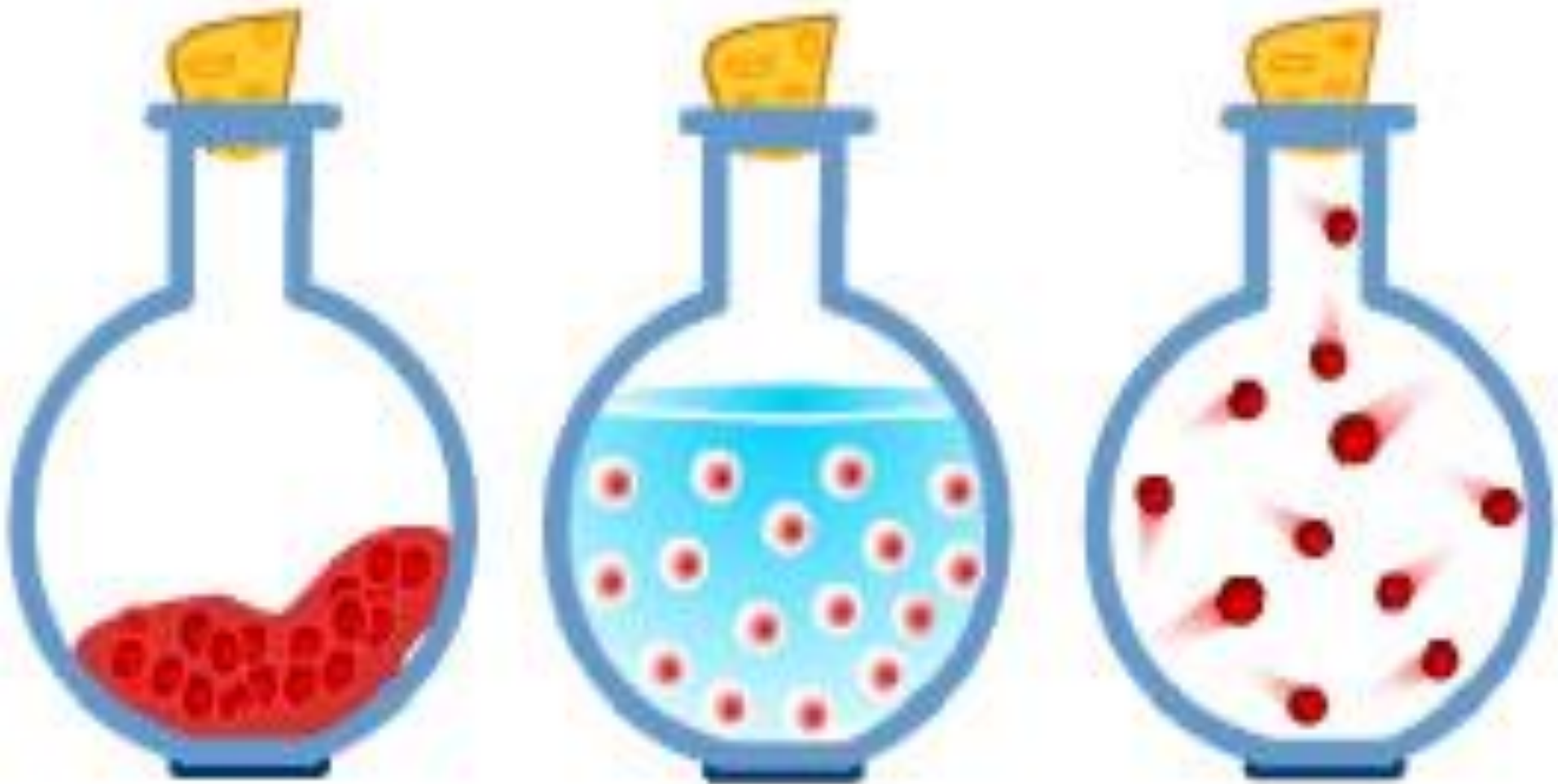
# Chemical Change

- is a change in matter that occurs when substances combine to form new substances
- It is difficult or impossible to reverse
- Ex : combustion of a piece of paper

