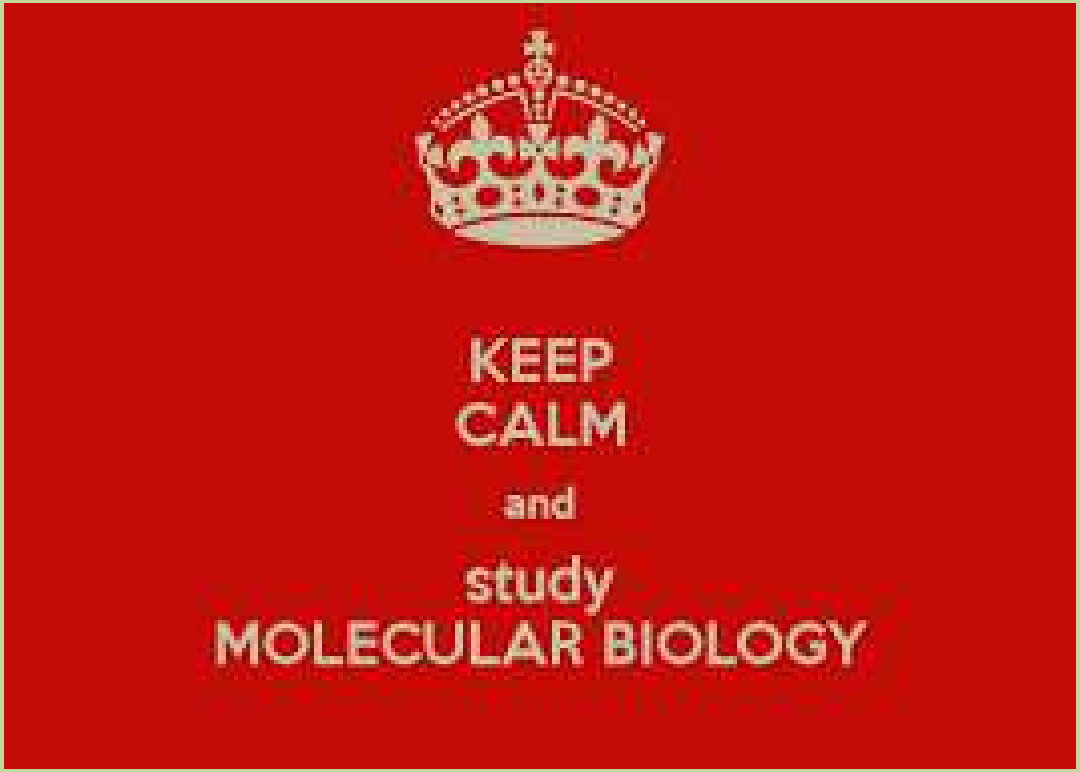
Molecular Biology



Energy Transfer Through Systems

&

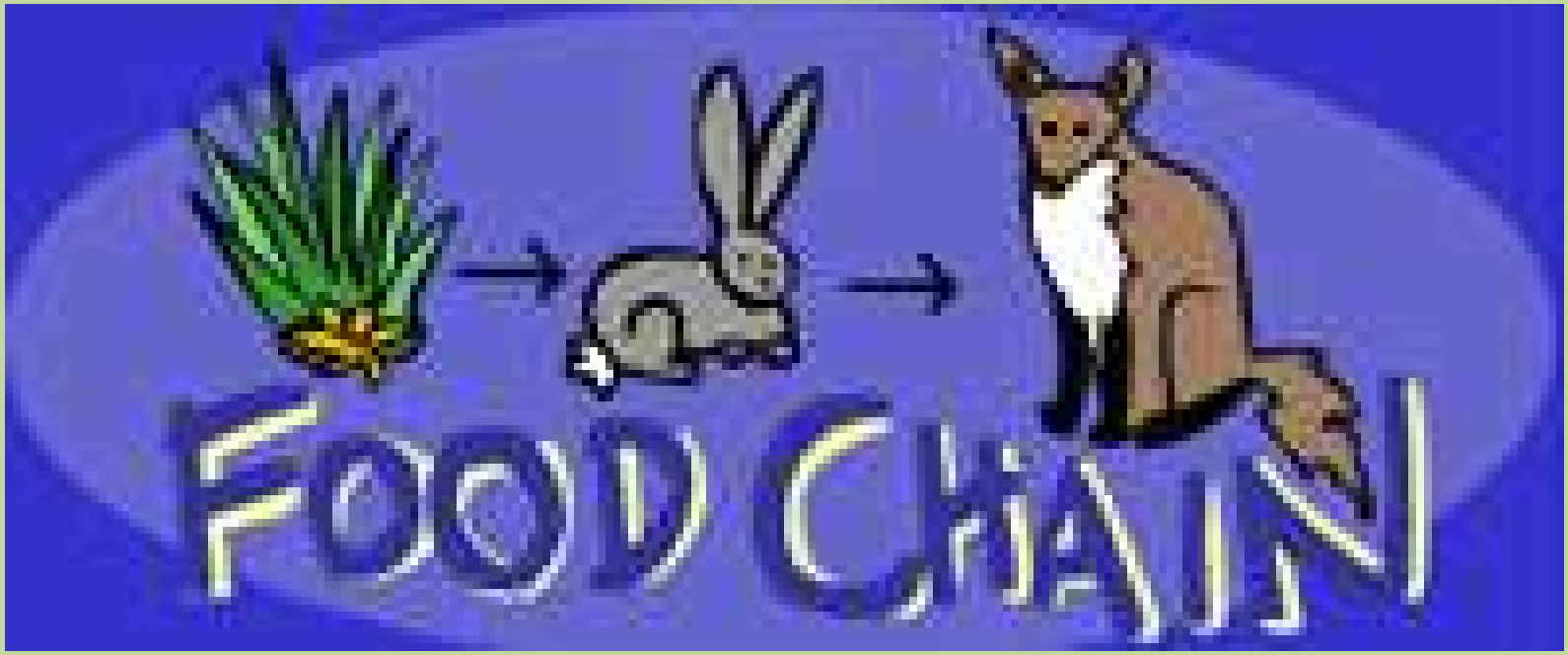
You Are What You Eat


Food Chain Activity:
Let’s Go Outside!!!!!

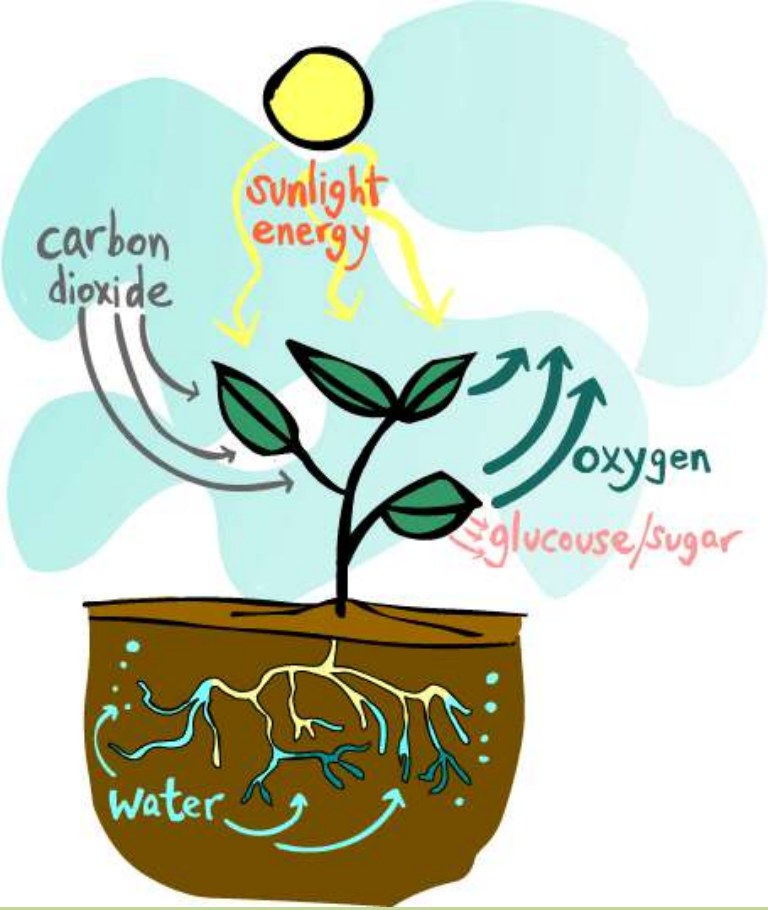
Reflection

Answer on a sheet of notebook paper. You do not need to write the question. ☺

1. Which animal had to eat the most food? The second most? The least?
2. Why do animals lower on the food chain need to eat more?
3. What does this tell us about how energy is transferred through food chains?
4. Is energy ever lost or created?


