Name _____Remember this: Environmental Chemistry

1) **Nutrients:** chemicals used in the body for energy, growth, and cell repair.

2) Organic nutrients (meaning it contains carbon): carbohydrates, proteins, lipids, and vitamins.

3) Organic molecule	Role in nutrition	Dietary source
Carbohydrate	Energy source	Rice, grains, potatoes
Proteins	Structural molecule	Meat, eggs, dairy products
Lipids	Storage of unused chemical energy	Vegetable oils, nut oils

4) **Minerals:** two types- Macrominerals (100mg or more a day). Trace elements (less than 100mg a day).

→ Plants convert solar energy into food energy for us by photosynthesis. They take in water and minerals by **root hairs.**

5) Nitrogen helps grow: shoots

Phosphorous helps grow: Roots

Potassium helps grow: Flowers

5) 3 types of Pesticides: Herbicides insecticides fungicides

Name _____Remember this: Environmental Chemistry

6)Insecticide- DDT.

PRO→Killed mosquitoes that carried malaria. Killed lice that carried typhus.

CON → Collected in fat stores of animals. Stopped proper formation of eggs, almost made Peregrine Falcon go extinct.

7) Biological magnification (aka biological accumulation). → Chemical becomes more concentrated as it moves up the food chain.

8) ACID (acidity)	**BASE (alkalinity)**
pH less than 7	pH over 7
Tart taste (sour), turn blue litmus red (BRA)	Taste bitter, feels slippery, Turns red litmus blue (RBB)

9) During an Acid- base neutralization what 2 products are created →
Created salt and water

10) What is a Catalytic converters- control harmful emissions from cars.

11) what are Scrubbers: reduces oxide emissions from industrial factories

12) What does ppm stand for: parts per million. (ppb= parts per billion, ppt= parts per trillion). Teenie tiny!

Name _____Remember this: Environmental Chemistry

13) Acute toxicity	**Chronic toxicity**
Serious symptoms after only one exposure	Symptoms appear only after chemical has accumulated
Ex) mercury	Ex) DDT

14) what does LD50 mean. Lethal Dose 50 – amount to kill 50% of test population

15)What is more toxic? **Botulinum** (**LD50 in ppm = 0.0000003**) or nicotine (LD50 0.86ppm)

Non persistent pollutants	**Persistent pollutants**
Wastes that can be broken down naturally	Accumulate in environment, break down slowly or not at all
Ex) sewage	Ex) DDT, mercury

16) Biological indicators definition: living organisms that can be used to show the health of an ecosystem. → most useful are the macro invertebrates (those that can be seen by unaided eyes, and lack a backbone).

Name _____Remember this: Environmental Chemistry

17) Substrate definition: An object that something living is fixed to. Ex) moss on a rock

18) Point source	**Non-point source**
Pollutants that enter from a specific point	Pollutants that are hard to pinpoint
Ex) pipe releasing sewage	Ex) city smog

➔ Ground water- filter down through pores in the soil. Does **not pass easily through clay.**

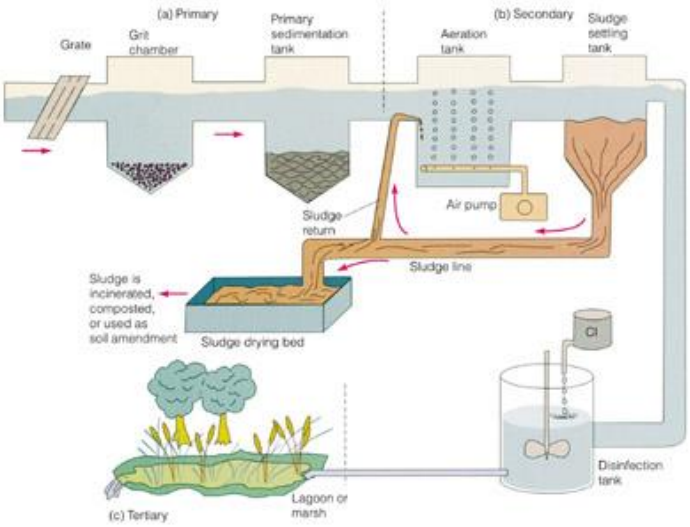


Figure 3.29. (a) Primary treatment. (b) Secondary treatment. (c) Tertiary treatment.