# Physical Change

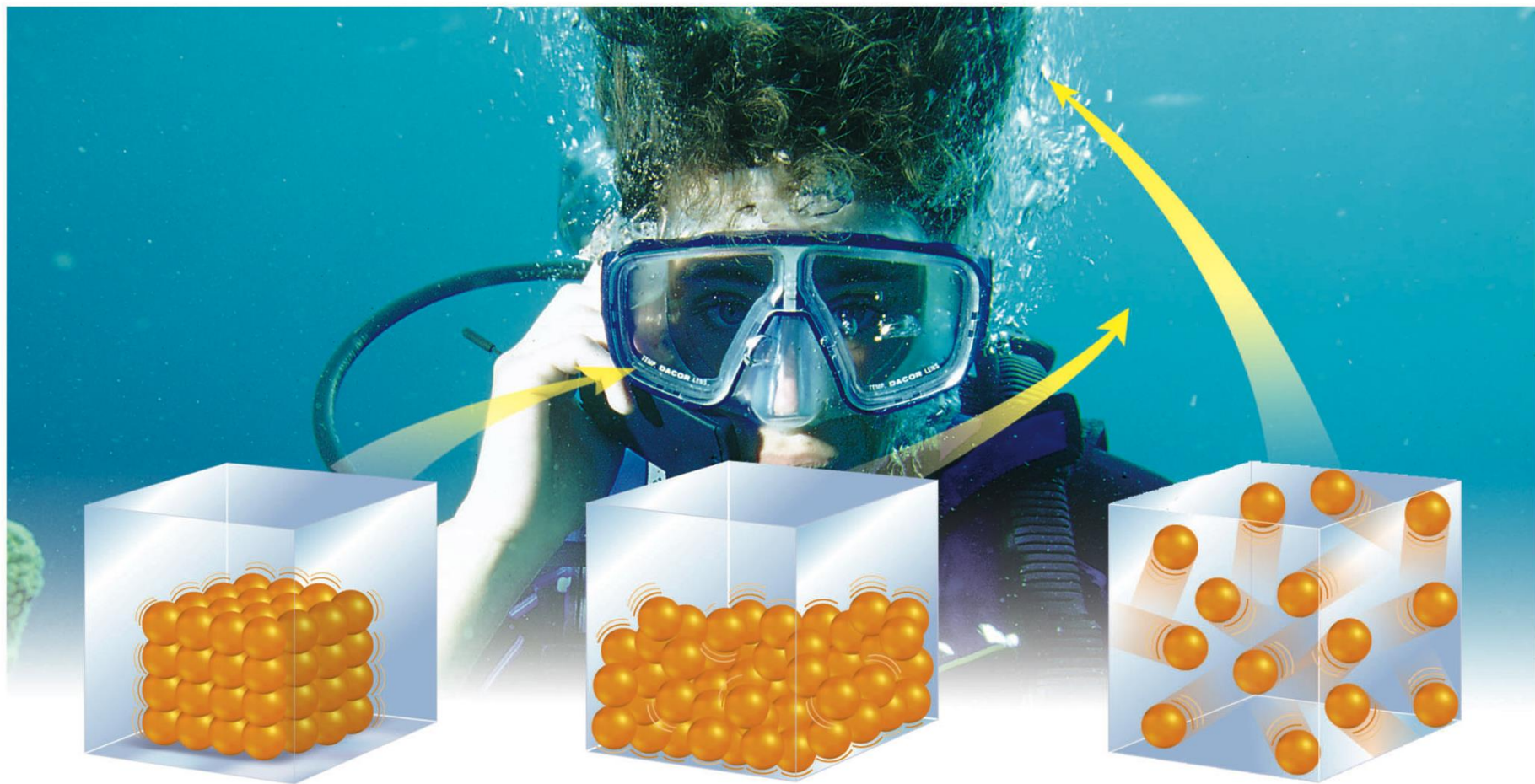
- A change in appearance by no new substances form
- The new properties are temporary because a **change in state** is reversible
- Ex : melting of ice