FOOD CHAIN

Producers


sunlight energy
carbon dioxide
oxygen
glucouse/sugar
water


carbon dioxide
glucouse/sugar + oxygen

Consumers


HERBIVORES

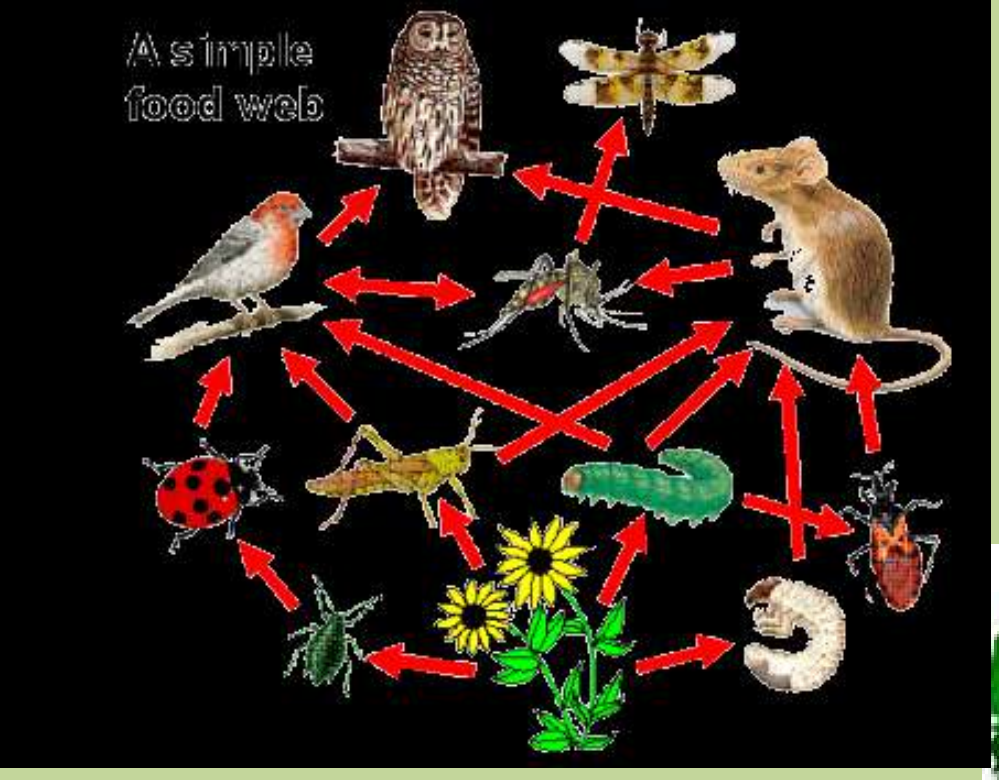

CARNIVORES

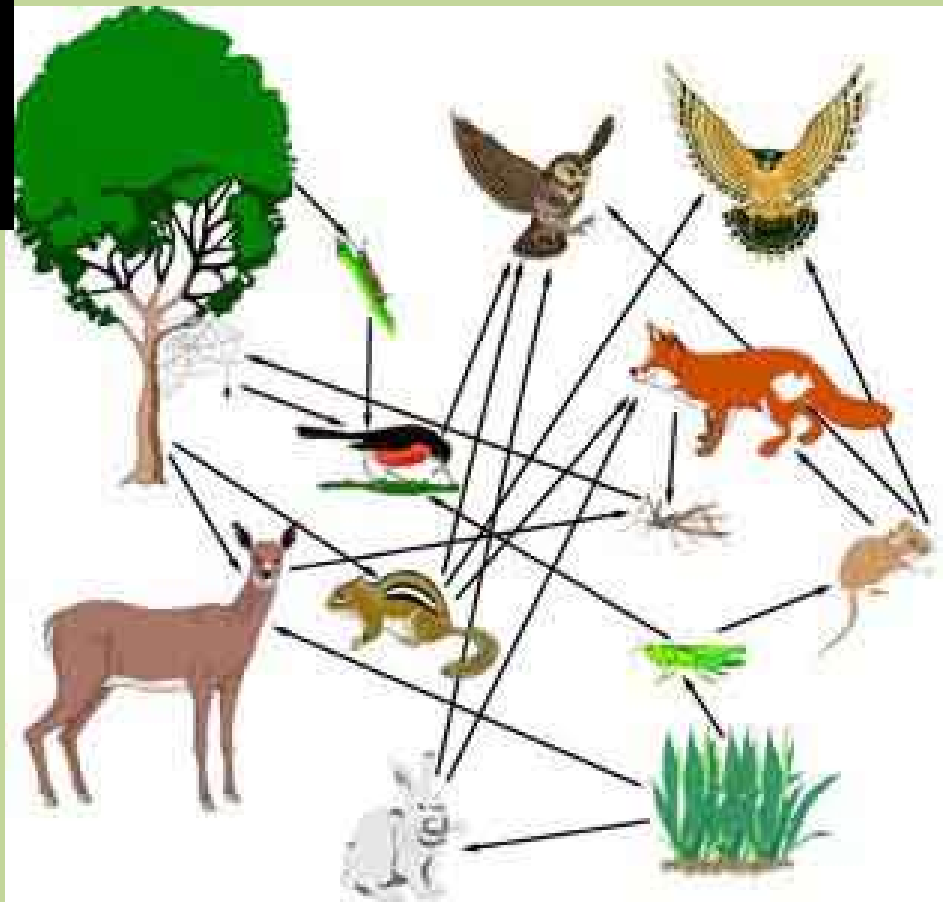

OMNIVORES


Barbara Manatee!!!
