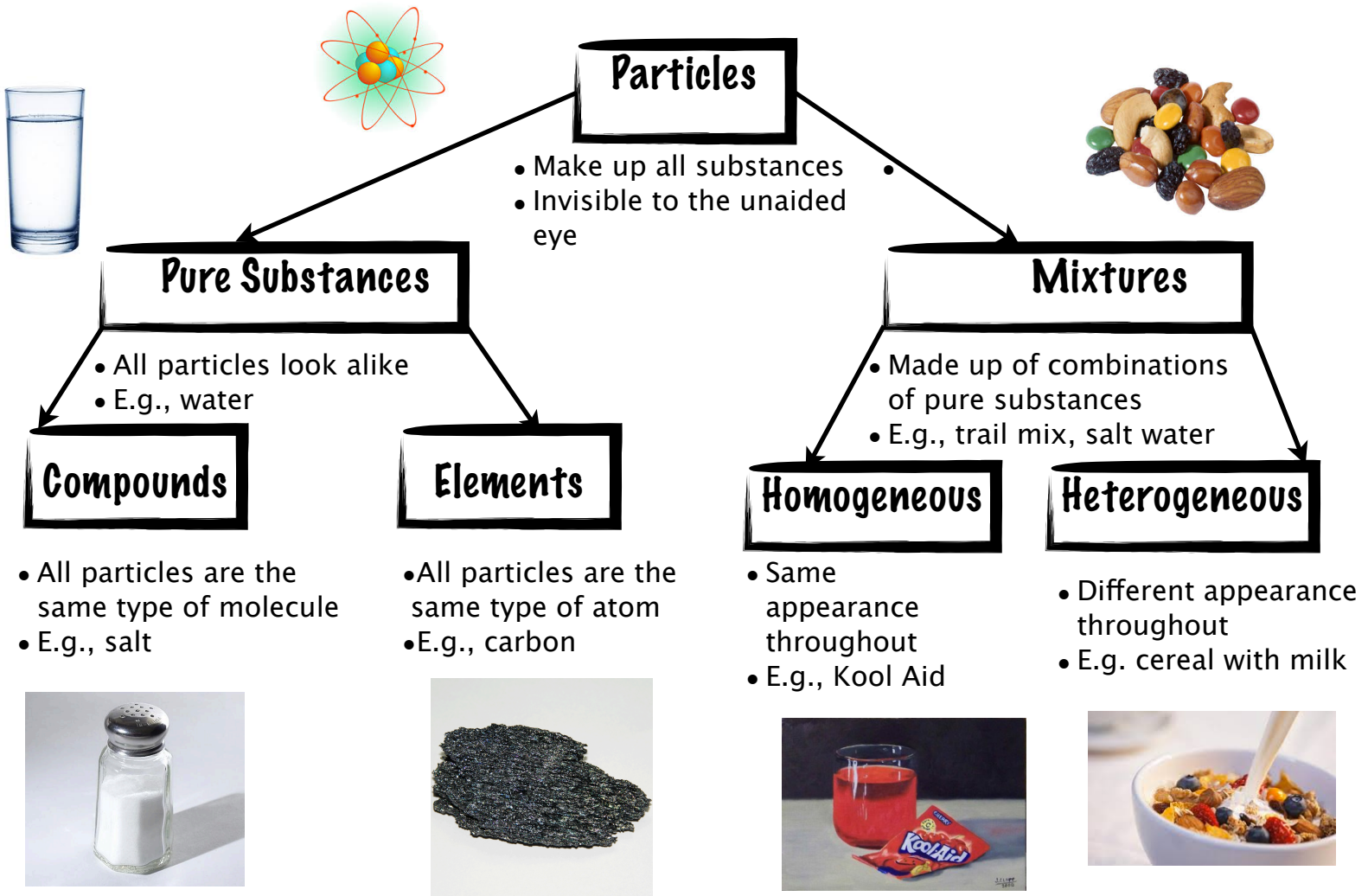
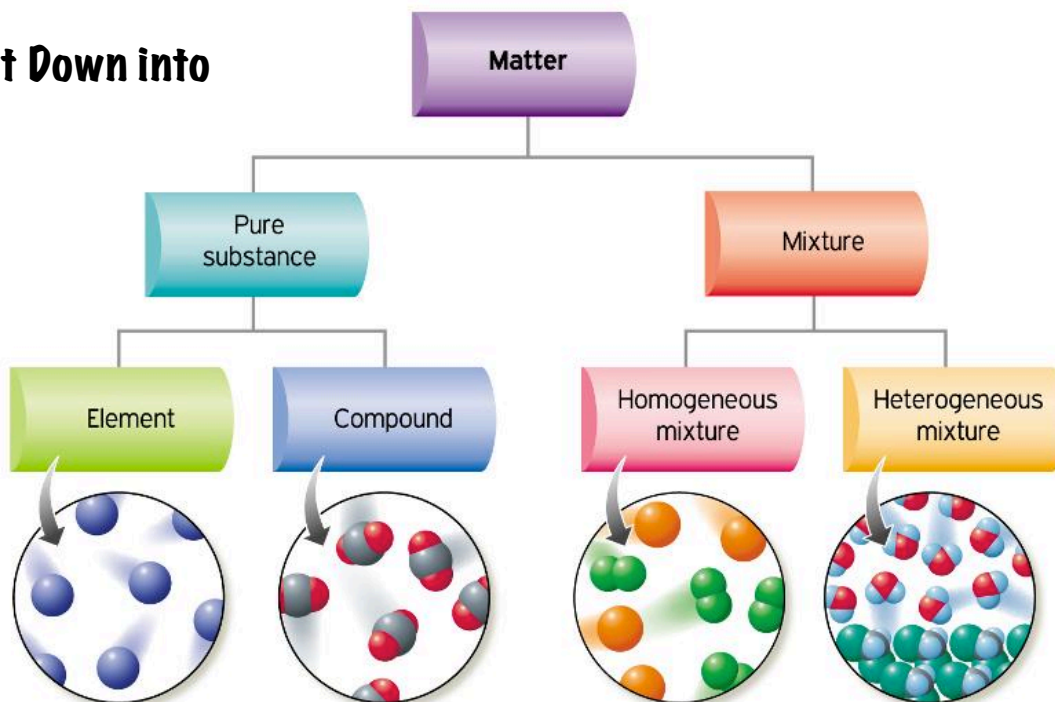