# Changes of State



# **Kinetic Energy**

- Is the energy of motion
- In any state, particles within an object are moving



**Figure 1.8A** The particles in a solid are packed together tightly. This means that solids will hold a definite shape. Even though a solid does not appear to move, the particles are constantly vibrating in place.

**Figure 1.8B** The particles in a liquid are in contact with each other, but they are not nearly as close as in solids. In fact, the particles in liquids can slip and slide past one another, changing their position. This slipping and sliding means liquids do not hold a shape and instead take the shape of their container.

**Figure 1.8C** Gas particles have very large spaces between them. In fact, gases are mostly empty space. Gases are quite different from liquids and solids because the particles in a gas can move freely in all directions. This is why gases always spread out or diffuse to fill their container.

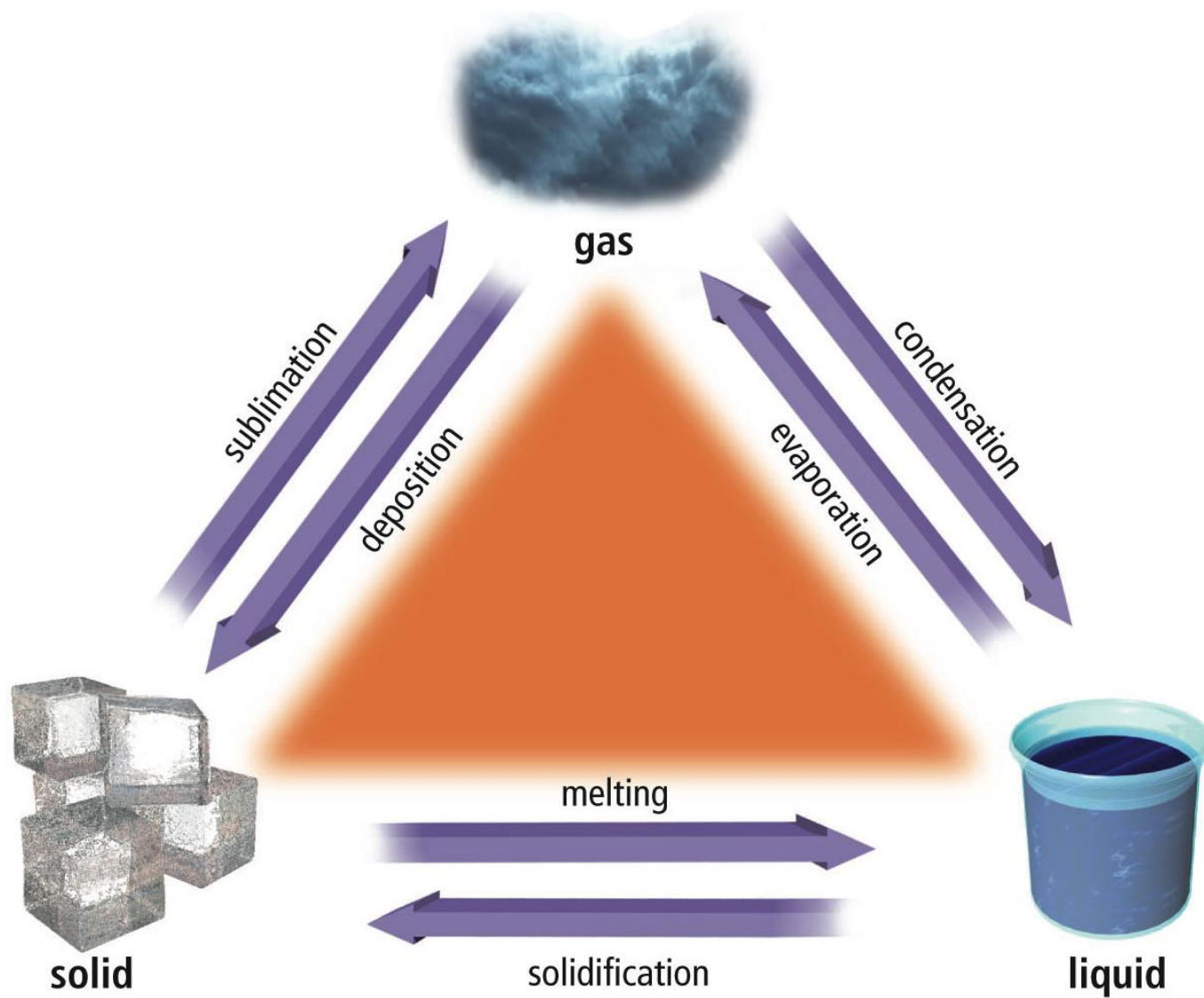