You are the one for me!!!
Sent from up above!!!
You are the one I love!!!
Endangered love!

(Decomposers)*

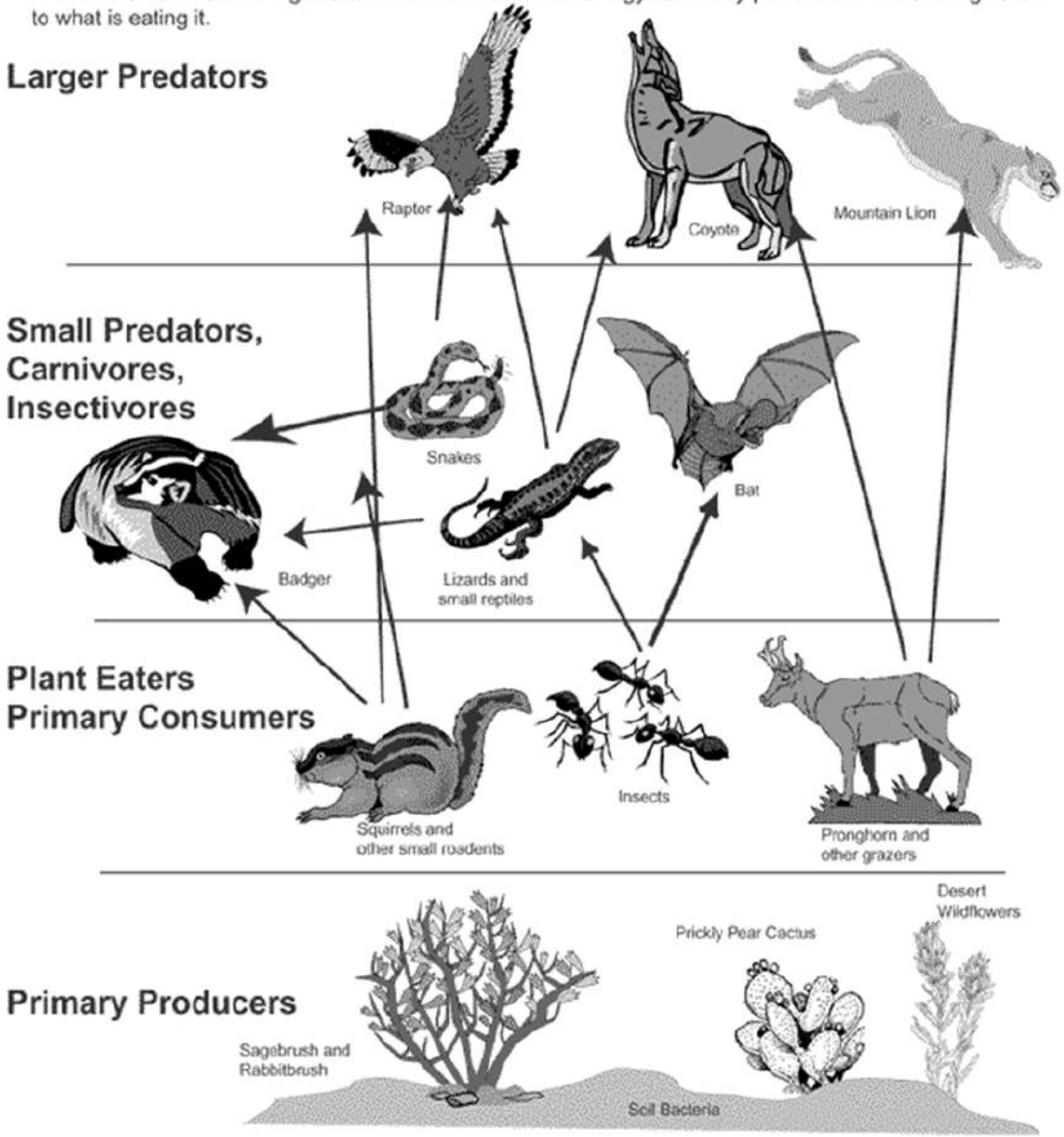
* You will need to know this for future lessons more than this one, it just makes sense to touch on the topic in this context.


