

ANALYTICAL CHEMISTRY

Vocabulary

Give definitions of each word or phrase:

- excess
- insoluble in water compounds
- external
- internal
- oxalic acid
- acetic acid
- chloride acid
- tartaric acid
- crimson
- quantitative determination
- light beam angle
- exact concentration
- appearance of a characteristic smell
- potable water
- iodine excess
- at a ratio of
- estimation
- solid residue
- to release
- precipitation
- buffer properties
- saturated solution

- medium
- retention
- thin-layer chromatography
- titration curve
- refraction index
- calomel electrode
- surplus

Task 1. Fill in the missing letters.

1. E_ter_al
2. Cr_ms_n
3. R_t_ntion
4. Pr_c_p_tat_on
5. C_n_entr_ti_n
6. S_t_r_ted
7. Q_ant_tat_ve

Task 2. Unscramble the following words.

1. n-e-s-t-i-a-t-i-o-m _____
2. e-x-s-c-s-e _____
3. m-c-a-l-o-e-l _____
4. p-a-p-e-a-r-n-e-a-c _____
5. c-a-e-c-i-t _____
6. e-l-e-a-e-r-s _____
7. b-o-t-a-l-e-p _____

Task 3. Match the words from column A with ones from column B to make a word combination and write sentences with each combination.

Column A	Column B
1 exact	a) solution
2 potable	b) chromatography
3 saturated	c) curve
4 thin-layer	d) water
5 titration	e) concentration
6 tartaric	f) properties
7 buffer	g) acid

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Task 4. Fill in the gaps using the words from the box.

<i>internal surplus</i>	<i>properties determination</i>	<i>acid precipitation</i>	<i>at a ratio of</i>
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1. What indicator is used for the quantitative _____ of sodium carbonate in a preparation by the method of acid-base titration?

2. Iodometric determination of formaldehyde in formaline can be done by the back titration. Iodine _____ is titrated with the standard solution of sodium thiosulphate.

3. Titrant of chelatometry method is trilon B solution that forms complex compounds with metal cations irrespective of their valence _____ 1:1.

4. Solution of potassium chromate was added to a solution under examination. As a result of it some yellow deposition settled down. This deposition cannot be dissolved in acetic _____. This means that the solution under examination contains cations of barium.

5. To maintain a certain level of pH-medium, the buffer solutions are used. Specify a composition of substances that DOES NOT EXHIBIT buffer_____

6. Both external and _____ indicators are used in the following titrimetric method of analysis.

7. Dimethyl glyoxime entered into reaction with a solution that contained cations of the IV analytical group (acid-base classification). The _____ turned crimson. What cation caused this analytical effect?

Task 5. Read the text.

ANALYTICAL CHEMISTRY

Like all fields of chemistry, analytical chemistry is too broad and too active discipline for us to define completely.

“Analytical chemistry is what analytical chemists do”. This quote is attributed to C. N. Reilly (1925-1981) on receipt of the 1965 Fisher Award in Analytical Chemistry. Reilly, who was a professor of chemistry at the University of North Carolina at Chapel Hill, was one of the most influential analytical chemists of the last half of the twentieth century.

Analytical chemistry studies and uses instruments and methods used to separate, identify, and quantify matter. In practice separation, identification or quantification may constitute the entire analysis or be combined with another method. Separation isolates analytes. Qualitative analysis identifies analytes, while quantitative analysis determines the numerical amount or concentration.

Analytical chemistry consists of classical, wet chemical methods and modern, instrumental methods. Classical qualitative methods use separations such as precipitation, extraction, and distillation. Identification may be based on differences in color, odor, melting point, boiling point, radioactivity or reactivity. Classical quantitative analysis uses mass or volume changes to quantify amount. Instrumental methods may be used to separate samples using chromatography, electrophoresis or field flow fractionation. Then qualitative and quantitative analysis can be performed, often with the

same instrument and may use light interaction, heat interaction, electric fields or magnetic fields. Often the same instrument can separate, identify and quantify an analyte.

Analytical chemistry is also focused on enhancement in experimental design, chemometrics, and the creation of new measurement tools. It can be applied to forensics, medicine, science and engineering.

The craft of analytical chemistry is not in performing a routine analysis on a routine sample, which more appropriately is called chemical analysis, but in improving established analytical methods, in extending existing analytical methods to new types of samples, and in developing new analytical methods for measuring chemical phenomena.

Task 6. Answer the questions.

1. What does analytical chemistry study and use?
2. What does qualitative analysis identify?
3. What does quantitative analysis determine?
4. What separations do classical qualitative methods use?
5. What methods does analytical chemistry consist of?
6. What is analytical chemistry focused on?
7. How can analytical chemistry be applied?

Task 7. Match the words from column A with synonyms from column B.

Column A	Column B
1 to separate	a) to evaluate
2 to quantify	b) size
3 colour	c) weight
4 odor	d) to set apart
5 mass	e) improvements
6 volume	f) smell
7 enhancement	g) tint
8 creation	h) development
9 amount	i) variations
10 changes	j) number

Task 8. Choose the phrase which best completes each sentence.

1. The methods of _____ are used in analytical chemistry.

- a) collecting, identifying and quantifying matter
- b) setting apart, recognizing and quantifying matter
- c) separating, selecting and quantifying matter

2. Identification may be based on differences in _____

- a) tint, smell, boiling point.
- b) melting point, molecular weight, color.
- c) color, odor, mass.

3. Classical quantitative analysis uses _____

- a) mass and temperature changes.
- b) color and volume changes.
- c) weight or volume changes.

