CH7: Physico-chemical analyses

1. Is your tap water drinkable ?

**DOCUMENT 1 : Collecting a sample**

www.wikimediacommons.org



**DOCUMENT 2: Examples of water analysis equipment**

www.wikimediacommons.org

1)  2) 

1) A conductimeter used to measure ion concentration

2) A gas chromatograph, mass spectrometer used to measure pesticides

**DOCUMENT 3: Water analyses**

www.wikimediacommons.org

- Color of water

- pH

- Taste and odor (geosmin, 2-Methylisoborneol (MIB), etc.)

- Dissolved metals and salts (sodium, chloride, potassium, calcium, manganese, magnesium)

- Microorganisms such as fecal coliform bacteria (Escherichia coli), Cryptosporidium, and Giardia lamblia

- Dissolved metals and metalloids (lead, mercury, arsenic, etc.)

- Dissolved organics: colored dissolved organic matter (CDOM), dissolved organic carbon (DOC)

**DOCUMENT 4: US Environmental Protection Agency water standards**

<http://extension.psu.edu/natural-resources/water/drinking-water/water-testing/testing/how-to-interpret-a-water-analysis-report>

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| --- | --- | --- | --- |
| **Contaminant** | **Acceptable Limit** | **Sources/Uses** | **Potential Health Effects at****High Concentrations** |
| Benzene | .005 ppm | gasoline additive; usually from accidental oil spills, industrial uses, or landfills | Immune system depression; acute exposure affects central nervous system causing dizziness, headaches; long term exposure increases cancer risks |
| Lead ion $Fe^{2+}$ | 0.3 mg.L-1 | used in batteries; lead gasolines; may be leached from brass faucets, lead pipes, and lead soldered joints | nervous disorders and mental impairment, especially in fetuses and infants; kidney damage; blood disorders and hypertension; low birth weights |
| Nitrate ion $NO\_{3}^{-}$ | 45 mg.L-1 | soil by-product of agricultural fertilization; human and animal waste leaching to groundwater | methemoglobinemaia (blue baby disease) in infants (birth to 6 months); low health threat to children and adults |
| Total Coliform | <1 colony /100 mL | bacterial or viral contamination from human sewage or animal manure | diarrhea, constant high level exposure can lead to cholera and hepatitis |

Common nuisance contaminants and their effects.

|  |  |  |
| --- | --- | --- |
| **Contaminant** | **Acceptable Limit** | **Sources/Uses** |
| Copper ion $Cu^{2+}$ | 1.3 mg.L-1 | blue-green stains on plumbing fixtures; bitter metallic taste |
| Manganese ion $Mn^{2+}$ | 0.05 mg.L-1 | black stains on fixtures and laundry; bitter taste |
| Chloride ion $Cl^{-}$ | 250 mg.L-1 | salty or brackish taste; corrosive; blackens and pitsstainless steel |
| Sulfate ion $SO\_{4} ^{2-}$ | 250 mg.L-1 | greasy feel, laxative effect |

**DOCUMENT 5 : Louisiana water analysis**



**DOCUMENT 6 : Fluvanna water analysis**



### Acquiring vocabulary: filling in the blanks

Using the documents, find the meaning of the following words :

|  |  |
| --- | --- |
| **English** | **French** |
| a water sample |  |
| an analysis, two analyses |  |
| a conductimeter |  |
| exposure (to a pollutant) |  |
| an oil spill |  |
| a landfill |  |
| sewage |  |
| leakage |  |
| groundwater |  |
| kitchen tap |  |

### Learning about water analyses : documents 1 to 3

According to **documents 1** to **3**, which common analyses are carried out on as sample?

Give examples of pieces of equipment that can be used?

### Analysing a laboratory report : documents 4 to 6

According to **documents 4** to **6**, is the Louisiana tap water drinkable?

Similarly, in your opinion is the Fluvanna tap water drinkable?

### Presenting

Present your results in a 1min presentation. You can choose to search for your local tap water analysis.

Activity summary

What you must remember :

* vocabulary associated with water analysis

Skills linked to the curriculum :

|  |  |
| --- | --- |
| **Compétences** | **Capacités à maitriser** |
| * APP
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| * Connaître le vocabulaire lié aux analyses d’une eau de ville
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| * APP
* ANA
* COM
 | * Citer des analyses physico-chimiques mises en œuvre dans le cadre d’études environnementales.
 |
| * APP
* ANA
* COM
 | * Savoir analyser, interpréter des résultats de dosage afin de déterminer la potabilité d’une eau de ville.
 |
| * COM
 | * Savoir présenter les résultats d’une analyse et des conclusions.
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