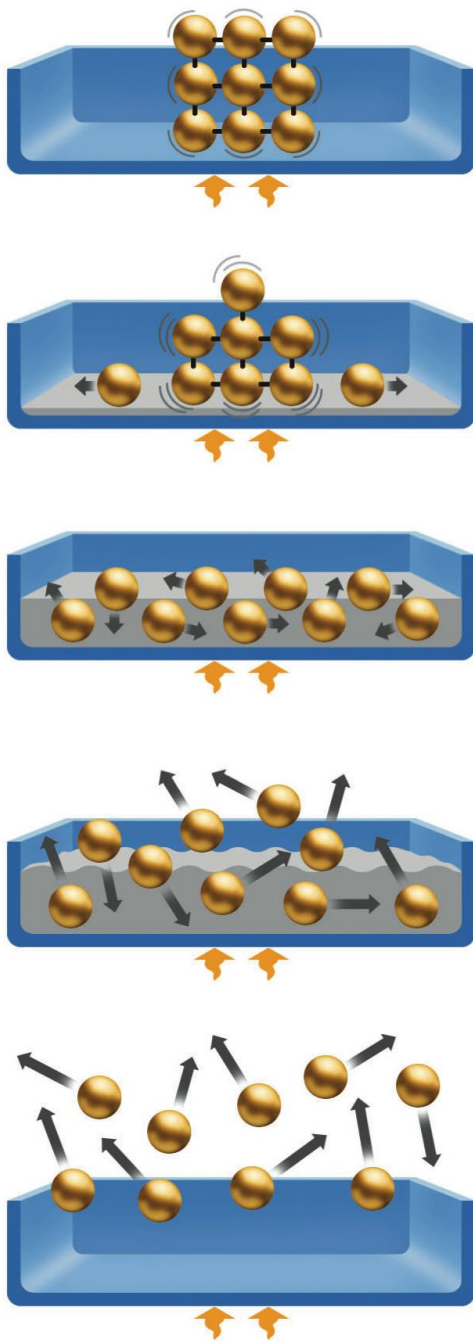


Figure 1.10 Changes of state



### 1. Solid gold

Particles are very close to one another, fixed in position, and vibrate.

### 2. Melting gold

As the temperature increases, the particles' kinetic energy increases. This motion results in the particles colliding with each other and making more space between them.

### 3. Liquid gold

All particles are still close, but now have enough space to slide past one another.

### 4. Boiling gold

As the temperature keeps on increasing, the kinetic energy increases and the particles bounce vigorously against each other, creating more space. Some particles gain enough energy to break completely free of the liquid gold.

### 5. Gaseous gold

All particles are highly energetic and move freely to spread out in their container. Further heating gives particles even more kinetic energy, making the gas spread out faster and farther.

Figure 1.9B Energy (shown by the orange arrows) added to gold causes a change of state.





