Gymnázium
Olomouc – Hejčín

Maturitní témata

Školní rok:			**2025/2026**	
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Předmětová komise:			Biologie Chemie	
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Předmět:			**Chemistry**	
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Schváleno předmětovou komisí dne:			**26.8.2025**	Podpis:
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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_2O, 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*