Test sprawdzający efekty kształcenia zawiera 50 losowo wybranych pytań testowych i jest testem jednokrotnego wyboru. Maksymalny czas odpowiedzi na pytania zawarte w teście wynosi 60 minut. Wszystkie pytania testowe mają jednakową wagę. Zestaw wszystkich pytań, z których losowane są pytania testowe, podaje się do wiadomości kandydatów najpóźniej miesiąc przed rozpoczęciem rekrutacji.

+ Issues competence test for candidates for second degree, Chemical Technology, specialties:
Innovative Chemical Technologies (ICT)
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1. Which of the following statements is true? (functions)
2. A numeric string is a strongly decreasing sequence if:
3. A numeric string with the general term \( a_n = \left(\frac{-1}{2}\right)^n \):
4. The number \(-2 - 3i\):
5. The equation \( x^2 + 1 = 0 \):
6. If the function \( f \) is differentiable at \( x_0 \) in that function’s domain, then:
7. Which of the following functions is not differentiable in its entire domain?
8. If the derivative \( f' \) of function \( f \) is negative within interval \( P \), then:
9. If the derivative of function \( f \) is zero at \( x_0 \) in that function’s domain, then function \( f \):
10. What is the derivative of function \( f(x) = \arctg x \)?
11. The definite integral \( \int_0^\pi \sin x \) is equal to:
12. The function \( f(x) = e^x \) is:
13. What is the particular solution of differential equation \( y' - y = \frac{e^x}{x} \)?
14. What kind of differential equation is \( y' + xy = \sin x \)?
15. What is volume of a solid drawn by rotation of curve \( y = \sqrt{1 - x^2} \) around axis \( Ox \) at \( x \in [-1,1] \)?
16. What are the partial fractions present in the decomposition of rational function \( \frac{3x^2 + 2}{x^3 + x} \)?
17. A system of linear homogeneous equations:
18. The matrix determinant \( A^{-1} \) is:
19. What is the product of two vectors perpendicular to each other?
20. Vector product \([2, -1, 1] \times [3, 0, -1]\) is equal to:
21. \( A \) is a singular square matrix of dimension \( n \times n \), \( (n > 1) \). Hence, matrix rank \( A \) is:
22. If the main matrix of a system of linear equations is nonsingular, the system:
23. Which of the following is not an indeterminate symbol?
24. Which of the following statements is true?
25. A numerical string is convergent when:
26. If the second derivative of function \( f \) is negative within interval \( P \), function \( f \) is:
27. If function \( f \) is both integrable and odd, the Riemann integral of function \( f \) within an interval symmetrical to zero is:
28. If the square matrix of dimension \( n \times n \) has a rank equal to \( n \), then this matrix:
29. A system of 6 linear homogeneous equations with 8 unknowns has:
30. Two vectors are parallel if:
31. The distance of point \((1,1,1)\) from plane \( x+y+z-3=0 \):
32. What does equation \( x^2+(y-1)^2+z^2=1 \) represent?
33. The determinant of a matrix transposed to $A$ is a number:

34. Which of the fundamental interactions is called the strong interaction:

35. A body with a mass $m = 2 \text{ kg}$ is accelerated from its stationary position over a time $t = 5 \text{ s}$ with a constant force $F = 8 \text{ N}$. What is the final velocity of this body?

36. A compact disc with a diameter $d = 12 \text{ cm}$ spins at approximately $f = 10 \text{ rpm}$. What is the mean linear velocity of a point at the circumference of the compact disc?

37. A ball is tossed straight up (ignore the resistance to motion). What happens at the highest point of its ascent?

38. A ball with a mass $m$ and a radius $r$ travels with a velocity $v = 2 \text{ m/s}$ and impacts with an elastic effect an identical ball which is stationary. What is the effect which directly follows the impact?

39. An ice skater spins around on the tip of its skate in a pirouette, with her hands raised straight up, and with angular velocity $\omega$. How will the velocity change when the ice skater lowers her hands and spreads them outward and horizontally?

40. Two point charges of the same sign generate and electrostatic field. In how many points of space the field intensity is zero?

