Heterogeneous Homogenous Mixtures Solutions

Phases of matter: Solid

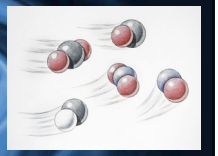
- Solid: atoms and/or molecules packed very close together. Hard, dense, fixed location.
- Crystalline solid v. amorphous: Crystalline Atoms and molecules are in geometric patterns that repeat. Amorphous solids they are in random order and can be somewhat flexible like glass or rubber.

Phases of Matter: Liquid

- Atoms and molecules are more spaced out and now can move. The material can be slightly compressed into a smaller space.
- They don't have a defined shape, but take the shape of their container.

Phases of Matter: Gas

- Atoms and molecules are far apart
- Atoms and molecules move freely
- The gas can be compressed significantly
- Assumes the shape of the container



Solid, Liquid, Gas

Matter Review: Anything that has mass and occupies (takes up) space.

HOMOGENEOUS	HETEROGENEOUS
Pure Substances:	Mixtures;
elements or compounds which CAN'T be physically separated	These CAN be physically separated

Some examples:
1. Soil: mixture
2. Oxygen: pure substance
3. Carbon Monoxide: CO : pure substance
4. Sugar water: mixture

Additional Terms to Know

- **Elements**: The most basic different types of matter. You can't break it down into other substances.
- **Atoms**: The smallest distinguishable unit of an element.
- **Molecules**: 2+ more atoms bonded together.

Elements, Compounds, Mixtures

- If there is only 1 atom type or molecule type in a given space we call it a **pure substance**
- If there are 2 or more atom types or molecules in a given space we call it a **mixture**.

Elements

- Can't be **broken down into simpler** or other substances.
- For example: you can do whatever you want to pure copper. You can't find a simpler version of copper.
- You can do whatever you want to pure sulfur. You can't find a simpler version of sulfur.

Compounds

- Compounds are substances composed of **2 or more elements** in **fixed and definite** proportions (ratios).
- You can mess with compounds to turn them back into elements.
- You can have a pure compound, where in a contained space it's only made up of that one compound, for example, pure water H_2O, pure carbon dioxide CO_2, etc.

Mixture

- You get a mixture when you combine
- at least two pure elements,
- at least two pure compounds,
- or at least 1 pure element and 1 pure compound into the same space.

Homogeneous Mixtures

- A homogeneous mixture is a uniform mixture where you can't otherwise tell that there are multiple phases.

- If it's gases it's homogeneous
- if it's solids you have to look at it. Steel is a mixture of iron and carbon, but you wouldn't know. A box of copper and steel nuts you can tell apart.

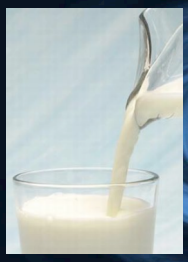
Homogeneous Liquid Mixtures

- If it's a liquid mixture and you can see through it it's homogeneous
- Tea is a homogeneous mixture.
- Milk is not.

Heterogeneous Mixtures

- If you can clearly tell that there is more than one thing in a container it's heterogeneous
- If there is a liquid that you can't see through it's heterogeneous
- If you can tell there is an easy way to separate things then it's a heterogeneous mixture.

Heterogeneous Mixtures



5. Homogeneous and Heterogeneous Mixtures

Ways of Separating Mixtures

- **Decanting**: pour off liquid leaving solids
- **Distillation**: evaporate off a material that boils more quickly (**Volatile**) than the one it's mixed with.
- **Filtration**: Solids are separated from a liquid by pouring both through a porous material.

