

Last time we were talking about water related diseases, the last group was water dispersed diseases and today we will talk about types of pollutants.

### 1) **Physical pollutants :**

- a) Heat
- b) Soil and dust
- c) Radiation

Might have direct or indirect effect on human health

#### ■ **Heat**

Indirect effect → When it comes to temperature, government is not concerned about the temperature of water when they send it to you, this is something you do at home by adjusting the temperature of water for drinking purposes or any other purpose .

However thermal pollution is important when it comes to environment, as we know we use water for cooling purposes [cooling nuclear reactor using water, by doing so this water will become hot] and by throwing this hot water in the closest river or lake, creatures there will die due to thermal shock which is a sudden change of water temperature and killing them affects us indirectly because it's a source of food.

Though they might be acclimatized to live in warmer water .E.g. We raise fish in Jordan (Ghor region) using relatively more hot water than usual for those fish but they are acclimatized and they are reproduced quicker than usual (special fish farms).

\* Hot water is considered as polluted water.

Note that specific heat of water is high and that's help us in cooling down our bodies.

#### ■ **Soil and (dust accumulation)**

How do you know that this water contains soil?

By turbidity measure for amount of soil in water and its unit is candle.

Turbid water is considered as biological contamination (although it's physical), why?

Because soil could be contaminated with microbes (we are afraid from pathogens within that soil that reaches water)

#### ■ **Radiation**

Recently we heard that Disi water might have some radio activity, possibly it's correct and the source of this radiation is natural source in the first place because we don't have any nuclear or industrial activity there.

## Water quality

Each country has its own water quality standards and criteria (if you are interested you can check the ministry of trade they have special department called “metrology and standards department” and ask them for Jordanian’s standards and criteria for drinking water) you will see any kind of contaminant (physical, chemical or biological) and how much of each is allowed in water. These standards are adopted by WHO.

- Why do we need this?

In Jordan, the duty of ministry of water is to find sources of water, clean it and then monitoring it to see if it’s within the acceptable standards so we use it as a reference.

### What is the difference between criteria and standards?

Criterion is a scientific figure as a result of lengthy and costly testing and working in laboratories.

Many scientists do such process to establish a toxicology profile for the new materials or old ones that we do not know much about it .

Standard is a political figure depends on a lot of variables including economy as a result of a meeting of scientists and economist and other interested people.

\* Governments follow the standards and not criteria.

\*note that the standards could be changed by time (after testing it).

## 2) chemical pollutants :

Any chemical that can reach water and it is water soluble.

Now since we are talking about large number of chemicals, then we say elements and compound that are harmful to living things are called toxic chemicals

- Toxic chemicals are either organic or inorganic compounds
- Inorganic chemicals are elements or compounds that lack carbon and hydrogen
- Many organic chemicals are derived from organisms (living things)
- Heavy metals are poisonous (A heavy metal is a metallic element with a high mass number.)

Examples of heavy metals: lead, cadmium, chromium, etc.

Heavy metal compounds are often by-products of industrial processes such as metal treatment and paint and plastics production. Factories sometimes discharge these materials directly into surface water.

These heavy metals can be found in organic or inorganic compounds e.g. if we are talking about lead or mercury as pure lead or as pure mercury it is considered as inorganic compound but if it reacts with other materials which result in organic compounds it’s considered as organic like methyl-mercury.

- A better way of classifying from the health aspect chemicals are 3 groups :

- ❖ Toxic chemicals that can cause harm when they exceed certain limits.  
e.g heavy metals , nitrate , pesticides.  
The first one of this group of certain importance is LEAD, what are the sources of lead that come to water?
  - 1- Most common source is used to be leaded gasoline and that's why Jordan stopped using it few years ago though some countries have taken this decision more than 15 years ago  
Why do you think that gasoline contain lead?  
To regulate the burning of gasoline inside the engine.
  - 2- Liquid batteries: pieces of lead inside acidic solution and by recycling it pollute the environment.
  - 3- Old water chains the old pipes contain lead.
  - 4- Solidifying agent in water fountains
  - 5- Pesticides especially (rodenticides)
  - 6- Paint (base paint)  
\*\*\*we add to this something that is not related to water in the third world countries >> we are interested in lead exposure to children
    - ✓ Kohl (Arabic kohl that might contain lead) its applied on the eyes and on the umbilical cord in the new born also they use it to heal injuries and cuts (which is fault medicine).
    - ✓ Flour mills (2 large stones that are moving against each other with an arm and an opening for wheat) they use them to grand wheat and uses lead to fix the arm of it, after time of using there will be erosion of the stone and then leakage of lead inside the bread. There were 3 major events from this problem (Jerusalem, Nablus and Cairo) where people ate contaminated bread.
    - ✓ The use of lead as solidifying agent for cans (canned food) and part of this lead will go inside food and people will eat it.
- ❖ Chemicals that interfere with acceptability of water for drinking purposes.
- ❖ Useful or beneficial chemicals that can cause harm when they exceed certain limits.

Please accept my apology if you find any mistake

Good luck 😊