41. A very large and flat plate is uniformly charged with electricity and attracts fine-grained electrically charged dust. When the dust particles approach the flat plate at a distance $d_1 = 2 \text{ mm}$, the force of attraction is $F = 2 \mu \text{N}$. What will be the force of attraction when the dust particles approach the flat plate at a distance $d_2 = 1 \text{ mm}$?

42. A circular circuit live with current $I$ generates a magnetic field the sense of which:

43. Which of the following cases features a particle loaded with a non-zero Lorentz force?

44. What is the EMF (electromotive force) unit of electromagnetic induction?

45. The wavelength of blue light in atmospheric air is:

46. What is the radiation reflecting power of a black body?

47. What are the electron subshells of an atom defined with?

48. The spin projection in a specific direction may have a maximum of:

49. $1s^22s^22p^2$ is the electron configuration of the fundamental state of a certain element. What is the element?

50. What is the periodic assignment of the atom with the electron configuration of $1s^22s^22p^63s^2p^6d^{10}4s^2p^6d^{10}4s^2p^6d^{10}6s^2p^2$?

51. What is a mass defect?

52. What is the elementary particle unstable in a free state?

53. What does the Heisenberg uncertainty principle apply to?

54. What is artificial radioactivity related to?

55. What is the designation of the nuclear radiation comprising helium nuclei?

56. A photoelectric effect occurs when:

57. The bond in homonuclear molecules is always:

58. What is hybridization:

59. When is a hydrogen bond formed?

60. What is the bond in oxygen acid anions?
61. What is the electronegativity of an element?
62. When do high-spin complexes form?
63. The definition of mole implies one of the following:
64. What is the SI unit of atomic mass?
65. What does molar concentration of a liquid solution depend on?
66. As the water vapour concentration in air increases, the density of air:
67. The density of a certain gas under specific conditions is 1.34 kg/m³. What would be the density of another gas under the same conditions and with half of the molar mass?
68. The simple ligand number in a complex monocentric compound can be determined by:
69. Haemoglobin features groups which bond oxygen with what atom?
70. How do chelating ligands bond with the central atom?
71. What do alkaline earth metals form with oxygen?
72. Atoms mainly consist of the following:
73. The electronegativity of the periodic system increases:
74. The 1st periodic group contains:
75. The primary sources of sulphur in Poland include:
76. The elements darmstadtium (110Ds), roentgenium (111Rg) and copernicium (112Cn):
77. What is a characteristic feature of group 1 kations?
78. What are the amorphous forms of carbon?
79. Orthophosphoric acid is the common name of what acid?
80. Icosahedron is a three-dimensional structure specific to the crystalline forms of:
81. In systematic qualitative analysis of cations, the following cation is precipitated with thioacetamide only and only at pH of 4. The resulting precipitate is easily solved in an NaOH solution with H₂O₂. What is the cation?
82. Which method is applied in commercial production of nitric acid?
83. What is electrolysis?
84. The dissociation fraction of a weak electrolyte:
85. Hydrolysis in water solutions of electrolytes applies to:
86. The constant ionic product of water refers to:
87. What is the solubility product of a non-readily soluble electrolyte AB?
88. How is the reaction of a water solution of an electrolyte determined?
89. The buffer capacity of a solution:
90. A water solution of a soluble salt with Fe³⁺ ions is spiked with NH₃SCN, NaF, KOH in succession.
91. What is the effect of adding a strong alkali to a water solution of a weaker alkali?
92. Which of the following reactions is protolysis according to the Brønsted theory?
93. The rate constant of a reaction depends on:
94. The potential of a hydrogen half-cell:
95. A catalyst:
96. In adiabatic conditions, temperature is found to increase for which reaction?
97. The activity coefficient of ions in a solution:
98. What is not present in a reaction mixture during chlorination of methane?
99. What is the result of reaction of aniline with an acetic anhydride?
100. Carboxylic acids can be produced by hydrolysis of:
101. Acetylene belongs to which group of chemicals?
102. Benzyl chloride is formed by reaction of benzyl alcohol with:
103. Acetal are products of which reaction?
104. The synthesis of 2-propyl chloride by reaction of propene and HCl is:
105. The products of nitration (HNO₃/H₂SO₄) of acetanilide are virtually devoid of:
106. The NO₂⁺ group is what factor?
107. The reactivity of (a) nitrobenzene, (b) chlorobenzene, and (c) toluene by nitration (HNO₃/H₂SO₄) is reduced in the following
108. Lactones are what cyclic compounds?
109. A benzenediazonium salt is the result of diazotization of:
110. What is formed while heating diethyl ether in concentrated hydroiodic acid?
111. What is the product of the Williamson reaction?
112. What may form geometrical isomers (cis/trans; Z/E)?
113. Methyl orange is what group of dyes?
114. What is the effect of reducing nitrobenzene with tin in concentrated hydrochloric acid?
115. What is the effect of oxidizing benzaldehyde with KMnO₄ / HCl?
116. What does not undergo aldol condensation?
117. What is formed in a reaction of organic magnesium compounds with aldehydes?