Primary – separates large solids

Secondary- removes organic compounds by bacterial decomposition – treated with UV radiation and chlorine.

Tertiary- percolates through ground water to remove nitrates and phosphates

Biodegradable – can be broken down by simple organisms

Leachate- liquid that results as wastes decompose and rain filters down through garbage.

Name _____Remember this: Environmental Chemistry

Practice Questions for Environmental Chemistry

1. Match the term with the appropriate description

Number	Term
1.	Enzyme
2.	Lipid
3.	Carbohydrate
4.	Mineral

Found in grains and rice __3___
Found in canola oil and margarine ___2__
May be classified as a trace element __4___
Not classified as a nutrient, acts as a catalyst _1____

2. Match the term with the appropriate description

Number	Term
1.	Trace element
2.	Macro mineral
3.	Protein
4.	Lipid

Used for building and cell repair __3___
Nutrient found in oils __4___
Calcium __2___
Iodine __1___

3. Match the term with the appropriate description

Number	Term
1.	Biomagnification
2.	Persistence
3.	Pesticide resistance
4.	DDT

The build up of a chemical in animals at different levels of the food web __1___
Process that allows a species to adapt to the presence of a pesticide __3___
Characteristic of DDT that makes it harmful to the environment __2___
Can severely affect the reproduction of birds of prey ___4__

Name _____Remember this: Environmental Chemistry

4. Match the term with the appropriate description

Number	Term
1.	SO_2 (sulfur dioxide)
2.	pH scale
3.	Acid
4.	Base

A chemical with a pH of >7 __4___
A chemical that turns blue litmus paper red _3____
Compares the relative acidity or alkalinity of a substance __2___
Produced by the combustion of fossils fuels and contributes to acid rain _1____

5. Order the following substances from most acidic to least acidic

Number	Substance	pH
1.	Baking soda	8.2
2.	Drain cleaner	14
3.	Lemon juice	2.0
4.	Acidic rainfall	4.4

__3___, __4___, __1___, ___2__,
most acidic least acidic

Name _____Remember this: Environmental Chemistry

6. You are a biologist hired by Environment Canada to study the amounts of DDT in a wetland environment. Your field work provides the following data:

Sample	DDT concentration (ppb)
Water	0.0001
Plankton	0.2
Fish	40
Osprey	5200

a) How many times greater is the concentration of DDT in the osprey than in the plankton? Show your work. **[2 marks] cg+**

Big/small → 5200/0.2 = 26 000 x greater

b) What **process** is being represented by the data? **[1 mark] cg**

Bioaccumulation → toxins build up in concentration as they work up the food chain

c) Explain how the DDT from the plankton can accumulate in the osprey. **[2 marks] eg**

The fish eats more than one plankton in its lifetime, and it collects all the DDT from each plankton it eats. This then gets passed onto the osprey (a large bird) when they eat the fish.

7. Place each of the following substances (use their number) on the pH scale provided. **[5 marks]** cg-

Number	Substance	pH
1	Battery acid	0.5
2	Drain cleaner	14
3	Human blood	7.4
4	Natural rainfall	5.6
5	Milk	6.6

1 4 5 3 2

Name _____Remember this: Environmental Chemistry

0 7 14

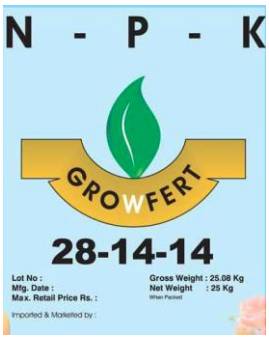
8. List a **function and an example food** for each of the organic compounds below:

a. Carbohydrates → immediate energy. Pasta

b. Lipids → storage of unused energy (fats). Oils

c. Proteins → cell building and repair. Beans, meat

9. Use the image to the right, explain what the numbers and letters on the bag of fertilizer means (what do they help grow?).