A simple
food web



Food Web in the Sagebrush-Steppe Ecosystem

A food web is a model that shows how energy is passed in the form of food from one organism to another. The arrows between the organisms show the direction of energy flow. They point from what is being eaten to what is eating it.



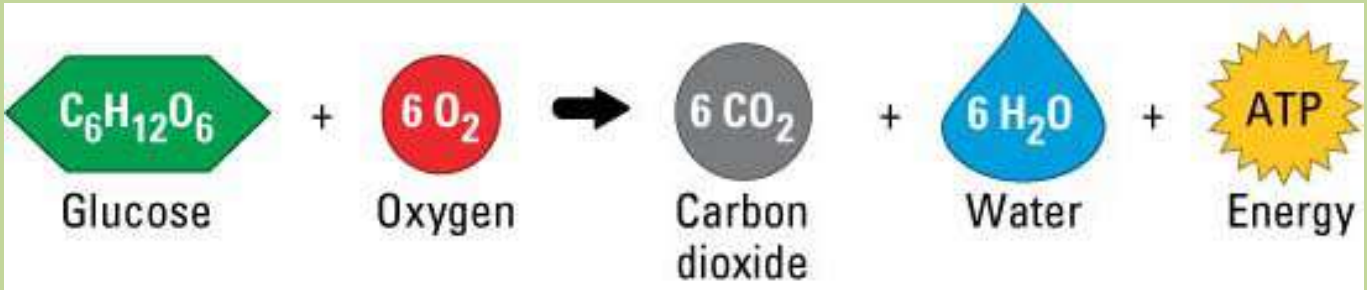
Create and Illustrate your own Food Chain

- MUST include **at least** 1 producer, consumer, and decomposer
- Include 2 or more producers, consumers and decomposers and get bonus points!

****Make sure to note the flow of energy through the system

Photosynthesis

Cellular Respiration is basically Photosynthesis REVERSED!



Cellular Respiration

	Photosynthesis	Respiration
Production of ATP	Yes	Yes
Reactants	$6CO_2$ and $12H_2O$ and light energy	$C_6H_{12}O_6$ and $6O_2$
Products	$C_6\ H_{12}\ O_6$ and $6O_2$ and $6H_20$	$6CO_2$ and $6H_2O$ and energy (ATP)
Requirement of sunlight	**Can occur only in presence of sunlight**	**Sunlight not required; cellular respiration occurs at all times.**
Equation	**$6CO_2 + 12H_2O$ + light → $C_6H_{12}O_6 + 6O_2 + 6H_20$**	**$6O_2 + C_6H_{12}O_6$ → $6C_O2 + 6H_2O$ + ATP (energy)**
Chemical reaction	**Carbon dioxide and water combine in presence of sunlight to produce glucose and oxygen.**	**Glucose is broken down into water and carbon dioxide (and energy).**
Process	The production of organic carbon (**glucose and starch**) **from** inorganic carbon (**carbon dioxide**) with ATP and NADPH produced in the light dependent reaction	Production of ATP via **oxidation of organic sugar compounds.** {[1] glycolosis: breaking down of sugars; occurs in cytoplasm [2] Krebs Cycle: occurs in mitochondria; requires energy [3] Electron Transport Chain-- in mitochondria; converts O2 to water.}

