



## Maturitní témata

Školní rok:	2024/2025		
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Předmětová komise:	Biologie Chemie		
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Předmět:	Chemistry		
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Počet výtisků:	4	Výtisk č.:	

### 1. Periodic system of elements

- *periodic law*
- *trends across the periodic system of elements*
- *uniqueness of noble gases within the periodic system of elements*
- *s, p, d, f blocks - characterisation*
- *principle of a chemical bond, types of bonds*

### 2. Atomic structure

- *models of atomic structure*
- *quantum numbers, electron configuration*
- *electronic structural formulae*
- *VSEPR theory – interaction of lone electron pairs*

### 3. Sources of energy

- *enthalpy change*
- *thermochemical equations - physical states of matter*
- *combustion vs. nuclear energy*
- *fossil fuels - combustion of alkanes*
- *cellular respiration vs. photosynthesis*

### 4. Catalysts

- *chemical kinetics - main assumptions of the collision theory*
- *a catalyst - an important factor affecting the reaction rate*
- *catalysts used in inorganic and organic syntheses and processes*
- *biological catalysts - enzyme kinetics*

## 5. Equilibrium

- *dynamic equilibrium*
- *Guldberg- Waag expression*
- *factors affecting equilibrium*
- *pH – ionic product of water and its derivation, calculations, uses*

## 6. Analytical chemistry

- *qualitative analysis - detection reactions of inorganic anions and cations, detection reactions in organic chemistry*
- *quantitative analysis - neutralisation and redox titrations*
- *acid - base theory*
- *strong and weak electrolytes*

## 7. Atmosphere

- *components of the air, separating the mixtures*
- *chemical properties of oxygen, nitrogen and noble gases*
- *environmental problems - pollution of the air and its consequences*
- *importance of the process of photosynthesis*

## 8. Water

- *unique properties of water*
- *hydrogen bridges*
- *water hardness*
- *processes leading to potable water, eutrophication of water*
- *hydrolysis*

## 9. Oxygen

- *oxygen – occurrence, manufacture, properties, uses*
- *oxides and peroxides, oxidation numbers*
- *ethers – important characteristics, preparation, properties, uses*
- *comparison of H<sub>2</sub>O, R-OH and R-O-R*

## 10. Hydrogen

- *hydrogen – occurrence, manufacture, properties, uses, isotopes*
- *hydrogenation – important chemical process, hardening of fats*
- *unsaturated hydrocarbons*

## 11. Important non-metals

- *characteristic properties of non-metals*
- *sulphur – occurrence, properties*
- *production of sulphuric (VI) acid*
- *glass manufacture - importance of silicon*

## 12. Properties of metals

- *characteristic properties of metals*
- *chemical behaviour of metals - reactivity series*
- *p- block metals*
- *s- block metals - compounds of I.A and II.A metals*
- *ionic bond*

## 13. Transition metals

- *characterisation of the d- block elements - electron configurations and their exceptions*
- *complex compounds and dative bond*
- *iron - properties, manufacture, uses*
- *the role of iron in the transport of oxygen - haem group - characterisation of heterocyclic compounds*
- *transition metals as enzyme inhibitors - types of inhibition*

## 14. Sources of organic compounds

- *fossil fuels - their importance, uses and risks*
- *fractional distillation of crude oil*
- *classification of hydrocarbons*
- *saturated hydrocarbons*

## 15. Isomerism

- *allotropic modifications*
- *shapes of molecules*
- *structural isomerism and stereoisomerism*
- *properties of alkanes, alkenes, amino acids and saccharides with respect to their typical isomerism*

## 16. Compounds of halogens

- *elements of the VII. A group - trends, physical and chemical properties, compounds, uses*
- *organic halogen compounds*
- *polarity of a covalent bond*
- *environmental problems – freons*

## 17. Compounds of nitrogen

- *chemistry of nitrogen - physical and chemical properties, compounds, uses*
- *properties of nitrogen compared to properties of phosphorus*
- *organic nitrogen compounds - amines, nitro compounds, nitration*

## 18. Hydroxycompounds

- *physical and chemical properties of hydroxycompounds*
- *differences between alcohols and phenols*
- *fermentation*
- *separating mixtures*
- *terpenes*

## 19. Carbonyl compounds

- *physical and chemical properties of carbonyl compounds*
- *differences between aldehydes and ketones*
- *typical chemical reactions*
- *monosaccharides - polyhydroxyaldehydes, polyhydroxyketones*
- *redox properties – reduction, oxidation*

## 20. Proteins

- *amino acids - the building blocks of proteins*
- *characterisation of substitutional derivatives of carboxylic acids*
- *nitrogen – an important bioelement*
- *different functions of proteins*
- *denaturing*

## 21. Lipids

- *different functions of lipids*
- *oils and fats - esters of glycerol and fatty acids*
- *characterisation of functional derivatives of carboxylic acids*
- *biological importance of steroids*

## 22. Genetic information

- *nucleic acids - DNA, RNA*
- *phosphorus – an important bioelement*
- *protein synthesis*
- *genetic engineering*

## 23. Metabolism

- *thermochemical laws*
- *anabolic vs. catabolic processes*
- *controlling the metabolic processes - enzymes, hormones*
- *vitamins*

## 24. Macromolecular compounds

- *naturally occurring macromolecular compounds*
- *polysaccharides, proteins, nucleic acids - their functions and importance*
- *synthetic macromolecular compounds - addition polymers and condensation polymers*

## 25. Structure and properties

- *aromatic hydrocarbons – properties of the aromatic ring – delocalisation*
- *reaction mechanisms*
- *functional groups*
- *biological importance of intermolecular forces - structural levels of proteins, DNA - double helix*
- *allotropic modifications of sulphur, phosphorus and carbon*