118. If a reaction of ozonolysis (following the breakdown of ozonide) gives 2 moles of propanediol [CH₂(CHO)₂] from 1 mole of alkene, what is the alkene?
119. Steam distillation cannot be applied to purify:
120. Which one of the following has optical activity?
121. A crystallization solvent should:
122. Fats are a group of compounds which belong to:
123. Which halides undergo SN2 nucleophilic substitution reactions most easily?
124. The carbon atoms in acetaldehyde are present in which hybridization?
125. What is the limit of determination of an analytical method?
126. What is sensitivity of an analytical method?
127. When are analytical methods with a high precision of determination applied?
128. What is a representative sample?
129. What is the purpose of preservation of samples prior to an analysis?
130. What material should the containers made from as used to sample water for determination of PAH levels?
131. What material should the containers made from as used to sample water for determination of heavy metal levels?
132. What is lyophilization for laboratory analysis?
133. What is lichen indication?
134. What is the common method for determination of deionised (or redistilled) water purity used in laboratory applications?
135. What is a reference material (usually certified) in laboratory analysis?
136. In a quantitative analytical test method for the addition of a standard:
137. The principle of operation of a photomultiplier tube is:
138. Flame atomic emission spectroscopy can be applied to determine:
139. Which is true for concentrated solutions of electrolytes?
140. What is the observation from conductometric titration of a hydrochloric acid with potassium hydroxide?
141. What is the measure of sensitivity in ion selective electrodes?
142. A glass electrode is calibrated with a calibration curve plotted which produces 2 equivalence points, Eq point A: SEM = 158 mV, log \( a_A = -3 \); Eq point B: SEM = 130 mV, log \( a_B = -4 \). What is the slope of the calibration curve?
143. What is called the ‘reduced retention time’ in chromatography?
144. In gas chromatography, the elution band width of the determined component is reduced:
145. Which of the following detectors is best for the determination of chloroorganic pesticides?
146. Which of the following equations describes the first law of thermodynamics (with: \( Q \) — system input heat; \( U \) — system internal energy; \( S \) — entropy; \( H \) — enthalpy; \( p \) — pressure; \( V \) — volume; \( T \) — temperature)?
147. As pressure increases, the melting point of ice:
148. The differential coefficient of internal energy of a system relative to temperature and at a constant volume is equal to:
149. The partial molar volume of a component in a solution:
150. The standard Gibbs free energy of spontaneous chemical reactions:
151. In polytropic processes:
152. Enthalpy (\( H \)) is defined with the following equation (with: \( U \) — internal energy; \( S \) — entropy; \( G \) — Gibbs free energy; \( p \) — pressure; \( V \) — volume; \( T \) — temperature):
153. The enthalpy (\( \Delta H \)) of the reaction \( 2\text{CH}_4 + \text{O}_2 \rightleftharpoons 2\text{CO} + 4\text{H}_2 \) can be calculated from the molar heat value of the reagents, \( \text{CH}_4 + 2\text{O}_2 \rightleftharpoons \text{CO}_2 + 2\text{H}_2\text{O} \mid \Delta_{sp}H(\text{CH}_4) \); \( \text{H}_2 + \frac{1}{2} \text{O}_2 \rightleftharpoons \text{H}_2\text{O} \mid \Delta_{sp}H(\text{H}_2) \); and \( \text{CO} + \frac{1}{2} \text{O}_2 \rightleftharpoons \text{CO}_2 \mid \Delta_{sp}H(\text{CO}) \), as follows:
154. When pressure is reduced, the conversion of substrates to the products of the following reaction, \( \text{S}(c) + \text{H}_2(g) \rightleftharpoons \text{H}_2\text{S}(g) \):
155. Which of the following statements is false about eutectic materials?
156. Which of the following physicochemical parameters can have negative values?
157. During a single distillation of a two-component system which forms a negative azeotrope, the composition in the vat shifts towards:
158. The BET theory equation includes the following application:
159. Which of the following materials coats the anode of a fully-charged lead-acid battery?
160. The rate of primary elementary reactions:
161. Which of the following reactions occurs on the anode of an alkaline cell during its current output?
162. The electromotive force is:
163. Catalysts affect chemical reactions as follows:
164. What is the principle of pH testing with a universal glass electrode?
165. What is the order of decrease of the standard potential of metallic electrodes immersed in a solution of the salts of their metals?
166. The conductivity of an electrolyte layer is:
167. The secondary reaction rate constants are usually expressed in the following units:
168. Physical adsorption is always:
169. What happens to the reaction rate constant in two-molecule reactions with the energy of reaction activation approaching zero?
170. What are the distinguishable features of isotopic peaks (elution bands)?
171. What is characteristic of primary alcohols?
172. CNMR allows detecting chemical shifts in:
173. The CNMR spectrum of acetone reveals:
174. The HNMR spectrum of acetone reveals:
175. The HNMR spectrum of benzene reveals:
176. The crystal in an ATR accessory is be made from:
177. The axis of the abscissae in the spectral images produced by infrared spectroscopy features:
178. A chromophore in UV-Vis spectroscopy is:
179. The hypochromic effect in UV-Vis spectroscopy is:
180. An auxochrome in UV-Vis spectroscopy is:
181. An ion gun in XPS (X-ray photoelectron spectroscopy) is used for:
182. What is a crystallite?
183. What is used in the Debey-Scherrer-Hull (DSH) method?
184. What signals are used in SEM for imaging the morphology of surface of materials?
185. A projection made by determining the orthogonal projections of the object on mutually perpendicular projection planes, given that the projected object is between the observer and a projection plane, is the definition of:
186. In third angle projection:
187. For a scale 1:1 axonometric isometric projection:
188. What is a technical documentation or specification?
189. What is the length of a drawing sheet format designated A4x4?
190. What is the name of a drawing used for preliminary recording of technical information and often non-compliant with standard technical drawing criteria?
191. A heavy solid line in a technical drawing can represent:
192. If a heavy solid line is 2.0 mm thick in a drawing, what shall be the thickness of the thin line?
193. The normal character height of inscriptions in technical drawings:
194. A dimension line:
195. When are revolved sections drawn in thin lines?
196. What is the only permitted style of filling cross-sections?
197. What is the eutectic of an iron/cementite system with 4.30% of carbon?
198. What is the specific structure of CrNiMg steel alloys resistant to electrochemical corrosion?
199. Brass is a group of alloys which comprise:
200. What is the order of oxides in a stratified scale produced over Fe during oxidation (at 1000°C in oxygen) from the metallic core outwards?
201. Transition metals and alloys thereof which are easily passivated can be effectively protected against electrochemical corrosion if:
202. The chemical compounds of what elements give a green colour to glass?
203. An ecosystem comprises the following:
204. At which stage does the greatest influence on the reduction of generated industrial solid waste volumes occur?
205. What is smog, or inversion fog?
206. What are the man-made sources of phosphorus compounds in the aquatic environment?
207. What is ozone layer depletion?
208. What is the most commonplace method of protecting the hydrosphere from household waste which feature compounds of C, N and P?
209. What products are formed during the mercury electrolysis of an NaCl solution?
210. Which process would you choose for a technology produced on a large scale?
211. As the volume of a reactor increases, the heat exchange with the ambient environment:
212. When are heat regenerators applied?
213. What should be used when drying perishables in a rotary dryer?
214. In the Solvay soda process:
215. Application of the principle of by-product use:
216. What is a Sankey diagram?
217. Flue gas treatment by desulfurization can be applied to produce:
218. In the Dorr method of production of phosphoric acid, the application of a cascade of reactors:
219. The driving force of a counter-current heat exchange process is:
220. Which of the following statements are true:
221. Salting out of soaps is intended to:
222. If the value of constant \( K_{\text{phi}} = 1 \), then \( K_{p} \) is:
223. What is the maximum number of linearly independent reactions for 7 reagents, while the matrix rank is 3 with the matrix determinant is other than zero?
224. What is the value of heat exchanged between a system and its ambient environment in an adiabatic process?
225. The molar concentration of an ideal gas is calculated as follows:
226. The process of ethylbenzene production by alkylation of benzene with ethene is performed by applying:
227. Which of the following basic processes is not a unit process?
228. The calculation of a composition in equilibrium with non-stoichiometric methods:
229. The effect of pressure on the value of enthalpy can be ignored for:
230. At given values of pressure and temperature:
231. What catalyst is used to produce ethanal by ethylene oxidation?
232. The molar entropy of a pure substance at \( T > 0 \) K:
233. Which is one of the basic materials used to produce regular superphosphate?
234. What is the predominant (main) mineral component of chalk?
235. Aqueous solutions of zinc chloride and calcium can be used for:
236. The Haber-Bosch apparatus generates ammonia by application of:
237. What is the formula of the product made with the Solvay process?
238. The curing of lime mortar at ambient temperature involves a reaction of:
239. What is a waste rock, or gangue?
240. In the contact process of sulfuric acid production, the absorption of \( SO_3 \) can be achieved with:
241. The input materials used in the production of clinker are:
242. What is the final product of the Bayer process?
243. What is the main product of a blast furnace process?
244. What are the primary input materials in glassmaking?
245. What is the main by-product from production of extraction phosphoric acid?
246. Which reaction is nitric acid produced by?
247. How is white phosphorus made?
248. The float method is a production process of:
249. What is not a carbonate input material?
250. What is the direct reducing agent for iron oxides in a blast-furnace process?
251. Propylene oxide is not produced as follows in the chemical industry:
252. What is the modern production method of ethylene oxide in the chemical industry?
253. How is acrylic acid currently produced?
254. What is the oxidation catalyst in methanol dehydrogenation?
255. What is the false statement about the catalytic cracking process?
