

Numbers and Measurements KEY

Vocabulary



These words are in the word cloud: vlastnost, nejednoznačný, násobit, velikost, podíl, měřit, odvodit, rovnice, převést, mocnina, proměnná, veličina, čistá látka, jmenovatel, hodnota, poměr, čísel

Task 3

1 values, 2 property, 3 compound, 4 unambiguous, 5 lay person, 6 pure,

In this section the language of measurement, which is central to chemistry, will be introduced. Chemists might measure a number of **variables** such as pressure, temperature, mass, and volume and use the experimental **values** to calculate some other **property**. The purity of a **compound** or the concentration of a compound in a commercial product are possible examples. The chemist needs to be able to record data and do calculations in a precise and **unambiguous** format. This requires a universally adopted language involving concepts, symbols and rules. While the average **lay person** knows little of these, knowledge of them is essential to the practising of chemistry. This section follows the recommendations of the International Union of **Pure** and Applied Chemistry (IUPAC), the international governing body for chemistry.

Task 4

- a property that is measured, e.g. mass
- a number with units
- the units in the numerator and denominator cancel
- by dividing the mass by the volume
- 1 mile = 1.609 km, we multiply the length in miles by 1.609

Task 5

1 amount of substance, 2 electric current, 3 frequency, 4 force, 5 pressure, 6 electric charge, 7 area, 8 mass, 9 volume, 10 length

Task 5

A amount of substance B pressure C mass fraction

Task 7

- a) 10 grams ✓ b) 15 kg c) 273 kelvins d) 20 m/s e) 50 nanoseconds

Task 8

1. What was the dosage (dávky, dávkování) of fluoride per kilogram of body weight?
a) **0.166** b) 0.16 c) 0.616
2. What was the sensitivity of the assay (analýza, rozbor)?
a) 0.02 b) 2.0 c) **0.2**
3. What is the output impedance (impedance - total resistance of a piece of electrical equipment) at the 5V end?
a) **0.02** b) 0.20 c) 0.92
4. What amperage (intenzita el.proudu) of flex (kabel) is used?
a) 0.6 b) **6** c) 6.8
5. What is the temperature below which the superconductor conducts (runs, passes, vést) electricity with no resistance (obstruction, odpor)?
a) $\frac{9}{10}$ b) **19** c) 90
6. What is the enthalpy (sum of internal energy, entalpie) change when 2 moles of water are formed at a pressure of one atmosphere and a temperature of 298 kelvin?
a) -517.6 b) -5716 c) **-571.6**
7. What is the lowest frequency at which young mice squeak when isolated from their mother?
a) 450 b) **45** c) 405
8. What speed laser pulses were used?
a) 15 b) **50** c) -50

Stoichiometry: Mass – volume problem <https://www.youtube.com/watch?v=UXRSHpIX-zo> 0 – 3.30

What do the following expressions mean in connection with calculations?

problem zadani *equation rovnice* *significant figures platne cislice* *round a number zaokrouhlit*

Problem: Calculate the volume of oxygen gas required to react with 50g of aluminium. You know that:

One mole of an ideal gas at standard temperature and pressure occupies 22.4 litres.

Relative atomic masses: $A_r(\text{Al}) = 27 \text{ g/mol}$, $A_r(\text{O}) = 16 \text{ g/mol}$, STP = standard temperature and pressure

Summary of the tutorial:

- 1 We start with an **equation** .. : $4 \text{ Al} + 3 \text{ O}_2 \rightarrow 2 \text{ Al}_2\text{O}_3$ (check that the equation is ... **balanced**...)
- 2 We know we have 50g of aluminium and we have to go from grams to ... **moles** of aluminium.
50 ... **divided** by 27 is 1.852 moles of aluminium.
- 3 Now we want to have moles of oxygen. Look at the equation - next to the moles of Al we have 4, next to the moles of O_2 we have 3. 1.852 times three divided by four equals **1.3889 moles** of O_2
- 4 We want to go from moles of O_2 to liters of O_2 . We multiply **1.3889** times ... **22.4**.....
- 5 Pay attention to sig figs. You started with three sig figs, you should end with **3 sig figs** , i.e. 31.1 L.
Do not round in the middle of the calculation but **at the end** .