6. Separation in a Sand Mixture

Homogeneous

- Can you look through it? (yes)
- Can you see solid objects? (no)
- Can you see a lot of bubbles? (no)
- Is it clear? (yes)

- Yes, no, no, yes means it's a homogeneous solution
- KoolAid, water, salt water are examples

Heterogeneous

- Can you look through it? (no)
- Can you see solid objects? (yes)
- Can you see a lot of bubbles? (yes)
- Is it clear? (no)

- No, yes, yes, no means heterogeneous
- Milk, Orange Juice, mud are examples

Solutions

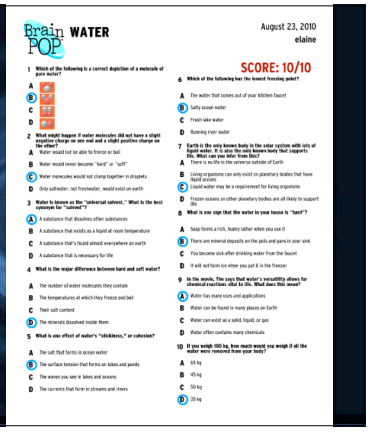
- Homogeneous:
- Heterogeneous:
- Homo-same, similar
- Hetero-Different

- Homogeneous solution is all the same
- Heterogeneous solution has different parts

Aqueous solutions

- Aqua means **water**
- These are solutions in water
- Like dissolving sugar in water makes an aqueous sugar solution
- Dissolving salt in water makes an aqueous salt solution
- Brain Pop: Water

Brain pop water answers



Brain POP WATER

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SCORE: 10/10

1 Which of the following is a correct depiction of a molecule of pure water?
A
B
C
D

2 What might happen if water molecules did not have a slight negative charge on one end and a slight positive charge on the other?
A Water would not be able to freeze or boil
B Water would never become "hard" or "soft"
C Water molecules would not clump together in droplets
D Only saltwater, not freshwater, would exist on earth

3 Water is known as the "universal solvent." What is the best synonym for "solvent"?
A A substance that dissolves other substances
B A substance that exists as a liquid at room temperature
C A substance that's found almost everywhere on earth
D A substance that is necessary for life

4 What is the major difference between hard and soft water?
A The number of water molecules they contain
B The temperatures at which they freeze and boil
C Their salt content
D The minerals dissolved inside them

5 What is one effect of water's "stickiness," or cohesion?
A The salt that forms in ocean water
B The surface tension that forms on lakes and ponds
C The waves you see in lakes and oceans
D The currents that form in streams and rivers

6 Which of the following has the lowest freezing point?
A The water that comes out of your kitchen faucet
B Salty ocean water
C Fresh lake water
D Running river water

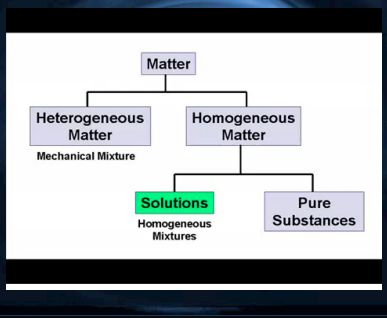
7 Earth is the only known body in the solar system with lots of liquid water. It is also the only known body that supports life. What is the connection between these two facts?
A There is no life in the universe outside of Earth
B Living organisms can only exist on planetary bodies that have liquid oceans
C Liquid water may be a requirement for living organisms
D Frozen oceans on other planetary bodies are all likely to support life

8 What is one sign that the water in your house is "hard"?
A Soap forms a rich, foamy lather when you use it
B There are mineral deposits on the pots and pans in your sink
C You become sick after drinking water from the faucet
D It will not form ice when you put it in the freezer

9 In the movie, Tim says that water's versatility allows for chemical reactions vital to life. What does this mean?
A Water has many uses and applications
B Water can be found in many places on Earth
C Water can exist as a solid, liquid, or gas
D Water often contains many chemicals

10 If you weigh 100 kg, how much would you weigh if all the water were removed from your body?
A 65 kg
B 45 kg
C 50 kg
D 35 kg

2. Solute & Solvent-Dissolving Review



Solvent and Solute

- The chemical that is the majority of the mass and **is dissolving another** compound is the **solvent**.
- The compound making up the smaller share of the mass and is **being dissolved** is the **solute**.

Determining Solubility

- The amount of a substance that can dissolve in a certain amount of liquid at a specific temperature (because temp effects solubility).
- 100g water at 25C can hold 36 g of NaCl (salt).
- If water has that salt much it's called **saturated**.
- If water has less than 36g of salt/100 g of water it's called **unsaturated**.
- If you heat the water, dissolve more than 25g, and then cool it down it will be **supersaturated**.

7. Soluble & Insoluble