256. What is the false statement about the action of water vapour in ethylbenzene dehydrogenation?
257. What is the false statement about olefin hydration?
258. To produce alkyl chloride, the process of propylene chlorination shall be carried out:
259. Currently, propylene is not produced:
260. What is gas stripping of natural gas?
261. What is the false statement about steam cracking of methane?
262. What is the false statement about propylene ammoxidation?
263. What is produced in the Ficher-Trupsch process?
264. In which chemical industrial process is phthalic anhydride produced?
265. What is the false statement about isobutane dehydrogenation?
266. What is the principle of the stilbene (Monsanto) process for production of styrene?
270. What is the difference between plastics and polymers?
271. The technical method of polymerization:
272. When exposed to temperature, thermoplastic polymers:
273. What is the main component of rubber latex?
274. A chain polymerization process is most often triggered with the substances characterized as:
275. What is the product of polycondensation?
276. The brittleness of polystyrene can be reduced by:
277. What is the method of commercial production of PVC?
278. Poly(ethylene terephthalate) (PETP):
279. An Au–Ag–Cu alloy is red if:
280. What is the matrix of any superalloy?
281. In WC-Co carbide materials, the predominance of triple carbides results in an increase of:
282. Choose the code of the alloy used for long-term implants:
283. What is the reaction in a fuel cell with a solid oxide electrolyte at the cathode?
284. Which of the following statements about emulsifiers is false?
285. What is the main component of lanolin?
286. Which of the following statements about silicones is false?
287. Which of the following is a biopolymer?
288. An extensive quantity:
289. For an ideal gas:
290. A cubic equation of state is a cubic polynomial because of:
291. The design composition of a product in the state of chemical equilibrium:
292. The thermodynamic yield of reaction $\eta$:
293. What is a solution?
294. Product $K_Y = \prod_{i=1}^{N} \gamma_i^{v(i)}$ (with $\gamma_i$ as the partial activity of component $i$, and $v(i)$ as the stoichiometric coefficient of the same component):
295. What is required to derive a formula for the analytic form of partial activity coefficient, $\gamma_i$?
296. Which of the following equations are currently used to calculate partial activity coefficient, $\gamma_i$?
297. A diathermic shield has the properties of:
298. The coefficient of compressibility which modifies the Clapeyron equation for real gases depends on:
299. What is the direction of change of specific heat in an ideal gas when temperature increases?
300. What is the value of specific heat in an isentropic process?
301. The Diesel cycle comprises:
302. What is the aridity degree?
303. The wet steam area in an i-s diagram:
304. The heat value:
305. The equilibrium of a flat arbitrary system of forces requires:
306. Friction does not depend on:
307. Which of these statements about the forces operating in a system is false?
308. A steel bar with a diameter of 20 mm is axially tensioned at 56 kN. What are the stresses in the cross-section of the bar?
309. The determination of critical force from Euler’s formula with buckling applies to:
310. What is the highest torsional moment a steel shaft with a diameter of 40 mm can withstand if $k_s = 30$ MPa?
311. What is the true statement about shafts and axles?
312. What is used to transmit drive between shafts of different axes of symmetry?
313. What are the processing zones in a tunnel furnace?
314. Dust separation from gases is feasible with the following:
315. The number of balls in a traditional ball grinder must:
316. Impeller pumps are applied when the following is required:
317. In granulators, material is agglomerated usually by:
318. The separation efficiency of a settlement chamber can be improved by installing:
319. Diffusers are installed in liquid mixers to:
320. Which forces provide the effect of dust extraction in dust chambers?
321. What are liquid dispensers?
322. What is the effect of overspeeding beyond the maximum frequency of revolutions in a drum ball grinder?
323. What is the duty of operation of jaw crushers?
324. What is the principle of operation of a jet mill?
325. What is the profile of the conveyor belt?
326. What is the type of motion of the actuator in a piston pump?
327. Do impeller pumps require priming before start?
328. What is the operating point of a compressor?
329. In resistance ovens, heat can be generated by electrical current which flows through:
330. A U-tube used to test the differential pressure of gas shows a difference of 17 mm between the water column height on both ends. What is the differential pressure (approximately) displayed by the U-tube? Ignore the effect of gas density on the indication.
331. Specify in which of the following cases the surface area of liquid remains unchanged while the vessel is emptied.
332. What should not be done to avoid cavitation in the suction line of a pump?
333. What should be done to prevent a mixed fraction during hydraulic grading?
334. What is the porosity of a granular bed?
335. Why does the rate of periodic filtration decrease during the process?
336. What are the basic types of heat flow?
337. What is a temperature gradient?
338. What does the Nusselt number describe?
339. Heat penetration is:
340. What is the heat capacity of a liquid?

