**Pure Substances Vs. Mixtures p. 18- 21**

**Pure Substances: contain only ONE KIND of particle**

* Can be in any state.
* Limited number in existence (elements or compounds only).
* All samples, no matter what size, have the same properties.
* Not often found in nature (tend to mix together)
* Examples of pure substances include diamonds, sugar, salt, aluminum foil, and copper

**Mixtures: contains TWO OR MORE pure substances (different kinds of particles)**

* Almost all natural and manufactures products are mixtures (large number; ever increasing).
* Can mix solids, liquids and gases together in any combination to make.
* Examples of mixtures include snack mix, chocolate cookies, granola cereal, and salt water.
* Two different types of mixtures : ***Heterogeneous & Homogenous***
* A ***solute***is the substance that dissolves and a ***solvent***is the substance that does the dissolving (for homogeneous mixtures)

Use a Venn diagram to represent the relationship between pure substances and mixtures.

**Pure Subs. Both Mixtures**

**Types of Mixtures:**

|  |  |
| --- | --- |
| **Solutions****(Homogeneous)** | **Mechanical Mixtures (Heterogeneous)** |
| General characteristicsof solutions:• composed of at least two parts: *solute* and *solvent*• do not settle out upon standing• uniform, appear as one state• evenly mixed or homogeneous (*same kind*)Examples:• Ocean water (water, salt, pollutants)• vinegar and water• drink mix and water• air (N2, O2, C02, Ar, etc)  | General characteristics of mechanical mixtures:• two or more substances mixed together• each component is visible (uneven mix)• heterogenous (*different kinds*)Examples:• pepper and water• vegetable oil and water• soil and water• sno cone• granola cereal• snack mix (Munchies) |

Show what you know:

**Vocabulary**

Define and represent the following terms with a picture / example:

1. pure substance
2. mechanical mixture / heterogeneous mixture

3. homogeneous mixture / solution

**Identifying Solutes and Solvents**

Complete the following chart:

|  |  |  |
| --- | --- | --- |
| **Solution** | **Solute(s)** | **Solvent** |
| 1. iced tea2. Pop (cola)3. gelatine dessert (jello) |  |  |

**Inquiry / Design Project: Separating Components of Mixtures**

Each group of students must generate possible methods for separating EACH of the mixtures below and **then choose one to**:

• research, plan, test, and revise (retest if needed) a way to separate the components of their mixture

• identify where their particular separation technique is used in industry

• present their results to the class

**Methods of Separating Mixtures Scenarios:**

**Scenario A:** Minute metal shards have fallen onto the sandy floor of a workshop. How could the owner clean the sandy floor of the dangerous metal pieces?

**Scenario B:** To improve the icy road conditions, a sand-salt mixture has been used on the highways all winter. The spring cleanup crew has scooped up the mixture and would like to use the sand for road construction but the workers must first remove the salt. How could this be achieved?

**Scenario C:** Pens were confiscated from three people suspected of forging a signature. How could one determine which pen was used to forge a signature on the given document?

**Scenario D:** You are stranded on a deserted island in the Pacific Ocean. There is no fresh drinking water, only salt water from the ocean. How could you obtain drinking water?

**Scenario E:** A gardener would like to use some soil from the backyard to start some seeds but there are a lot stones in it. How could the stones be removed?

**Scenario F:** A person would like to make a glass of fresh pulp-less orange juice. What method could the person use?

**Scenario G:** A community by the ocean would like to establish a small business that sells salt and pepper. Farmers are already growing peppers to be dried and used in the business but there are no salt mines within the vicinity. Someone has suggested obtaining the salt from the salt water of the ocean. How would this be done?

**Assessment Checklist:**

The student:

0 understands the problem

0 brainstorms possible solutions

0 creates a written plan

0 develops criteria for success

0 includes a labelled diagram

0 tests the separation technique

0 identifies and makes improvements

0 uses appropriate safety equipment

0 displays the proper disposal method of used materials

0 displays identifies which industry uses the same separation technique or a similar separation technique

Particle Theory Connection: p. 26 – 27

*Answer q’s 2 & 3 p.27*

*2)*

*3)*

Solubility and Saturation – p. 32-35

***Solubility***is the ability of a substance to go into a solution by dissolving.

Brainstorm ways to increase the solubility of a sugar cube. Then test one hypothesis in pairs or small groups.

***Factors that affect solubility:***

• particle size or surface area

• agitation/stirring

• temperature

**Saturation Scenario:**

A company that makes hummingbird feeders for indoor aviaries would like to include, with its product, instructions on how to make the liquid food that goes into the feeders. The feeders are built to release the sugary liquid when a bird sticks its beak into the sipping holes.

Hummingbirds require a lot of energy to survive; thus, they require high concentrations of sugar. Therefore, the water must **be saturated** (***no more solute will dissolve in it***) with the sugar. It has been found that if too much sugar is added, the sipping holes clog up.

*Working in groups:*

1. create a plan to determine exactly the amount of solute per 100 mL solvent needed to saturate the water at room temperature
2. draw up their results as a set of instructions that can appear on the box of the hummingbird feeders

**Define in your own words:**

* Unsaturated: a) Dilute

b) Concentrated

* Saturated
* Superstaurated