Classifying Substances by their Composition



Breaking it Down into Particles:

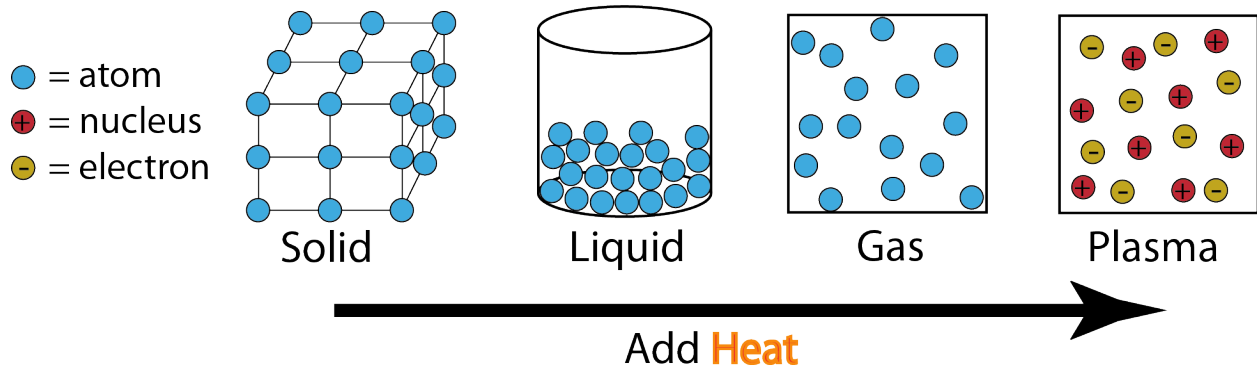


Substances can be classified by:

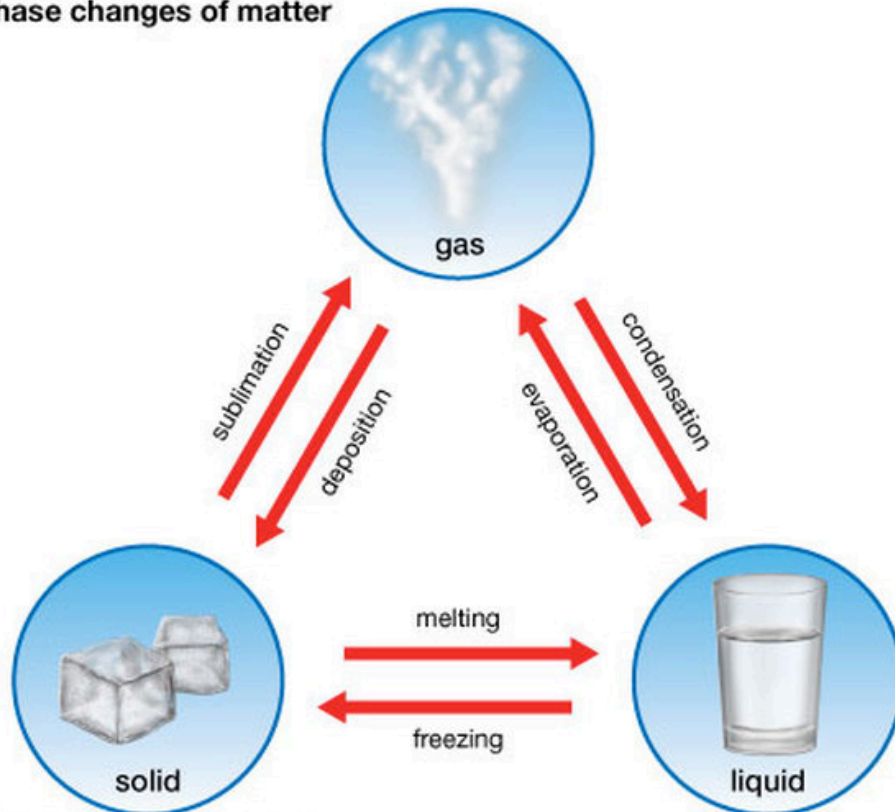
- 1) Their state
- 2) Their composition

Classifying Substances by their State

States of Matter



Phase changes of matter



How It's Made: Ice Cream

As you read through these instructions on how to make ice-cream at home, underline all the examples of substances that you see and add them to your classification chart. Make sure to also star* any changes of state.

People have been making ice cream far longer than the invention of electricity so there's no reason you can't make ice cream and sorbets at home without a machine. The advantage to using an electric or hand-cranked machine is that the final result will be smoother and creamier. Freezing anything from liquid-to-solid means you're creating hard ice crystals, so if you're making it by hand, as your ice cream or sorbet mixture freezes, you want to break up those ice crystals as much as possible so your final results are as smooth and creamy as possible.

Ingredients:

- 1 cup (250ml) whole milk
- A pinch of salt
- 3/4 cup (150g) sugar
- 1 vanilla bean, split lengthwise
- 2 cups (500ml) heavy cream
- 5 large egg yolks
- 1 teaspoon pure vanilla extract



Steps:

1. Heat the milk, salt, and sugar in a saucepan.
2. Set up an ice bath by placing a small bowl in a larger bowl partially filled with ice and water. Set a strainer over the top of the smaller bowl and pour the cream into the bowl.
3. In a separate bowl, stir together the egg yolks. Rewarm the milk then gradually pour some of the milk into the yolks, whisking constantly as you pour. Scrape the warmed yolks and milk back into the saucepan.
4. Cook over low heat, stirring constantly and scraping the bottom with a heat-resistant spatula, until the custard thickens enough to coat the spatula.
5. Strain the custard into the heavy cream. Stir over the ice until cool, add the vanilla extract, then refrigerate to chill thoroughly. Preferably overnight.
6. Remove the vanilla bean and freeze the custard in your ice cream maker according to the manufacturer's instructions.

Classifying Substances:





Substance	State (gas, solid, liquid)	Composition (pure, mixture, element, compound, etc.)

Discussion Questions:

- 1) Choose one of the substances above and explain how you knew the composition and state. What were your clues?
- 2) How many changes of state are involved in making ice-cream? Explain.
- 3) Why do you think they used heat in Step 4 in order to thicken the ice-cream?

Minds On:

Working with a partner, give two **classifications** (categories) for the substances below:

Substance	Classification 1	Classification 2
 <p>Water</p>		
 <p>Ice</p>		
 <p>Dirt</p>		
 <p>Steam</p>		