341. What are the basic types of mass movements?

342. The penetration of a mass comprises:

343. What does the Sherwood number describe?

344. What is a perfect plate in a rectifying column?

345. What is the definition of wet bulb (WB) temperature?

346. How can the local stability of a stationary state be defined for a discrete dynamic object by using focused variables?

347. What is the operator transmittance of an object?

348. What are frequency responses of an object?

349. What is a closed loop automatic control system?

350. What is proportional speed control?

351. What is a thermocouple?

352. What noise characteristics contribute to hearing damage?

353. What is a dose?

354. The concentration of toxic chemicals shall be tested at least every six months if:

355. What are the personal protective equipment used during exposure to noise?

356. What engineering measures should have the priority in protection of people against exposure to particulates?

357. Mechanical hazards include:

358. Periodical medical examination of workers are performed:

359. The methods of calculating the phase equilibrium of liquid to vapour under the general designation $\phi - \gamma$:

360. The systems comprising the following need to be corrected for vapour phase association:

361. The T. K. WILSON model (which is the Tsuboka-Katayama modification of the Wilson equation) was developed for the purpose of calculating:

362. The vapour fugacity/Poynting correction:

363. How is the volume calculated for the formula of fugacity, $\phi_i$, derived from the SRK equation of state?

364. What should the data bank of each of the tested substances contain to calculate the liquid to vapour equilibrium with the Peng-Robinson equation of state?