N nitrogen (shoots)

P phosphorous (roots)

K potassium (flowers)

10. State whether each sentence below refers to an acid, a base or a neutral solution:

a. Solution A turns blue litmus paper red. _____Acid (BRA- Blue turns Red in an Acid)

b. Solution B has a pH of 10. _____base_____

c. Pure water has a pH of 7. _____neutral_____

d. Solution C neutralizes an acid. _____base_____

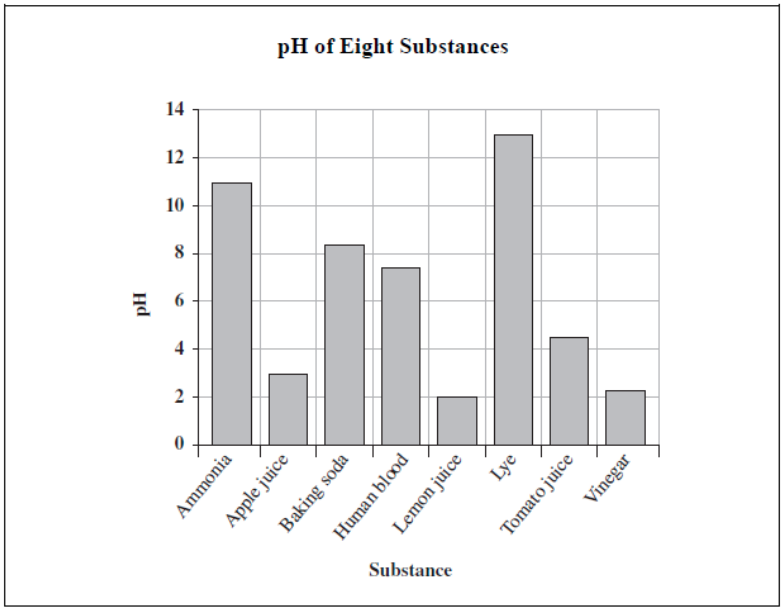
11. Barnacles are found all over rocks in the intertidal zones of ponds and lakes. What is the substrate for the barnacle?

The rocks.

Name _____Remember this: Environmental Chemistry

12. Humans need to take in nutrients, as they cannot make their own. The process when humans eat food-containing nutrients is called ingestion
Once the food has been broken down, it then is absorbed into the blood stream by the process of diffusion (which moves it from a high to low concentration).

Use the following graph to answer question 13.



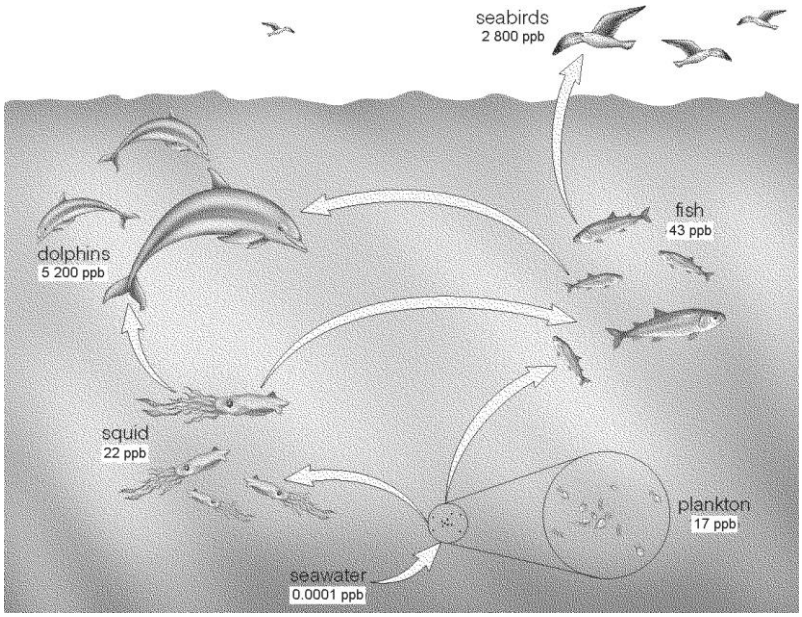
13. Which of the following conclusions can be made from the graph above?

