Questions from the "PAL Prüfungsbuch"
Stoichiometry – Part 2

451: In the course of the titration of m_E = 0.2500 g iron ore with potassium permanganate solution $\tilde{c}(\frac{1}{5}\ KMnO_4)$ = 100 mmol/L accidentally to much standard solution was applied. Therefore m_M = 500.0 g Mohr salt, $Fe(NH_4)_2(SO_4)_2 \cdot 6\ H_20$, was added to the solution. The tritration was continued. A total of V = 33.30 mL potassium permanganate solution was consumed. How much iron was contained in the ore?

M(Fe) = 55.80 g/mol
$M(Fe(NH_4)_2(SO_4)_2 \cdot 6\ H_20)$ = 392.0 g/mol
$MnO_4^- + 5\ Fe^{2+} + 8\ H^+ \rightarrow Mn^{2+} + 5\ Fe^{3+} + 4\ H_20$

1) 22.9 %
2) 24.8 %
3) 38.3 %
4) 45.8 %
5) 74.3 %

456: For the determination of the acid value m = 1.251 g of an oil are dissolved in neutralized alcohol and then titrated with V = 22.3 mL KOH, $\tilde{c}$ (KOH) 0.1 mol/L, t = 1.0000, against phenolphthalein. What is the acid value AV (in mg/g)?

M(KOH) = 56.1 g/mol

1) AV = 50.0 mg/g
2) AV = 124 mg/g
3) AV = 125 mg/g
4) AV = 100 mg/g
5) AV = 155 mg/g

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459: What is the equivalent concentration c_{eq} (in mol/L) of an ammonia solution that contains 400 L gaseous NH_3 per litre under normal conditions?

V_{mn} = 22.4 L/mol
$M(NH_3)$ = 17.031 g/mol

1) c_{eq} = 0.895 mol/L

2) c_{eq} = 1.19 mol/L

3) c_{eq} = 1.79 mol/L

4) c_{eq} = 11.9 mol/L

5) c_{eq} = 17.9 mol/L

462: For titer determination of a potassium permanganate solution $\tilde{c}(\frac{1}{5}\ KMnO_4)$ = 0.1 mol/L, m = 0.2180 g sodium oxalate $Na_2C_2O_4$ are weighed in. After disolving in water and addition of sulphuric acid the titration with permanganate solution is carried out. Consumption: V = 31.80 mL. What is the titer of the potassium permangante solution?

$2\ MnO_4^- + 5\ C_2O_4^{2-} + 16\ H^+ \rightarrow 2\ Mn^{2+} + 10\ CO_2 + 8\ H_2O$
$M(Na_2C_2O_4)$ = 134.0 g/mol

1) t = 0.977

2) t = 1.008

3) t = 1.023

4) t = 1.063

5) t = 1.229

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464: For the complete neutralisation of 298.5 g oxalic acid-2-hydrate, $H_2C_2O_4 \cdot 2\ H_20$, a volume V = 24.3 mL caustic soda, $\tilde{c}(\frac{1}{1}\ NaOH)$ = 0.2 mol/L is necessary. What is the titer of the sodium hydroxide standard solution?

$M(H_2C_2O_4 \cdot 2\ H_20)$ = 126.066 g/mol

1) t = 0.513

2) t = 0.974

3) t = 1.026

4) t = 1.306

5) t = 1.949

466: A KOH with the substance concentration of $\tilde{c}(\frac{1}{1}KOH)$ = 1.000 mol/L is to be prepared. What is the titer t of the KOH if the mass concentration β(KOH) = 56.25 g/L?

M(KOH) = 56.1 g/mol

1) t = 0.6951

2) t = 0.9973

3) t = 1.0000

4) t = 1.0026

5) t = 1.4386

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469: 50.0 mL of an Fe^{2+}-containing solution consumes *V* = 24.6 mL potassium permanganate when titrated.

$\tilde{c}(1/5KMnO_4)$ = 0.1 mol/L, *t* = 0.986

What is the mass concentration $\beta(Fe^{2+})$ in g/L of the employed solution?

M(Fe) = 55.847 g/mol

1) $\beta(Fe^{2+})$ = 1.35 g/L

2) $\beta(Fe^{2+})$ = 2.71 g/L

3) $\beta(Fe^{2+})$ = 4.06 g/L

4) $\beta(Fe^{2+})$ = 5.41 g/L

5) $\beta(Fe^{2+})$ = 6.77 g/L

481: The pH-measurement of a water sample results in a pH-value of 7.5. What is the mass concentration $\beta(H_3O^+)$ in µg/L?

$M(H_3O^+)$ = 19 g/mol.

1) $\beta(H_3O^+)$ = 0.32 µg/L

2) $\beta(H_3O^+)$ = 0.60 µg/L

3) $\beta(H_3O^+)$ = 7.5 µg/L

4) $\beta(H_3O^+)$ = 0.75 µg/L

5) $\beta(H_3O^+)$ = 0.032 µg/L

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