4. Analytical chemistry is also focused on _____

- a) enhancements in experimental design.
- b) chemometrics.
- c) the development of new measurement tool.

Task 9. Put the words in the correct order to make up a sentence.

1. Analytical / matter / used to / and / uses / and / methods / instruments / studies / separate / identify / and / quantify / chemistry.

2. isolates / analytes / Separation.

3. chemistry / classical / chemical / methods / and / instrumental / methods / Analytical / consists of / wet / modern

4. quantitative / uses / or / volume / to quantify / amount / analysis / mass / changes / Classical.

5. is / focused / on / experimental / chemometrics / and / the
creation / of / new / measurement tools / Analytical / chemistry / also /
improvements / in / design

Task 10. Make a dialogue about the importance of analytical chemistry. Comment on the following.

“Chemistry is necessarily an experimental science: its conclusions are drawn from data, and its principles supported by evidence from facts” – Michael Faraday.

ORGANIC CHEMISTRY

Vocabulary

Give definitions of each word or phrase:

- bond
- balance
- absorption
- citric acid
- alkali
- boiling point
- catenation
- to conduct
- to charge
- current
- derived unit
- density
- diffusion
- ductile
- detection
- to distinguish
- electrical conductivity
- ether
- to involve
- liquid
- mass
- matter
- to observe
- protecting group

- reduction
- qualitative analysis
- Grignard reagent
- solid
- solubility
- treatment
- transparent

Task 1. Fill in the missing letters.

1. Tr_nsp_r_nt
2. Tr_a_m_nt
3. I_v_l_e
4. L_q_ _d
5. O_s_r_e
6. M_t_ _r
7. S_ _id

Task 2. Unscramble the following words.

1. a -b -c-l-a -n-e _____
2. n-o-p-i-t _____
3. e-r-c-u-r-t-n _____
4. g-c-a-r-e-h _____
5. c-d-t-e-t-i-n-e-o _____
6. t-y-s-u-o-b-i-l-i-l _____
7. o-n-f-d-i-f-u-s-i _____

Task 3. Match the words from column A with one from column B to make a word combination and write sentences with each combination.

Column A	Column B
1 boiling	a) conductivity
2 electrical	b) group
3 protecting	c) unit
4 citric	d) analysis
5 derived	e) experiment
6 to conduct	f) acid
7 qualitative	g) point

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Task 4. Fill in the gaps using the words from the box.

liquid density mass conducts reduction reagents
boiling point

1. Copper _____ electricity well.
2. Alcohol in the human body's metabolic process is oxidation-_____ reaction.
3. The _____ of water is 212 ° Fahrenheit or 100 ° Celsius.
4. Scientists measured the object, checking its _____ to see how solid it is.
5. It goes from being a solid to a _____.
6. Research found a link between high body _____ index and poor memory.
7. In preparing the Grignard _____ the commencement of the reaction is accelerated by a trace of iodine.

Task 5. Read the text.

ORGANIC CHEMISTRY

Organic chemistry is the study of the structures, properties, behaviors, and reactions of compounds containing carbon-hydrogen bonds.

Carbon is now known to form a seemingly unlimited number of compounds. The uses of organic compounds impact on our lives daily in medicine, agriculture, and general life.

Organic chemistry started as the chemistry of life, when that was thought to be different from the chemistry in the laboratory. Then it became the chemistry of carbon compounds, especially those found in coal. Now it is both. It is the chemistry of the compounds of carbon along with other elements which are found in living things and elsewhere.

Organic chemistry developed into a productive and exciting science in the nineteenth century. Many new synthetic methods, reaction mechanisms, analytical techniques and structural theories have been developed.

The huge number and variety of different organic compounds – with different physical and chemical properties – is due to the different ways in which elements can link to each other, not due to the involvement of many different elements.

Organic chemists use models to describe molecules because atoms are tiny creatures with some very unusual behaviors, and models are a convenient way to describe on paper how the atoms in a molecule are bonded to each other.

The organic compounds available to us today are those present in living things and those formed over millions of years from dead things. In earlier times, the organic compounds known from nature were those in the ‘essential oils’ that could be distilled from plants and the alkaloids that could be extracted from crushed plants with acid.

Task 6. Answer the questions:

1. What does organic chemistry study?
2. How did organic chemistry start?
3. What is organic chemistry now?
4. Where could organic compounds be found?
5. When did organic chemistry develop into a productive and exciting science?
6. What do organic chemists use to describe molecules?

Task 7. Which of the following statements are true and which are false?

1. The uses of organic compounds don't impact on our lives daily.
2. Organic chemists use models to describe molecules.
3. The organic compounds available to us today are those that present only in living things.

Task 8. Match the words from column A with one from column B to make a word combination.

Column A	Column B
1 organic	a) molecule
2 chemical	b) occurred
3 reactions	c) properties
4 nitrogen	d) compounds
5 essential	e) atoms
6 bonded	f) oils

Task 9. Choose the phrase, which completes each sentence:

1. The uses of organic compounds impact on _____
 - a) our lives daily in medicine, agriculture, and general life.
 - b) quality of education.
 - c) quality of skills.
2. Organic chemists use _____
 - a) graphics to describe molecules.
 - b) models to describe molecules.
 - c) language to describe molecules.
3. The organic compounds available to us today are those _____
 - a) present at laboratories.
 - b) present in daily life.
 - c) present in living things and elsewhere.

Task 10. Imagine a situation that you are taking an interview for a TV program. Why do people need organic chemistry? What is its role in our society? Comment on the following:

“Organic chemistry is the study of organs; inorganic chemistry is the study of the insides of organs”, – Max Shulman.