365. What are BIPs, or binary interaction parameters, in a model based on the SRK equation of state?

366. The model of a regular solution:

367. What are the possible magnitudes for a properly defined flux?

368. The enthalpy calculation model designated:

369. A system includes several substances which react with one another by way of two parallel reactions. The conversions of both reactions are known. What reactor shall be used to model the reactions?

370. What the Gibbs reactor needs to be defined with?

371. The liquid density calculation model is applied for:
372. The equation of state-based methods for calculating liquid to gas phase equilibrium:
373. Which of the following magnitudes belongs to the minimum required data?
374. The AMINE model:
375. An equilibrium reactor:
376. The correction for water/hydrocarbon solubility shall be defined as immiscible:
377. A unit process is:
378. A unit operation is:
379. A high-ton-output process shall be performed in what type of processing?
380. Main or primary input or raw materials are materials which:
381. The key role in alloy steels (stainless steels) is attributed to:
382. What material is required to make a storage container for hydrofluoric acid?
383. What would you use for dust removal of particulates up to 10μm in grain size?
384. What would you use to grind sphalerite from the grain size of 1 mm to 0.1 mm?
385. What is a vacuum dryer useful for?
386. A pneumatic conveyor is useful for handling of:
387. What type of furnace would you design to produce cement clinker?
388. Choose which cyclone has the best performance.
389. Sampling and preparation of specimens for testing:
390. The method of test specimen sampling:
391. The validation of a test method:
392. What is bulk density?
393. Mineralization of a test specimen prior to testing involves:
394. The Kjeldahl method:
395. Understanding the natural coning angle of a test bulk material is essential to:
396. Methods of spectrophotometric determination of elements consist in:
397. X-ray fluorescence analysis (XRF) is an analytical method which can be used to:
398. Which is not an atmospheric layer?
399. What is the chemical released to the atmosphere by man-made sources?
400. What is the lowest atmospheric layer of the Earth?
401. Which of the following sensors used in exhaust gas analysers is subject to irreversible failure over time?
402. The temperature of a sampled gas specimen handled from the sampled point to an exhaust gas analyser shall be:
403. What is the purpose of a Peltier element in an exhaust gas analyser?
404. What needs to be known to convert the concentration of an exhaust gas component from ppm to mg/m$^3$?
405. A simultaneous of the oxygen and carbon dioxide concentrations indicated by an exhaust gas analyser during combustion of methane gas is partial to:
406. The effect of chemiluminescence is most often used in the following quantitative determination while analysing the most common gaseous pollutants in the air:
407. An analyser with a FID sensor for combined determination of organic chemicals requires the FID to be continuously supplied with:
408. The electrochemical cells used in quantitative determination of oxygen levels in exhaust gas work by redox with:
409. The maximum emission level of gas pollutants is regulated by the following instrument of the Polish Ministry of Environment:
410. A split and mix combined synthesis:
411. Which of the following statements about biotransformation is false?
412. Which of the following statements about a medicinal product is false?
413. Choose the true statement(s):
414. Typical homogeneous catalysts do not include:
415. What are the examples of homogeneous industrial processes with acidic catalysts?
416. What are the examples of homogeneous industrial processes with alkaline catalysts?
417. What are the examples of homogeneous industrial processes with catalysts comprising salts and/or complex compounds of transition metals?
418. What is the catalyst for the Wacker process?
419. What reactions are Grubbs' catalysts used in?
420. What are the possible products of O-alkylation?
421. What is an example of high-ton-output C-alkylation catalyzed with a mineral acid?
422. What is used in the production of LDPE?
423. Nylon-6.6 is:
424. Macromolecular epoxide compounds (like epoxidated fats for the production of polyols) are the product of a reaction between a unsaturated derivative and:
425. What is the catalyst in the Cyclopol-Bis process?
426. What are the input materials in the SOCHIO process?
427. What is the conversion of substrate A into a product?
428. What is the purpose of the method of nuclear coefficients?
429. The method of stoichiometric coefficients:
430. What is the selectivity of a process?
431. What is the contraction of a reaction?
432. What is the actual conversion for a 50% thermodynamic efficiency of a process with the conversion equilibrium of the substrate is at 80%?
433. What is the equation which describes the correct relationship between the constants of thermodynamic pressure, activity and pressure equilibrium?
434. What needs to be used to calculate a reaction enthalpy in non-standard conditions when the standard reaction enthalpy is known?
435. What is the catalyst in the OXO process?
436. What are the catalysts used in isobutane alkylation with olefins?
437. Acetic acid is commercially produced by oxidation of:
438. In the ethylene oxidation process by Wacker-Chemie:
439. What is the true statement about the processes of ethylene oxide production?