A. Vinegar is more basic than lye.
B. Ammonia is more acidic than apple juice.
C. Tomato juice is more acidic than lemon juice.
D. Baking soda is more basic than human blood.

14. What does biodegradable mean?

Can be broken down by small microorganisms.

Name _____Remember this: Environmental Chemistry



15. To find how much more concentrated a chemical is. Divide bigger/ smaller.

a) How much more concentrated is the DDT in dolphins than in squid?

5200/22 =236 times more concentrated

16. The nutritional information label on a cereal box states that each **35 g** serving of cereal contains **24 mg (0.024 g)** of sodium. What is the concentration of sodium in parts per million (ppm)? **Careful of units.**

$$\frac{\text{Solute}}{\text{Solvent}} = \frac{\text{ppm}}{1\,000\,000} \qquad \frac{0.024}{35} = \frac{?}{1\,000\,000} \qquad = 685.7 \text{ ppm}$$

17. A **700 000 mg** water sample from the Flow River contains **120ppm** of barium. Calculate the amount of barium in the water, in milligrams (mg).

$$\frac{?}{700\,000} = \frac{120}{1\,000\,000} \qquad = 84\text{mg}$$

18. If the LD50 of salt is 3000mg/kg in rats, and we feed that amount to 682 rats, how many will be alive at the end of the experiment?

Name _____Remember this: Environmental Chemistry

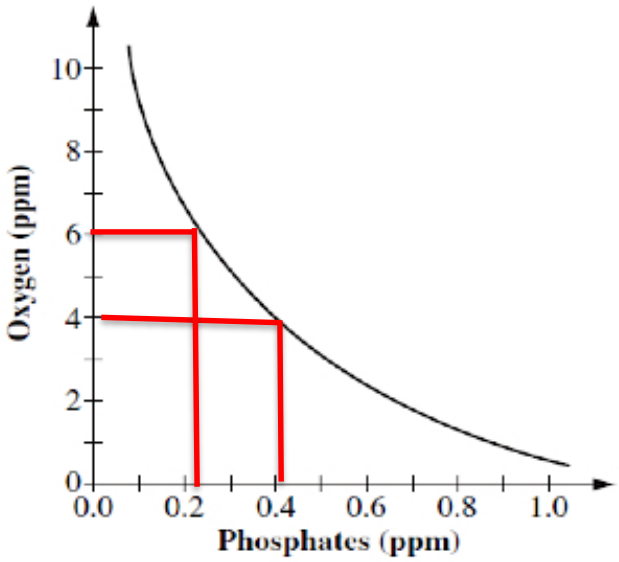
LD50= lethal dose to kill 50% of population. So 682/2 = 341 rats alive at the end.

19. Graph reading. What are the phosphate levels, in ppm, when there is an oxygen concentration between 4-6ppm?

** On the y axis is oxygen in ppm. Draw a line from oxygen of 4 and 6 over to the graph. Draw down to the x axis and see what the matching phosphate level is.

→The phosphate levels are between 0.2 and 0.4 when the oxygen is between 4-6.

The Relationship Between the Concentrations of Oxygen and Phosphates in a Particular Pond



20. Explain what each of these scientific variables means:

a. Manipulated variable the thing you are changing in the experiment.

b. Controlled variable What stays the same in the experiment

c. Responding variable what you are measuring in the experiment.