	Photosynthesis	Respiration
Fate of oxygen and carbon dioxide	Carbon dioxide is absorbed and oxygen is released.	Oxygen is absorbed and carbon dioxide is released.
Energy required or released?	Requires energy	Releases energy in a step wise manner as ATP molecules
Main function	Production of food. Energy Capture.	Breakdown of food. Energy release.
Stages	2 stages: 1. The light dependent reaction (AKA light cycle) 2. The light independent reaction. (AKA Calvin cycle)	4 stages: 1. Glycolysis 2. Linking Reaction 3. Krebs cycle 4. Electron Transport Chain
Occurs in which organelle?	Chloroplasts	Mitochondria Glycolysis (cytoplasm)
Occurs in which organisms?	Occurs in plants, Protista (algae), and some bacteria.	Occurs in all living organisms (plants and animals).

	Aerobic Respiration	Anaerobic Respiration
Definition	Aerobic respiration uses oxygen	Anaerobic respiration is respiration without oxygen
Cells that use it	Aerobic respiration occurs in most cells.	Anaerobic respiration occurs mostly in prokaryotes
Amount of energy released	**High** (36-38 ATP molecules)	**Lower** (Between 36-2 ATP molecules)
Stages	Glycolysis, Krebs cycle, Electron Transport Chain	Glycolysis, Krebs cycle, Electron Transport Chain
Products	Carbon dioxide, water, ATP	Carbon dioxide, reduced species, ATP
Site of reactions	Cytoplasm and mitochondria	Cytoplasm and mitochondria
Reactants	glucose, oxygen	glucose, electron acceptor (not oxygen)
combustion	complete	incomplete
Production of Ethanol or Lactic Acid	Does not produce ethanol or lactic acid	Does produce lactic acid. (Fermentation produces ethanol)

Proteins

- **Provide energy, encourage growth and tissue repair**
- Made up of small units called amino acids
  - 20 important to the human body: 9 your body can't make and 11 it can
- **Complete protein: animal foods and soy**
- **Incomplete proteins: plant foods**
  - **Must pair 2 foods together: beans and rice**

Fats

- **Important energy source**
  - Lipid family which includes **fats and oils**
- Hydrogenation: adds hydrogen atoms to unsaturated fatty acids (liquid) turning them into more saturated solid fats
  - Crisco and margarine sticks
- **Cholesterol: fatlike substance found in every cell in the body**
  - **Important… found in skin tissue, produces hormones**
  - Two types: Dietary and Blood

Carbohydrates

- The body's chief source of energy
- Starches : USED MORE LONG TERM
  - Complex Carbohydrates
- Fiber
- Sugar
  - Simple Carbohydrates : USED QUICKLY
    - Glucose: Blood
    - Fructose: Fruit
    - Galactose: Milk
    - Sucroce: Table sugar

Vitamins

- Are **complex organic substances**
  - **Normal growth, maintenance, and reproduction**
  - **Your body cannot produce all vitamins- you can get those by eating a nutritious diet**.
- Fat-soluble vitamins: carried in fatty parts of foods and dissolve in fats (body stores them in fat… build up can be dangerous)
- Water-soluble vitamins: dissolve in water (body does not store them)

Minerals

- In addition to vitamins your body also **needs 15 minerals that help regulate cell function and provide structure for cells**. Major minerals, in terms of amount present, include **calcium, phosphorus, and magnesium**. In addition, your body needs smaller amounts of **chromium, copper, fluoride, iodine, iron, manganese, molybdenum, selenium, zinc, chloride, potassium and sodium**.
- **Amounts needed for most of these minerals is quite small and excessive amounts can be toxic to your body.**