**03.2 Framework of the lesson plan**

**Age group/grade:** 15 – 16 m. / 1st gymnasium grade

**Lesson title:** Metals

**Key concepts:** atoms, ions, ionic compounds, metallic bond, colored flame reaction, salt dissociation.

**Objectives:**

* + - Describe metallic atom structure and metallic bonds.
    - List the physical properties of metals.
    - Detect metal ions by flame color.

**Skills developed:**

* Ability to describe the structure of a metal atom using the periodic table of elements.
* Ability to relate the physical properties of metals to the metallic bond.
* Ability to detect metal ions by flame color.
* Dissociation equation writing skills.

**Materials/Equipment needed:**

the periodic table of elements, the solubility table of acids, salts and bases in water, VR headsets, video projector, computer.

**Assumptions:** (Programs for students with special needs, other important information)

Do not write reaction equations, no need to perform calculation tasks.

**Lesson Plan**

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| **Stages** | **Description of activity** | **Time** |
| **Preparation before the lesson** | To prepare the VR experience safety rules.  To prepare presentation on the physical properties of metals, metallic bonds. |  |
| **Introduction** | Introduction of the topic and objectives, the safety rules for working with VR headsets. | 5 min. |
| **Initial Immersive Experience** | Students indicate the location of metals in the periodic table of elements, describe the structure of metal atoms, the composition of atoms. Students are listing the physical properties of metals and linking them with the metal bonds (teacher helps if neaded). | 10 min**.** |
| **Guided Immersive Experience** | Prior to the VR experience, the chemical bonds of the compounds are repeated, the term “dissociation” is reminded. Teacher explains how the metal ions are recognized by the color of the flame. | 10 min. |
| **Follow up** | Students are watching chemical experiments using VR headsets: <https://eloquent-ramanujan-887aa5.netlify.app/chemistry-2.html>  Then students are given the following tasks:  To detect the color of a given metal ion in salt solution;  To write the dissociation equations of given salts;  To compare structures of metal atoms and ions.  Answer the question: where color reactions of metal ions can be used?  Groups of students present their work done. | 15 min. |
| **Formative Assessment** | The work done is discussed within the groups, each group identifies their success and failures and the ones of all other groups.  Questions for self-evaluation:  1. During this lesson I understood the following key questions…  2. Working in the group with other students I learned … | 5 min. |