440. What is the true statement about the Halcon process of propylene oxide production:

441. The input materials in the cumene process of phenol production may include:

442. What are the possible products of nitrobenzene reduction?

443. Aniline is an important substrate in organic synthesis and can be produced by:

444. In the phosgenation process:

445. What are the chemical concepts of vinyl chloride production:

446. Which compound can be used as a polymerization initiator for methyl methacrylate?

447. What is the reaction of sulfonation of dodecylbenzene?

448. What is a viable catalyst for sorbitol dehydration?

449. What is SPAN?

450. What is the equation which describes the reaction rate of radical polymerization?

451. What is the sulfonation agent with the highest mass share of sulfur trioxide?

452. The sulfonation reaction depends on:

453. Sulphonic acids cannot be isolated from a post-reaction mixture by:

454. HNO₃ readily dissociates in small amount of water and forms nitrate ions. What is added to the mixture to prevent the formation of the ions?

455. The dehydrogenation reaction is facilitated by:

456. What is the inhibitor for styrene polymerization?

457. What is the general notation of transesterification (alcoholysis)?

458. Choose the true statement:

459. How is hydrogen cyanide produced?

460. In the process of transesterification of plant oils with methanol:

461. Phthalocyanines:

462. In amylohydrolysis:

463. Oil refining with extraction by urea is:

464. PMMA:

465. Poly(vinyl acetate):

466. Polyvinyl alcohol:

467. Polyvinyl acetics:

468. Unsaturated polyesters:

469. Polyamides:

470. Polyamide-6:

471. Novolak resins:

472. Isocyanate plastics:

473. Polyols:

474. Polymethyl methacrylate:

475. What is added to unsaturated polyester resins?

476. How are novolak resins crosslinked?

477. The block polymerization of methyl methacrylate:
478. What is polyamide-6,6 made from?
479. PET:
480. Poly(vinyl acetate):
481. What are the catalysts used in the synthesis of polyurethanes?
482. What is the most cost-effective method of producing hydrogen used in the synthesis of ammonia?
483. What is the main component of the acidic gas produced by natural gas desulfurization?
484. Identify the correct temperature of industrial ammonia synthesis:
485. Identify the pressure range most often used in ammonia synthesis:
486. What would be the temperature range for catalytic oxidation of ammonia to NO?
487. What is the most popular catalyst for ammonia oxidation?
488. What is the temperature range of combustion of sphalerite to produce SO\(_2\) in a fluidized bed furnace?
489. What is the temperature range of oxidation of SO\(_2\) to SO\(_3\) in the contact method?
490. During sulphuric acid production, SO\(_3\) is absorbed with:
491. What is the temperature range of SO\(_3\) absorption in sulphuric acid production?
492. What is the main input material in the Solvay soda process?
493. What is the temperature range of ammoniated brine carbonization during production of soda?
494. The gypsum binder (CaSO\(_4\)·0.5H\(_2\)O) produced in industrial processes from gypsum (CaSO\(_4\)·0.5H\(_2\)O) is formed in a temperature range:
495. What is the temperature range for the production of clinker from Portland cement?
496. What is the temperature range for the production of calcium oxide from limestone in shaft furnaces?
497. What is the primary fuel type in the Polish cement industry?
498. What is the maximum concentration of SO\(_2\) in the exhaust gas from the combustion of sulphur in atmospheric air?
499. What would you use to reduce NO\(_x\) emission to the atmosphere in medium-pressure nitric acid synthesis?
500. Which of the statements below is a correct definition of the bactericidal action of alcohols?
501. Lactic acid is an AHA. Underline the statement which is a correct characterization of the role of lactic acid in cosmetic and beauty products.
502. Chemistry-wise, phospholipids are: