Questions from the "PAL Prüfungsbuch"
Stoichiometry

157: At ϑ = 25°C a solutions pH is 10.65. Which concentration of substance *c*(OH-) in mol/L has this solution?

1) *c*(OH^-) = 3.35 mol/L
2) *c*(OH^-) = 10.65 mol/L
3) *c*(OH^-) = 2.24 * 10^{-11} mol/L
4) *c*(OH^-) = 4.47 * 10^{-4} mol/L
5) *c*(OH^-) = 1.00 * 10^{-10} mol/L

162: 500 g sodium hydroxide solution, *w*(NaOH) = 30,0 % are to be produced by mixing a sodium hydroxide solution, *w*(NaOH) = 42.0 % and water. Determine the weight in grams of the required sodium hydroxide solution, *w*(NaOH) = 42.0 %.

1) 207 g
2) 210 g
3) 259 g
4) 293 g
5) 357 g

163: 48 kg sulfuric acid, *w*(H_2SO_4) = 12 % are to be produced from water and sulfuric acid, *w*(H_2SO_4) = 96 %. Determine the weight in kilograms of the required sulfuric acid, *w*(H_2SO_4) = 96 %

1) 3.8 kg
2) 4.6 kg
3) 5.5 kg
4) 5.8 kg
5) 6.0 kg

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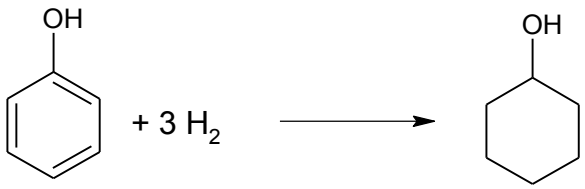
168: 1.5 kilograms of an organic matter are to be entirely burnt up. The analysis of the compound show the following mass percentages: *w*(C) = 83.7 %, *w*(H) = 16.3 %. How many cubic metres of air, $\varphi(O_2)$ = 20.8 % (normal state) are necessary, when working with a level of excess air of 40.0 %?
M(C) = 12.0 g/mol; M(H) = 1.0 g/mol;
$V_{mn}(O_2)$ = 22.4 L/mol

1) 15 m³
2) 18 m³
3) 25 m³
4) 34 m³
5) 53 m³

169: Cyclohexanal, m = 500 kg is to be produced by hydrogenation of phenol. How many cubic metres of hydrogen (normal state) are necessary, when working with a hydrogenation yield of 90.0% and a hydrogen excess of 15.0 %?



M(C) = 12.0 g/mol; *M*(H) = 1.0 g/mol
M(O) = 16.0 g/mol; $V_{mn}(H_2)$ = 22.4 L/mol

1) 370 m³
2) 386 m³
3) 397 m³
4) 425 m³
5) 429 m³

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170: 7.2 mol Iron are to be transposed to ferrous(III)-sulphate, $Fe_2(SO_4)_3$. How many litres of sulphuric acid $c(H_2SO_4)$ = 3.0 mol/L are necessary when working with a sulphuric acid excess of 25 %?
M(Fe) = 55.85 g/mol
$M(Fe_2(SO_4)_3)$ = 399.87 g/mol
$M(H_2SO_4)$ = 98.07 g/mol

1) 3.0 L
2) 3.6 L
3) 4.5 L
4) 4.8 L
5) 9.0 L

171: m = 250 kg fatty alcohol ($C_{16}H_{33}OH$) is to be produced by hydrogenation of $C_{16}H_{29}OH$. How many cubic metres H_2 (standard conditions) are necessary when working with a yield of 80% and a hydrogen excess of 20 %?
$V_{mn}(H_2)$ = 22.4 L/mol; M(C) = 12.0 g/mol
M(H) = 1.00 g/mol; M(O) = 16.0 g/mol

1) 4.4 m³
2) 69.4 m³
3) 70.6 m³
4) 72.3 m³
5) 73.6 m³

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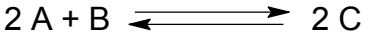
173: 100g $Na_2SO_4 \cdot 10\ H_20$ are to be dissolved in water. How many grams of water are necessary to obtain a solution with a mass percentage $w(Na_2SO_4)$ = 5.00 %?
M(S) = 32.0 g/mol
M(H) = 1.00 g/mol
M(Na) = 23.0 g/mol
M(O) = 16.0 g/mol

1) 78.2 g
2) 177 g
3) 782 g
4) 838 g
5) 1900 g

181: The following concentrations of substance of raw material and product of the reaction



are existent in an equilibrium.

c(A) = 0.100 mol/L; *c*(B) = 0.200 mol/L
c(C) = 0.800 mol/L

What is the equilibrium constant *K* (in L/mol) of this reaction?

1) K = 4.00 L/mol
2) K = 32.0 L/mol
3) K = 40.0 L/mol
4) K = 320 L/mol
5) K = 400 L/mol

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183: The used raw material quantities for an esterification reaction are n_B = 2.00 mol benzoic acid and n_E = 10.0 mol ethanol. n_{Es} = 1.40 mol ester are existent in the state of equilibrium of this reaction. What is the equilibrium constant *K* of this esterification reaction?

1) K = 0.102
2) K = 0.271
3) K = 0.380
4) K = 2.63
5) K = 10.2

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